

ICD 08241

Amateur Radio

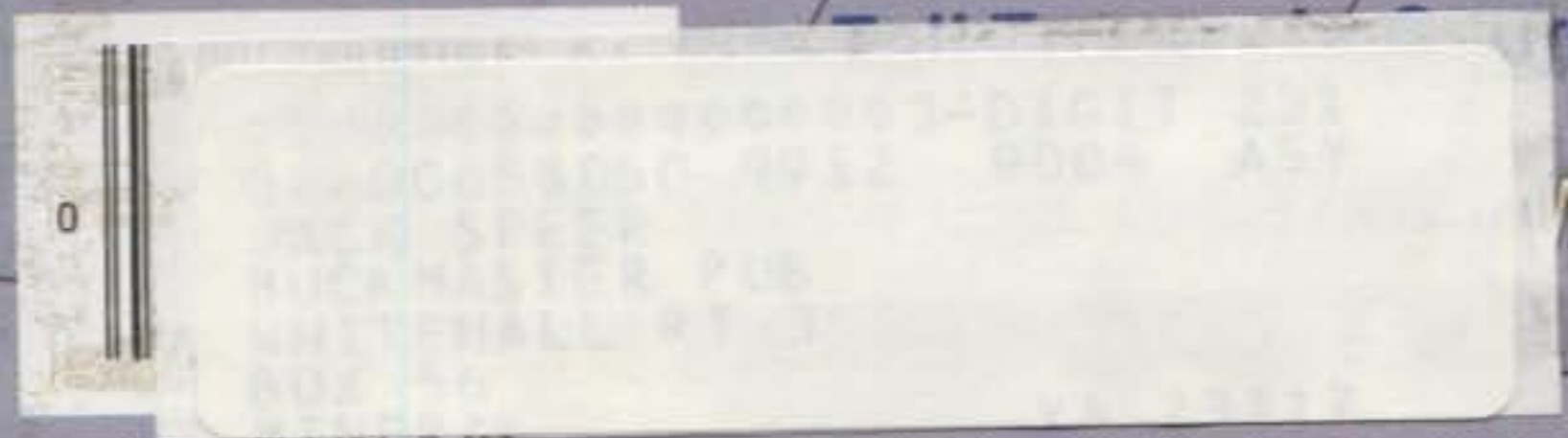
SERVING AMATEUR RADIO SINCE 1945

APRIL 1990 \$2.50

CANADA \$3.50



BULLETIN!
FCC Proposes
New Code-Free
Amateur License.
See page 13.



AMATEUR'S JOURNAL

KENWOOD



TS-950SD

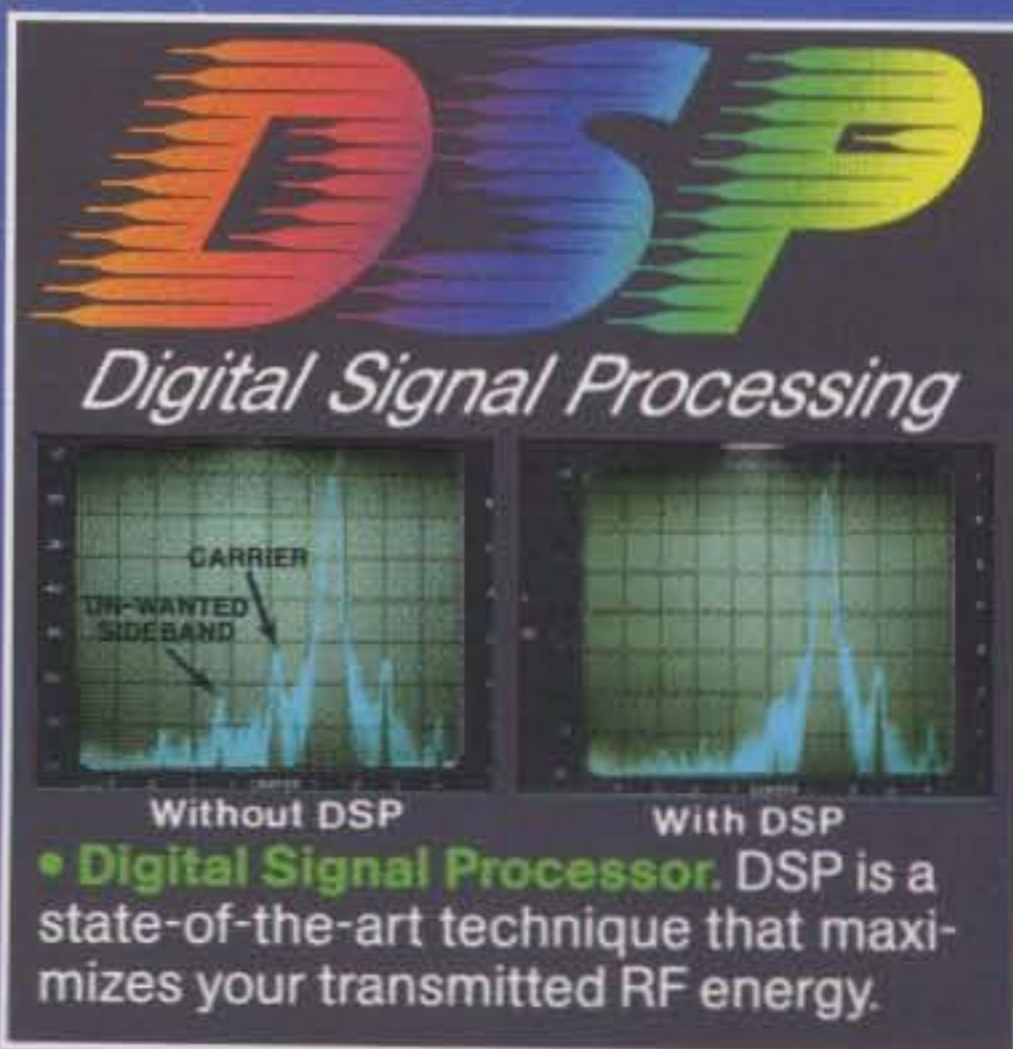
"DX-clusive" HF Transceiver

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.

- **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. Specifications, features and prices subject to change without notice or obligation.

The Ultimate Signal.



• **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

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
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TM-731A/631A 144/450 and 144/220 MHz FM Dual Banders

- **Extended receiver range** (136.000 – 173.995 MHz) on 2 m; 70 cm coverage is 438.000 – 449.995 MHz; 1-1/4 m coverage is 215 – 229.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144 – 148 MHz. Modifiable for MARS/CAP. Permits required.)
- **Separate frequency display for "main" and "sub-band."**
- **Versatile scanning functions.** Dual scan, and carrier and time operated scan stop.
- **30 memory channels.** Stores everything you need to make operating easier. Two channels for "odd splits."
- **50 Watts on 2 m, 35 watts on 70 cm, 25 watts on 1-1/4 m.** Approx. 5 watts low power.
- **Automatic offset selection.**
- **Dual antenna ports.**
- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **CTCSS encode/decode selectable from front panel or UP/DWN keys on microphone.** (Encode built-in, optional TSU-6 needed for decode.)
- **Balance control and separate squelch controls for each band.**

- **Full duplex operation.**
- **Dimmer switch.**
- **16 key DTMF/control mic. included.**
- **Frequency (dial) lock.**

Optional Accessories:

- **PG-4H** Extra interface cable for IF-20 (for three to four radios)
- **PG-4J** Extension cable kit for IF-20 DC and audio
- **PS-430** Power supply
- **TSU-6** CTCSS decode unit
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **SP-41** Compact mobile speaker
- **SP-50B** Deluxe mobile speaker
- **PG-2N** DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** Base station mics.
- **MA-700** Dual band 2 m/70 cm mobile antenna (mount not supplied)
- **MB-11** Mobile bracket
- **MC-43S** UP/DWN hand mic.
- **MC-48B** 16-key DTMF hand mic.

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"Dynamic Duals"



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Affordable DX-ing!

TS-140S/680S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. (Receiver specifications guaranteed from 500 kHz to 30 MHz.) Modifiable for HF MARS operation. (Permit required).
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.
- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.

- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.
- **M.CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.



- **Selectable full (QSK) or semi break-in CW.**
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

Optional Accessories:

- **AT-130** compact antenna tuner
- **AT-250** automatic antenna tuner
- **HS-5/HS-6** headphones
- **IF-232C/IF-10C** computer interface
- **MA-5/VP-1** HF mobile antenna (5 bands)
- **MB-430** mobile bracket
- **MC-43S** extra UP/DOWN hand mic.
- **MC-55** (8-pin) goose neck mobile mic.
- **MC-60A/MC-80/MC-85** disk mics.
- **PG-2S** extra DC cable
- **PS-430** power supply
- **SP-41/SP-50B** mobile speakers
- **SP-430** external speaker
- **SW-2100** SWR/power meter
- **TL-922A** 2 kW PEP linear amplifier (not for CW QSK)
- **TU-8** CTCSS tone unit
- **YG-455C-1** 500 Hz deluxe CW filter
- **YK-455C-1** New 500 Hz CW filter.

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TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Pre-amplifier for 6 and 10 meter band.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

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The Radio Amateur's Journal



ON THE COVER: CQ Photographer Larry Mulvehill, WB2ZPI catches Steve McElroy, K4JPD at the 160' point on the tower bearing his 2-element 80-meter yagi.

APRIL 1990

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ZERO BIAS

EDITORIAL

It was a long time in between, but the other shoe has finally dropped. The FCC has come through with their proposal for a code-free amateur license, their second proposal on the subject in six years. You can read the details on this proposal in W5YI's special article on page 13.

To refresh your memory, the first proposal had the proviso of losing the bottom 2 MHz of 220 MHz if the proposal was defeated (which it was, and we did). The first time through amateurs were disbelieving, indignant, and fond of saying "You can't do that to me." That's sort of what you hear people say their first morning in the army, but by the afternoon they no longer say that. In our case, we spent thousands (or so it seems) of dollars, countless man-hours, and reams of paper fighting the inevitable. In our May 1984 issue, then PRB Chief Robert S. Foosner told us exactly what would happen down the road. He was right. They can do that to us.

There are no more shoes to drop. Whatever becomes of this proposal has our future tied tightly to it. Cellular phones need more frequencies, HDTV is going to need more room, and a rather unique proposal out of Newington could mean more foreign broadcasting on 20 and 40 meters. Wherever you look, there is some group or another breathing down hard on amateur radio spectrum. Always remember: We don't own the bands and we don't determine their future. We are on the receiving end of our government's largesse.

So what about this proposal? It's obvious that some of us won't like it and some will feel it doesn't go far enough. There is a six-month comment period which should give people enough time to make their feelings known. It is also obvious that there are shortcomings which will impact the hobby. What the proposal does say or imply is that either we open up and grow in some reasonable manner or all bets are off. We in all likelihood will no longer be welcome at the well, and amateur radio as we know it will be chipped and eroded away. The master switch on benevolence works both ways.

I have to admit that the rationale behind eliminating the Novice and Technician licenses is totally obscure. These two classes of license represent the largest and possibly most active segment of amateur radio. Perhaps this move is just to see how serious we are about these two grades of amateur license. Will there be a "fight" to save them or any con-

certed effort to have these two classes remain? I should hope so. Perhaps it is just a bargaining chip to assure passage. If it is not an issue open for discussion, then our fragile amateur radio industry could be in for some hard times.

These days Novices and Technicians, who make up just about a simple majority of amateurs, seem to be the ones who are buying new HF gear. Take away that market and install a potential market for gear that everyone is afraid to make during these times and what does that leave? 220 MHz is sensitive enough, but with cellular phone growth and frequency congestion, there will be pieces undoubtedly cut out of 900 and 1200 MHz in due time.

After you read W5YI's report, you will also notice another anomaly. When our Communicator Class amateur does decide to upgrade to a nine-character call sign by passing a code test, he or she will be upgraded to a class of license that doesn't exist anymore. So, it does look like there is some room for a bit of give and take in this proposal and that a final ruling is likely to be somewhat different from this proposal.

What is clear, though, is the underlying message "You asked for it, so here it is." We will have to work out something and implement some form of code-free license that will attract new people to amateur radio. I don't think that anyone has to be polite and wait for the "or else" to be said, anymore than the average recruit waits for the drill sergeant to say it. You just know.

There are those who will argue that any opposing view can be adjudicated in the courts. Their philosophy also includes an idea that we can fight for whatever piece of "turf" we use that industry wants. Via the legal system we can make it very expensive to take each segment. Reality says that whoever the potential adversary is, they have more money to expend. This is a simple deduction based on the fact that if they succeed, they will be able to market via that frequency a product or service that will generate enough income, and then some, to make the initial expense worthwhile. We, on the other hand, will expend a huge amount of money (for us) to try to save a group of frequencies that most amateurs will not use. If we were fortunate to win a protracted legal battle, we still would not be able to generate enough income to pay for the battle.

At this point there is some merit to the logic that various commercial industries could seek amateur frequencies continually (and see the financing for these efforts returned in short order), whereas with all of our resources (including the ARRL) we could not. It's simple economics.

I think, or I'd like to believe at this point, that the government is saying to us, "How serious are you about a code-free license? How serious are you about growth?" If we don't see the need or shrug it off as simply industry greed, then amateur radio as we know it will become just a phase in history. If everyone who is licensed today sits back feeling smug via their "grandfathered status" and says, in effect, "I've got mine," then whatever constitutes "mine" can never be inherited or passed on. We're coming to a time in history when we have to make choices which will affect the future of amateur radio—or even if there will be a future.

Unlike the ostrich, we can't bury our heads in the sand pretending that there's nothing there. We are a minority trying to stop or even slow down progress. We don't have the weight of social injustice on our shoulders, nor the right to use it as a banner. The ARRL has taken not only the right step, but also the courageous step of endorsing a code-free license in their petition. However hard some of us may kick and scream, we are trying to move forward to ensure growth, and most of all to ensure a future.

Times Sure Have Changed

The other day Dick came into my office to show me a picture in the February issue of *Florida Skip*. The picture was on the back cover and ran across both columns. Dick commented on how things have changed. The picture showed the members of the Dade Radio Club circa early 1950s. Of the almost 50 people shown, most seem to be in their teens and early 20s. A few look a bit older and a few look a bit younger, but the apparent median age of this group is less than half of the current median age of amateurs. Somewhere along the line something happened to this club and to many others. We amateurs of that generation grew up and "matured," and new, young potential members found something else to do.

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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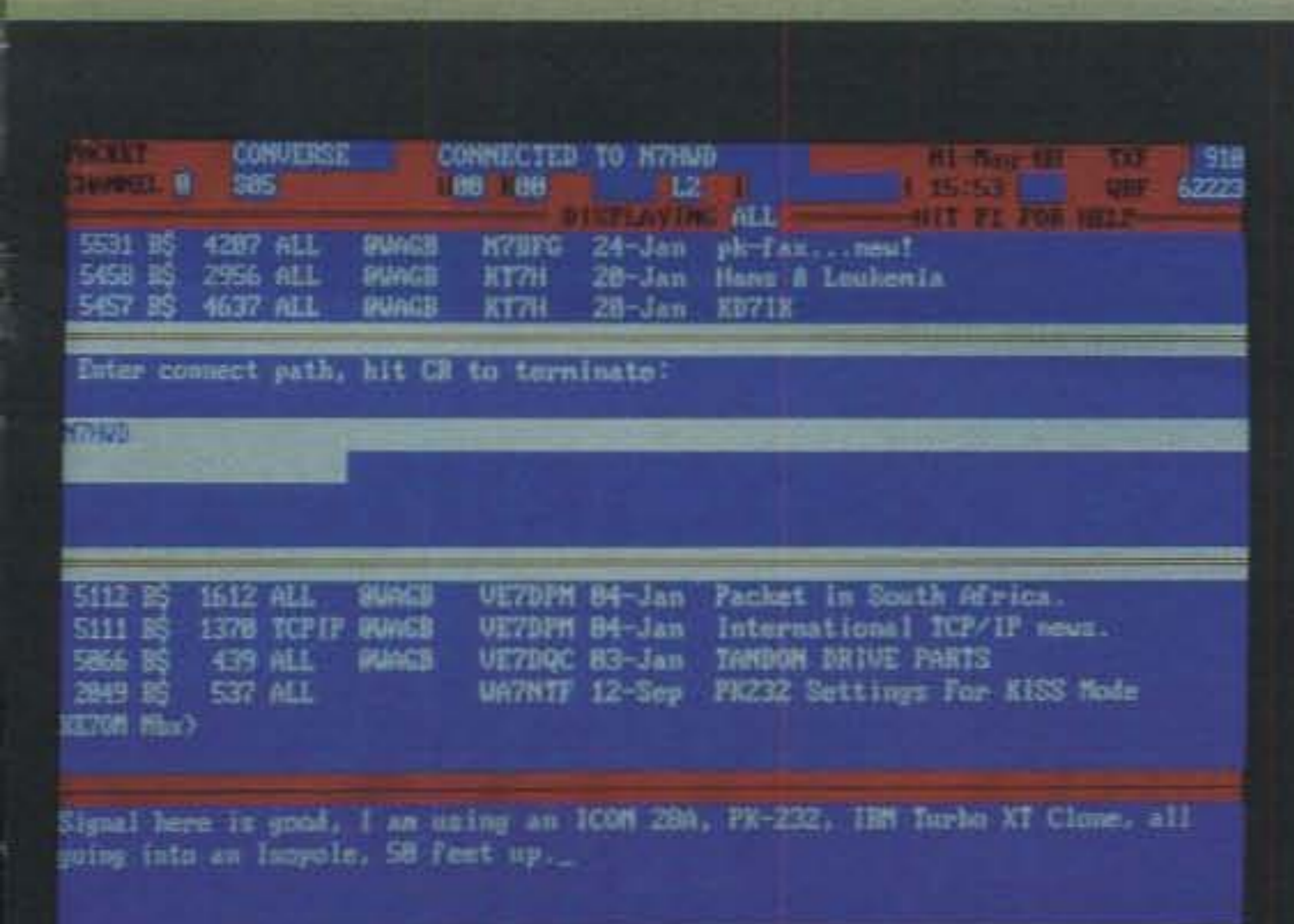
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206-775-7373

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CIRCLE 96 ON READER SERVICE CARD



Signal here is good, I am using an ICOM 280A, PK-232, IBM Turbo XT Clone, all going into an Isopylo, 58 feet up...

ANNOUNCEMENTS

• **VHF Technical Programs** - The Central States VHF Society Conference will be held in Wichita, Kansas in July. The society is calling for technical programs to be presented at the conference. Programs can range from 15 minutes to one hour. Persons wishing to present programs at the conference should contact Jon Jones, NOØY, 1116 Gatewood Court, Wichita, KS 67206.

• **Foundation for Amateur Radio Scholarships** - Thirty-three scholarships for the academic year 1990-91 will be awarded to licensed radio amateurs by this organization. Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted by an accredited university, college, or technical school. Some of the scholarships require a general class license or higher. Additional information and an application may be requested by letter or QSL card, postmarked prior to May 31, from FAR Scholarships, 6903 Rhode Island Ave., College Park, MD 20740.

• **AEA's Amateur Ambassador Award** - Advanced Electronic Applications, Inc. is accepting applications for its 1990 Amateur Ambassador Award. The award will be presented to the radio amateur who demonstrates extraordinary effort in promoting the amateur radio service to individuals new to amateur radio. The award includes a \$1000 cash prize and round-trip airfare, accommodations, and meals to the ARRL National Convention in Kansas City, Missouri, June 8-10, 1990. Nominees are judged by the following criteria: dedication to amateur radio; positive influence on new ops; and initiation of special projects or programs to promote amateur radio. To nominate any licensed radio amateur, send a letter of nomination to AEA, P.O. Box 2160, Lynwood, WA

98036. Include both the nominee's and your name, address, and phone number, and an outline of the nominee's activities (being as specific as possible); limit materials to three pages maximum. All entries must be postmarked by May 1.

• **MOARC VE Exams** - The Madison-Oneida ARC holds VE exams on the third Friday of every month at the Madison-Oneida BOCES, Verona, New York. The contact VE is Leonard Popyack, WF2V, telephone 315-853-8974.

• **Southeastern Virginia Exam Schedule** - May 5, Portsmouth ARC (ARRL exam), contact Art Thiemens, AA4AT, 484-2857; May 19, Hampton Roads Radio Assn. (W5YI exam), Bill Runyon, N4BDH, 487-8611; June 2, Virginia Beach ARC (ARRL exam), Tom Weikel, KA4UNC, 340-7697; July 14, Chesapeake DX Assn. (W5YI exam), Bill Verebely, KC4YX, 424-4764. Walk-ins okay, but contact would like to know in advance that you are coming for the test. Bring original and photocopy of your license and any license upgrade certificates.

• **Special events for April:**

NT1I, from Islands on the Air mini-DXpedition, Martha's Vineyard, MA (counts for NA-46); March 31 to April 2; 80-10 meters, phone on the lower portion of the General bands. QSL via NT1I.

WA3DFU/3, from Delaware; Warminster ARC, April 8; SSB 7.275, 14.275, 28.375, CW contacts on request. QSL with SASE to Warminster ARC, Box 113, Warminster, PA 18974.

W4DW, from 200th anniversary of the U.S. Coast Guard, Manteo, NC; Raleigh ARS and Outer Banks Repeater Assn.; 1200Z April 28 to 1500Z April 29; General portion of all bands, Novice portion of 10 meters. For QSL send #10 SASE to RARS, P.O. Box 17124, Raleigh, NC 27619.

W4UCJ, 69th Annual Rose Festival, Thomasville, GA; Thomasville, GA ARC; 1830 April 27 and 1530-2300Z April 28; Novice SSB portion of the 10 meter band, CW in General portion of 75/80, 40, or 20 meters. For certificate send SASE to Thomasville ARC, P.O. Box 251, Thomasville, GA 31799.

K4RQQ, from submarine *USS Drum*, Mobile AL; Mobile ARC; 1400-2400Z April 11; 3.965, 14.260, 21.360, 28.360, local 2 meter repeaters. For certificate send QSL and 9 x 12 SASE to Murray Flanders, K4RQQ, 9075 Howells Ferry Rd., Semmes, AL 36575.

NG5A, from 75th anniversary of SW Baptist Theological Seminary School of Religious Education, Fort Worth, TX; campus ARC; 1400-0000Z April 2, 3, 4; 28.375, 21.375, 14.375, plus/minus QRM. For QSL send SASE and QSL to Southwestern Baptist Theological Seminary, P.O. Box 22068, Fort Worth, TX 76122.

KC7YL, Fort Pillow State Park, Lauderdale County, TN; Tipton County ARES Club; 0200Z April 7 to 2200Z April 8; 2, 10, 15, 20 meters with suggested freqs 28.375, 21.375, 14.275, 146.540, and CW 28.200, 21.150, 14.100, RTTY on 10 and 20 meters. For certificate send QSL and large SASE to WB4DPL, P.O. Box 402, Covington, TN 38019.

K8DAC, Ojibway Island DXpedition; Saginaw Valley, Michigan ARA; beginning April 1 from 1400-2300Z; SSB 3.875, 7.275, 14.260, 21.375, 28.400, CW homebrew QRP in the Novice portion of 80 meters. For certificate and QSL, send QSL and SASE to K8DAC, SVARA, P.O. Box 1783, Saginaw, MI 48605.

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(continued on p. 94)

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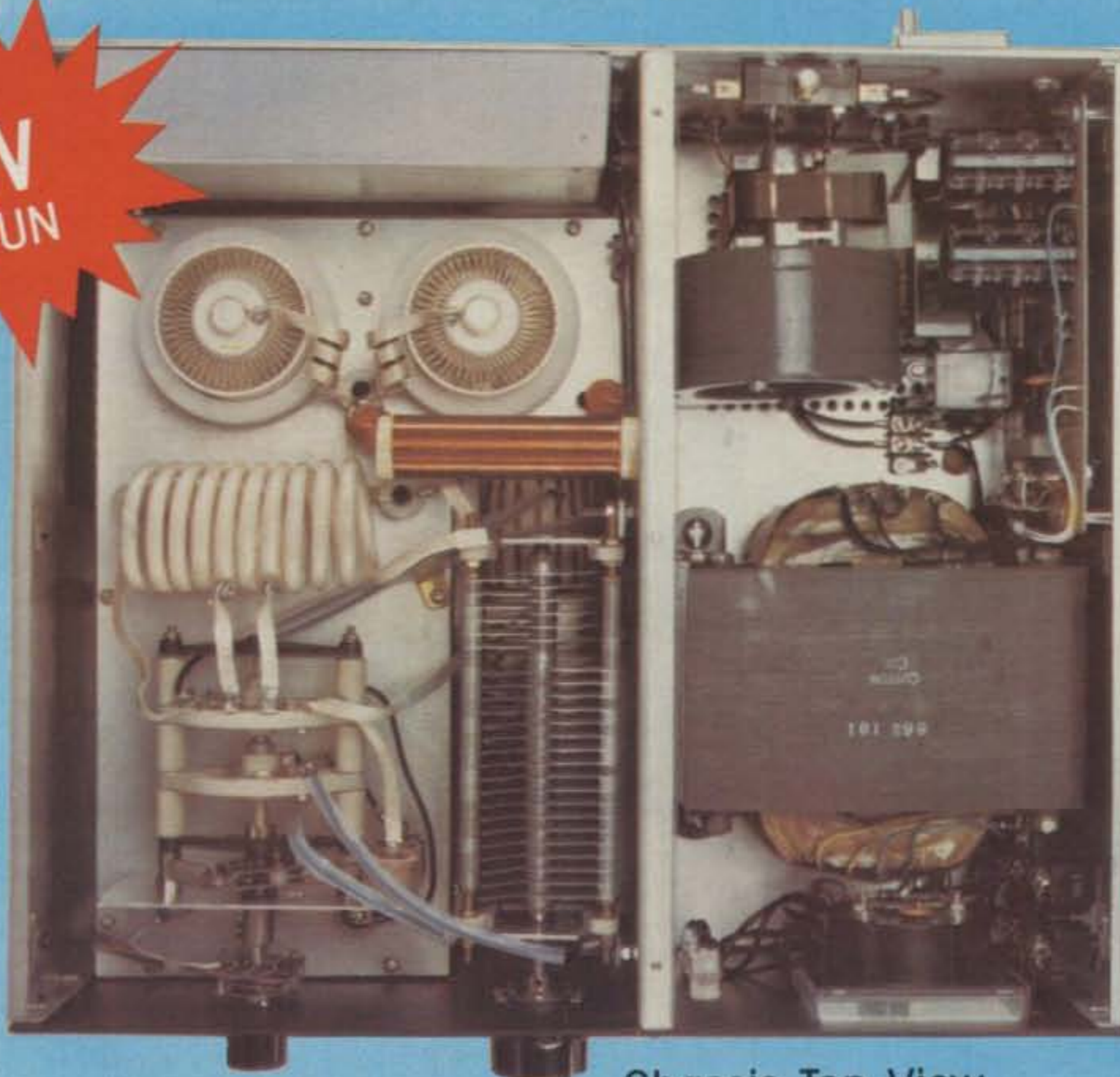
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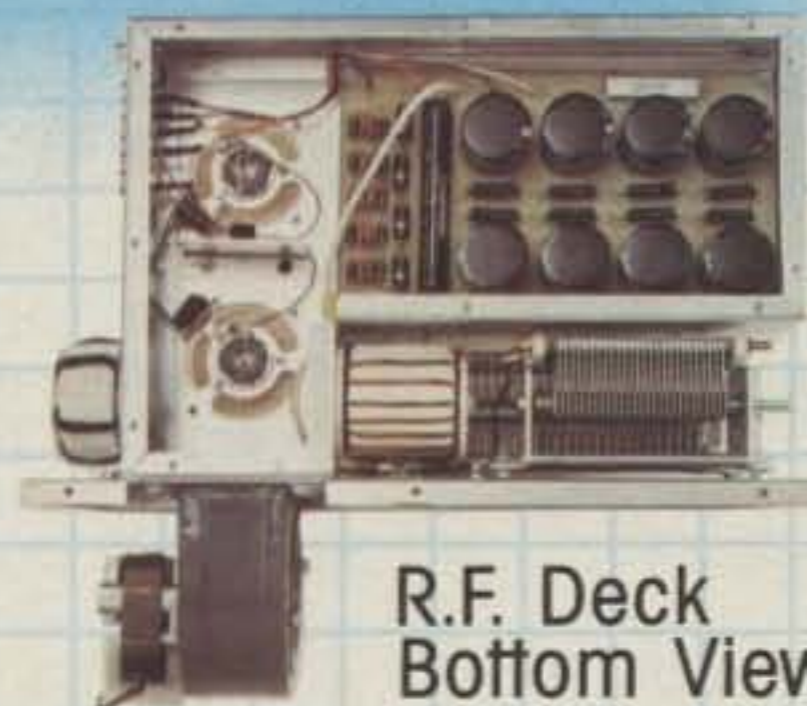
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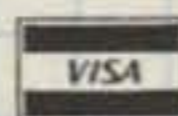
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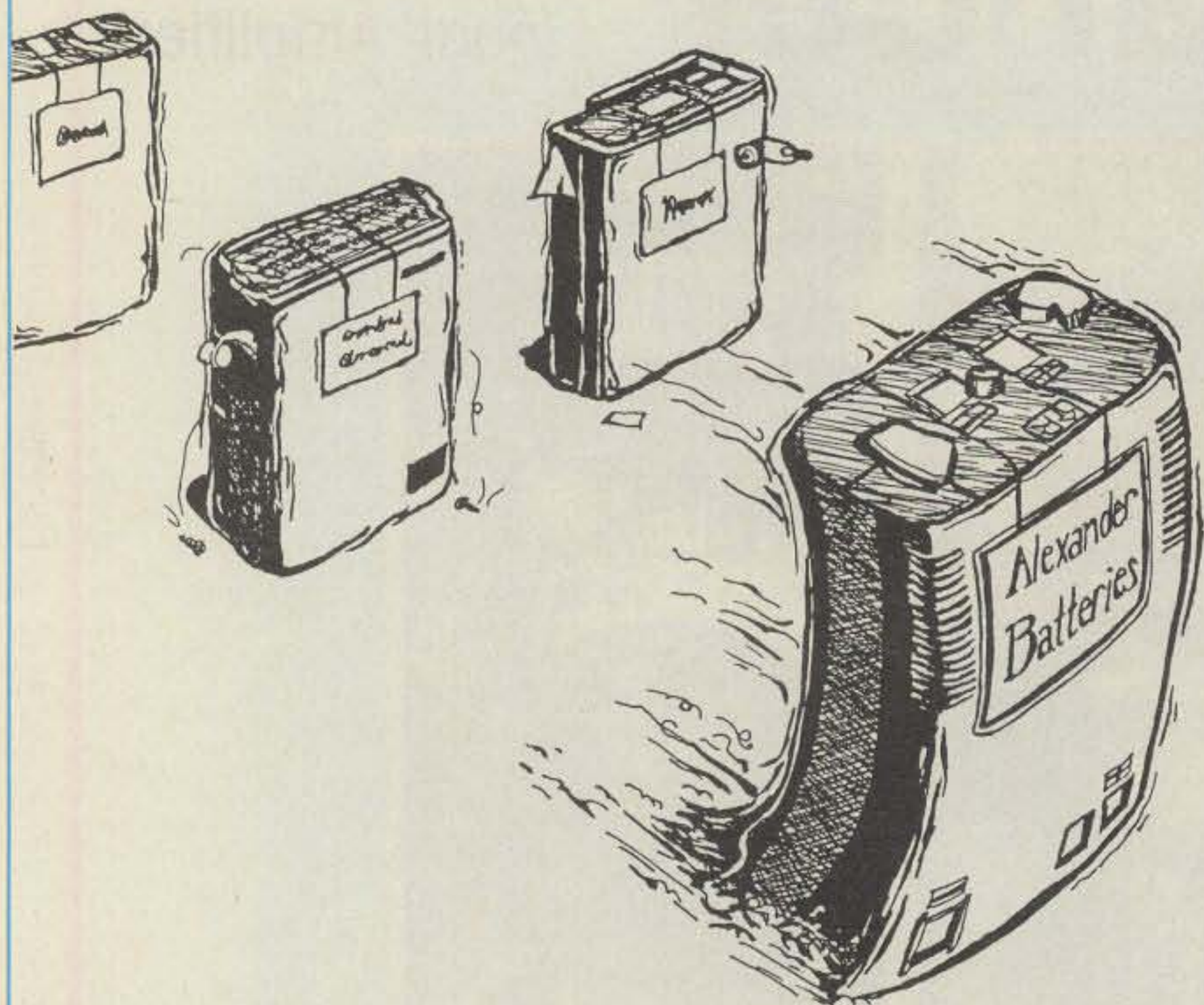
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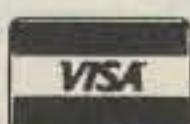
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OUR READERS SAY

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Editor, CQ:

As a CQ Awards checkpoint person, I was amused at the license plate I saw (see photo)



while visiting in Lexington, Kentucky (for the marriage of KA4POS). As far as I know, this is a regular issue plate. Gee, I didn't know there were so many zones!

Bob May, K4SE
Jonesboro, TN

Mixed Message

Editor, CQ:

Last year during Hurricane Hugo amateur radio received much well-deserved, positive attention for providing the main and sometimes the only link with devastated areas. Sadly, the news media often saw the darker side of hams, too—deliberate interference, lack of any semblance of self-control, and frequent use of abusive language.

In our area I was inundated with both the news media and people desperately trying to contact family and friends in the Virgin Islands. While the news media saw the hams relaying vital messages from the center of destruction as the hurricane hit, they also heard one ham, supposedly from Florida, claim that the stations were really drug dealers trying to arrange illegal drug drops.

Unfortunately, while one can always excuse the actions of a few emotionally unstable individuals, the worse example of amateur radio came from a group of obviously licensed, proper hams on Wednesday morning at 7:30 AM EDST. With the local media present and recording I heard the weak signal of Steward, a visiting amateur on St. Croix, who had been frequenting one frequency (14.306) for several days. Stu called for someone to pick up some emergency traffic that he had and I quickly came back to his plea. I offered to take his emergency traffic, but was soon greeted by a much stronger signal who informed me that I was operating on "his frequency" and that he and a few friends were chatting with another amateur in Europe. With camera recording I quickly explained that I was answering the emergency call of a station in the devastated areas of St. Croix with emergency traffic. While I had expected the ham to quickly offer his assistance, too, I was promptly informed that there are nets for that and "PLEASE CLEAR MY FREQUENCY!"

With some difficulty Stu was able to move to another frequency and a dozen pieces of emergency traffic were relayed around the United States, including a direct link between a

(continued on p. 95)

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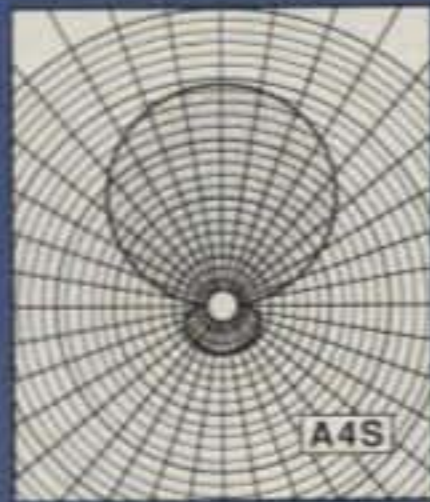
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●Coaxial cable : None



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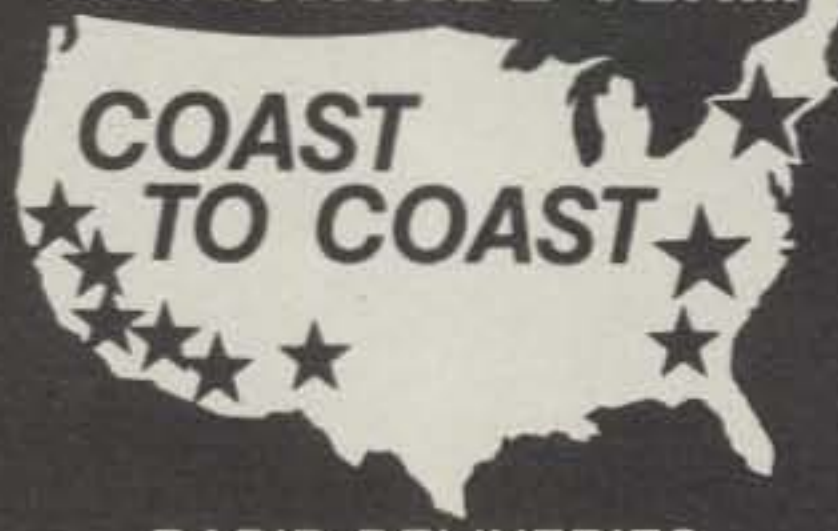
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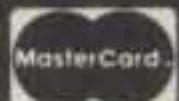
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Bulletin: **FCC Proposes Codeless Class Of Amateur Operator License (PR Docket 90-55)**

BY FREDERICK O. MAIA*, W5YI

At their regular Commissioner's meeting on February 8th, the FCC proposed to adopt a new Communicator class of amateur operator license not requiring code proficiency. The Communicator Class

would be incorporated into a simplified licensing structure containing four ascending steps: (1) Communicator, (2) General, (3) Advanced, and (4) Amateur Extra classes.

The current Novice and Technician classes would be discontinued, but current licensees could renew and modify their licenses indefinitely. Thus, the Communicator class license would replace

two existing beginner operator classes and would streamline the amateur operator license structure.

The codeless operator class license would satisfy three major objectives. The first objective is to offer an entry-level license for all persons who find telegraphy a barrier to pursuing the purpose of the amateur service. The second objective is to design a codeless license that can easily be implemented into the current licensing process. The third objective is to avoid any negative effect upon current licensees, the volunteer examiners who administer amateur examinations, and the Commission's workload.

The international rules state that the amateur service exists for the purpose of self-training, inter-communication, and investigations to be carried out by duly authorized persons interested in radio technique solely with a personal aim, and without financial gain.

International law requires individuals seeking a license to operate an amateur station to prove that they can send correctly by hand and receive correctly by ear text in Morse code signals. Although this requirement may be waived for an operator of an amateur station transmitting only on frequencies above 30 MHz, each of the five classes of operator licenses issued by the Commission requires the applicant to pass an examination in the international Morse code.

The Communicator class operator license would not require knowledge of Morse code telegraphy messages. Privileges for the Communicator class would include all modes and emission types. The Commission would require applicants for the Communicator class license to pass a 60-question written examination. The Communicator test would consist of 30 Novice questions, 25 Technician questions, and 5 new questions. The questions on the examination would come from the pools of questions now used by the Novice and Technician licenses plus a few new questions, no doubt designed to assure that the candidate is at least aware of the existence of Morse code.

The Communicator would be tested through the so-called VE/VEC System which requires three accredited examiners. As the Communicator would replace the Novice license, this would bring all amateur testing under the VEC System, and the two examiner Novice testing program would be abolished.

By eliminating the Novice class license, the FCC appears to have solved two problems: first, test administration. When the volunteer examination program was created, Senator Goldwater wanted specifically to preserve the ease with which a Novice class candidate could receive a test. Therefore, the Novice class test was specifically excluded from the Volunteer Examination Pro-

*Washington Correspondent, CQ, P.O. Box 565101, Dallas, TX 75356-5101

gram. With the elimination of the Novice class license, the impediment to testing of the entry-level license under the VEC program appears to have been solved. This relieves much concern about the possibility of fraud in the testing process.

Second, the administrative impact has been eased. Whenever the FCC is asked to act on a proposal for a new class of license, it must consider how much of a strain the new license will put on its resources. Under this proposal, instead of

adding a sixth class of amateur license, the number of classes would shrink to four.

Communicator class privileges would include all modes and emissions on frequencies above 222 MHz and with power up to 200 watts PEP. This is generally in line with the petition that had been filed by the American Radio Relay League. Nevertheless, the FCC specifically asked for comments on the effects of excluding Communicator class licensees from the

2 and 6 meter bands. Communicator class licensees would be eligible for Group D callsigns. Group D formats contain two prefix letters, a geographical radio district number, and three suffix letters—for example, KD6AAA is a Group D callsign.

Comments are also requested on the desirability of including the opportunity for Communicator class licensees to experience on-the-air telegraphy operation on the HF bands. The Commission will explore the possibility of some limited Communicator HF privileges, but for domestic HF use only.

Additionally, a Communicator class licensee who passes or receives credit for a 5 WPM telegraphy examination would be authorized the privileges of the Technician class. The Tech 2 and 6 meter and HF privileges would be granted upon passing the test. No new license or callsign would be granted and no FCC action would be taken. The upgrade would be conferred by examiners operating under the VEC System only. Upgraded Communicators would sign /AC after their call.

FCC staff could not explain why a code test was chosen as the means to obtain VHF privileges other than to state that that was what the ARRL wanted. Commission staff emphasized that the primary goal of the proposal was to grant the ARRL no-code petition to the maximum extent possible given the "resource impact" constraints. That is, the no-code license should not increase the FCC's or VE's workload or place burdens or restrictions on existing licensees.

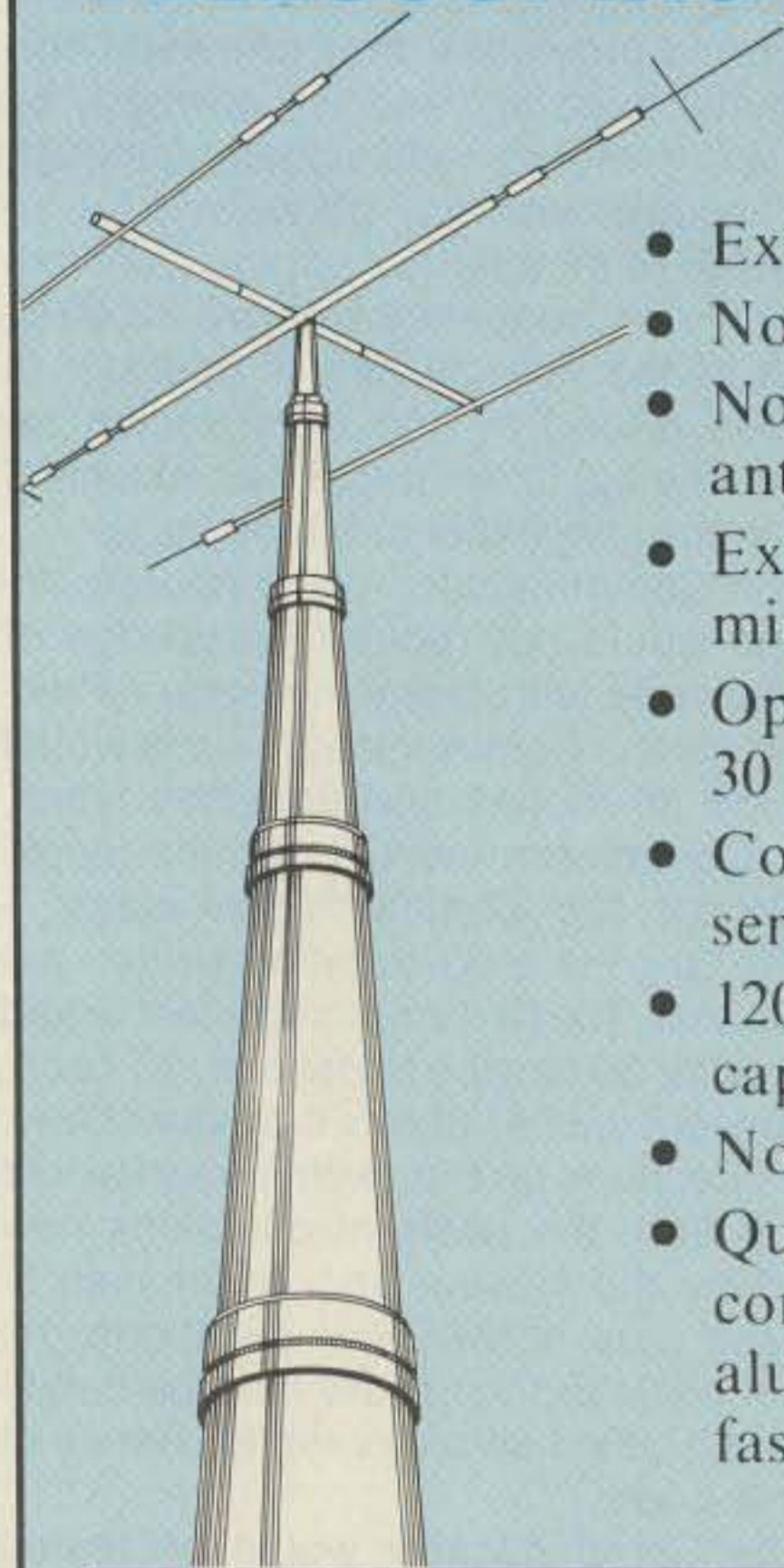
The Commission is requesting comments on all aspects of this proposal. Private Radio Bureau Chief Ralph Haller said that this proposal reflected a change of attitude on the part of the mainstream of amateur radio. He said that the comment period would be open for six months and that the period for filing replies to those comments would be 45 days. Thus, by his reckoning, the FCC would probably not issue its final decision until the end of calendar year 1990. Mr. Haller also mentioned that, if adopted, the new rules would require some time, possibly as long as 6 months, to go into effect because changes would need to be made in the Private Radio Bureau's processing procedures in Gettysburg, Pennsylvania.

Comments on PR 90-55 are due August 6, 1990. The parameters of the no-code license will undoubtedly change somewhat once the FCC receives input from the public and amateur community during the comment period. Best guess is that the new Communicator class license will probably be implemented in the spring of 1991.

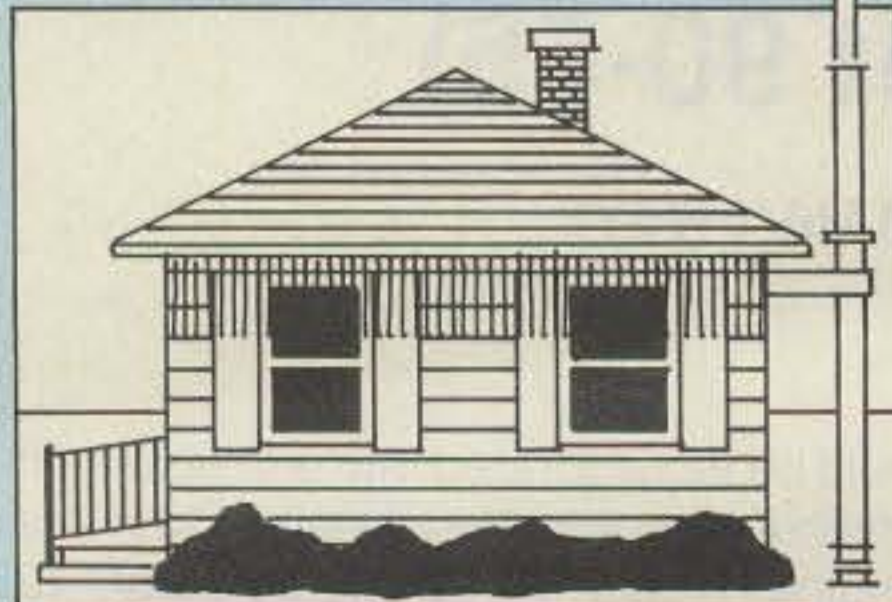
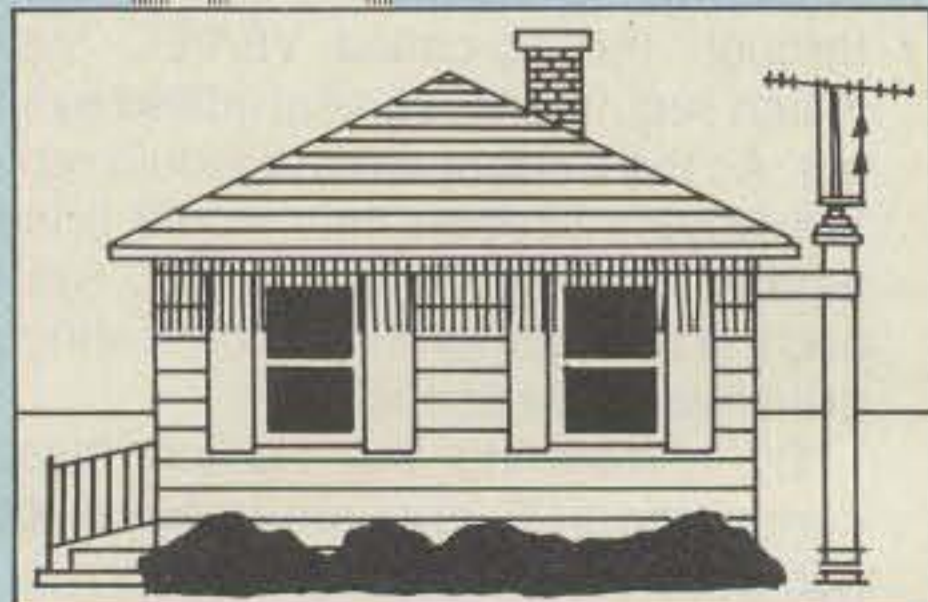
The actual Notice of Proposed Rule-making paperwork is not yet available. We will have a detailed report on the FCC's no-code proposal in our next issue.

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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.



DR-110T&R-410T

Tiny 2M Power From Alinco!

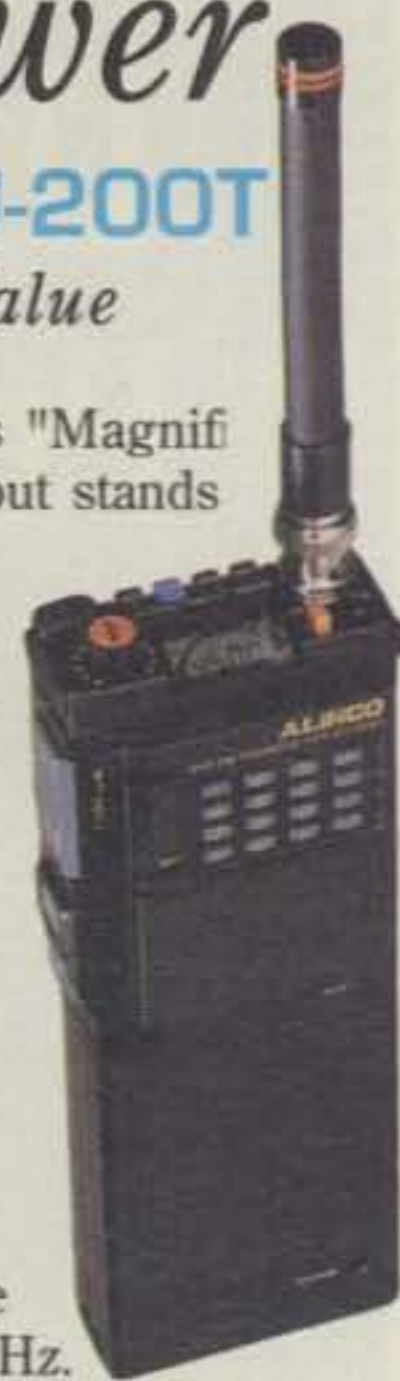
DR-110T, this 2M Alinco, enters the nineties a proven winner with the "reputation" of best value. The DR-110T packs a powerful 45W on 2M and sports all the features you expect in today's transceivers. Tuning is a snap with the multi-functioned easy-to-see keyboard, 14 memory channels, subtones, scan, multi-colored LCD readout, reverse, are a few of the many features of the DR-110T. 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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Ericson Communications—Chicago, IL
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Don't put those tools away just yet. N4PC has another project for our workshop and shack.

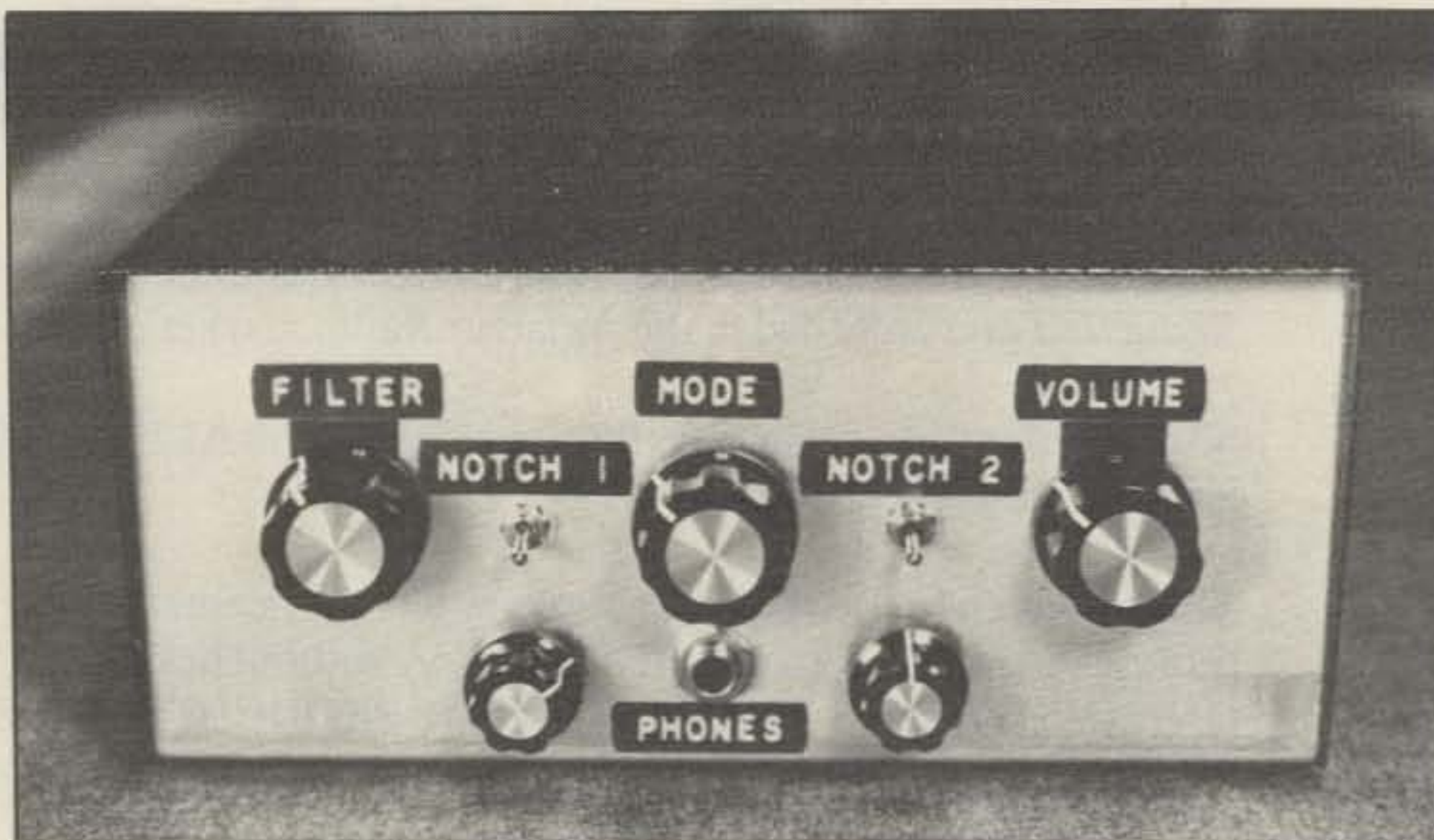
How To Build The "Synthetic" Crystal Filter (And Get "Real" Results)

BY PAUL D. CARR*, N4PC

Tired of fighting QRM? Would you like a good filter to plug into your headphone jack that will give really good results? Do you like to work contests and find that some filters are so sharp they cut out what's going on around your operating frequency? Are you displeased with RC active filters because of the operator fatigue that they can produce? If the answer to one or more of these questions is yes, read on. I have something for you.

Background

RC active filters have been around for many years. I have built and evaluated many of the standard circuits and have always come away displeased until now. I had always built CW filters, and although the selectivity was great, after an hour of



Front view of the completed filter. The Filter switch selects either filter or bypass. The Mode switch selects the output. The Volume control adjusts the audio output level. The Notch controls select notch filter in or out, and the small knobs below the Notch switches control the frequency response of each filter.

*97 West Point Rd., Jacksonville, AL 36265

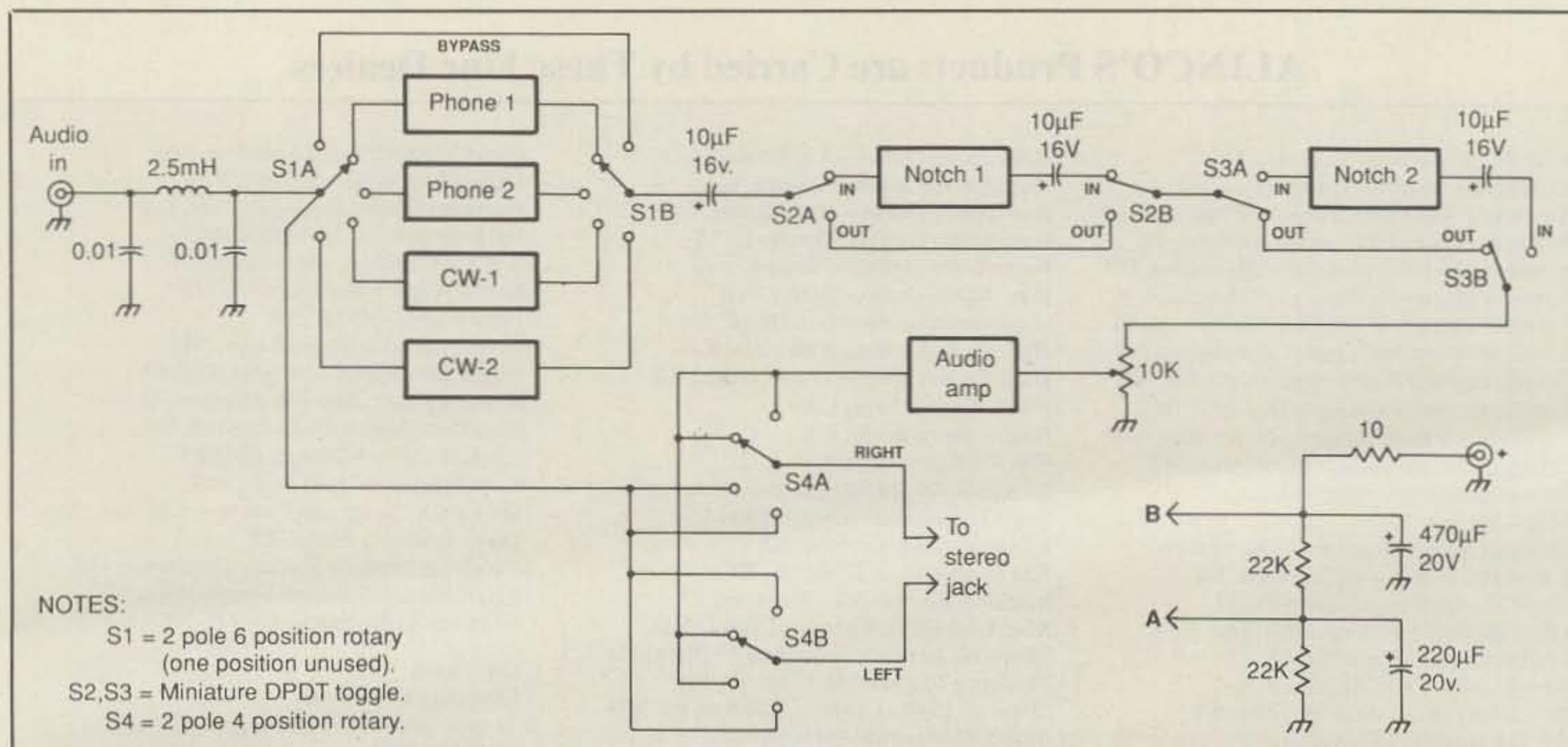


Fig. 1—Block diagram of the CW/SSB filter.

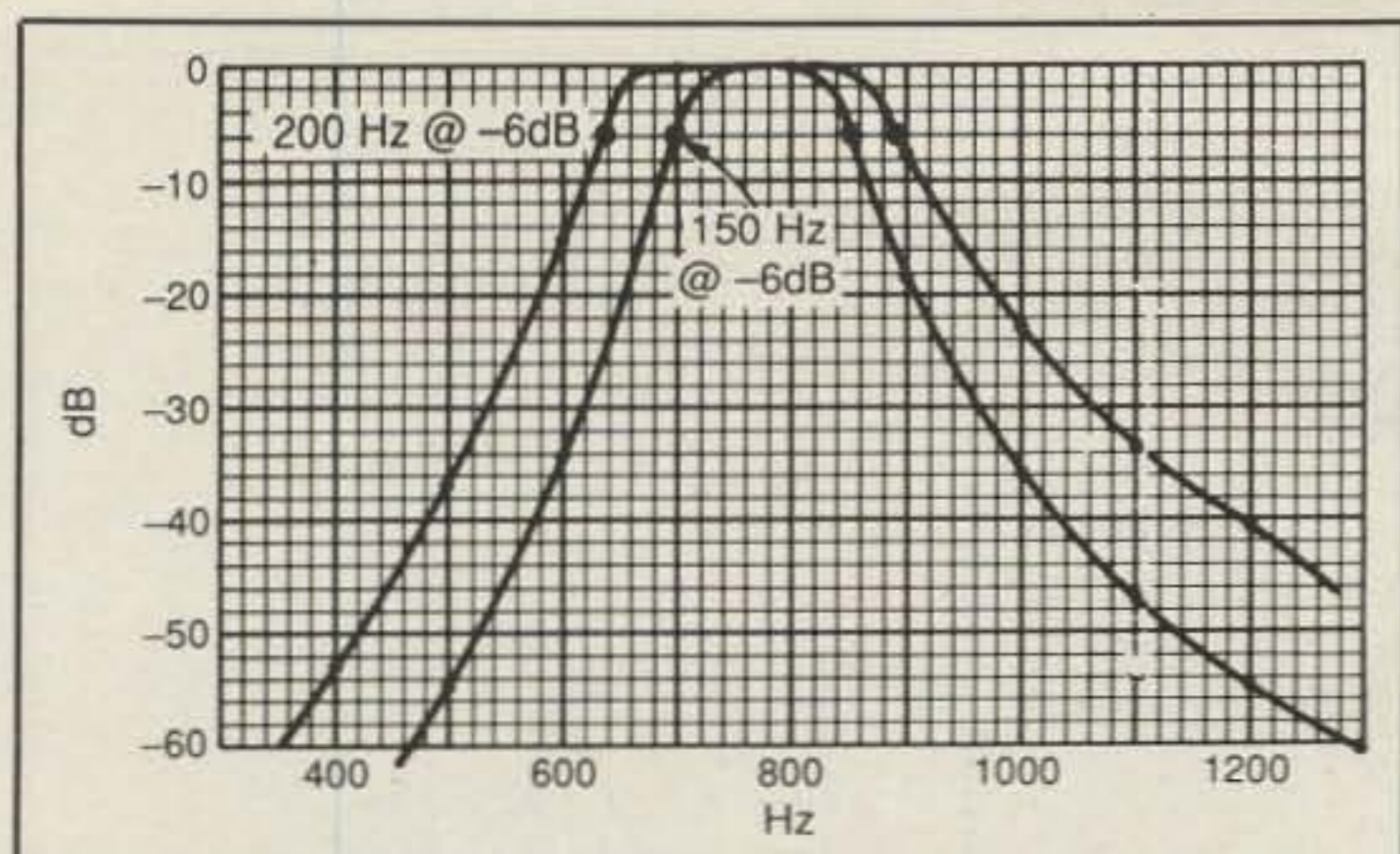


Fig. 2- The response curve for the CW filter.

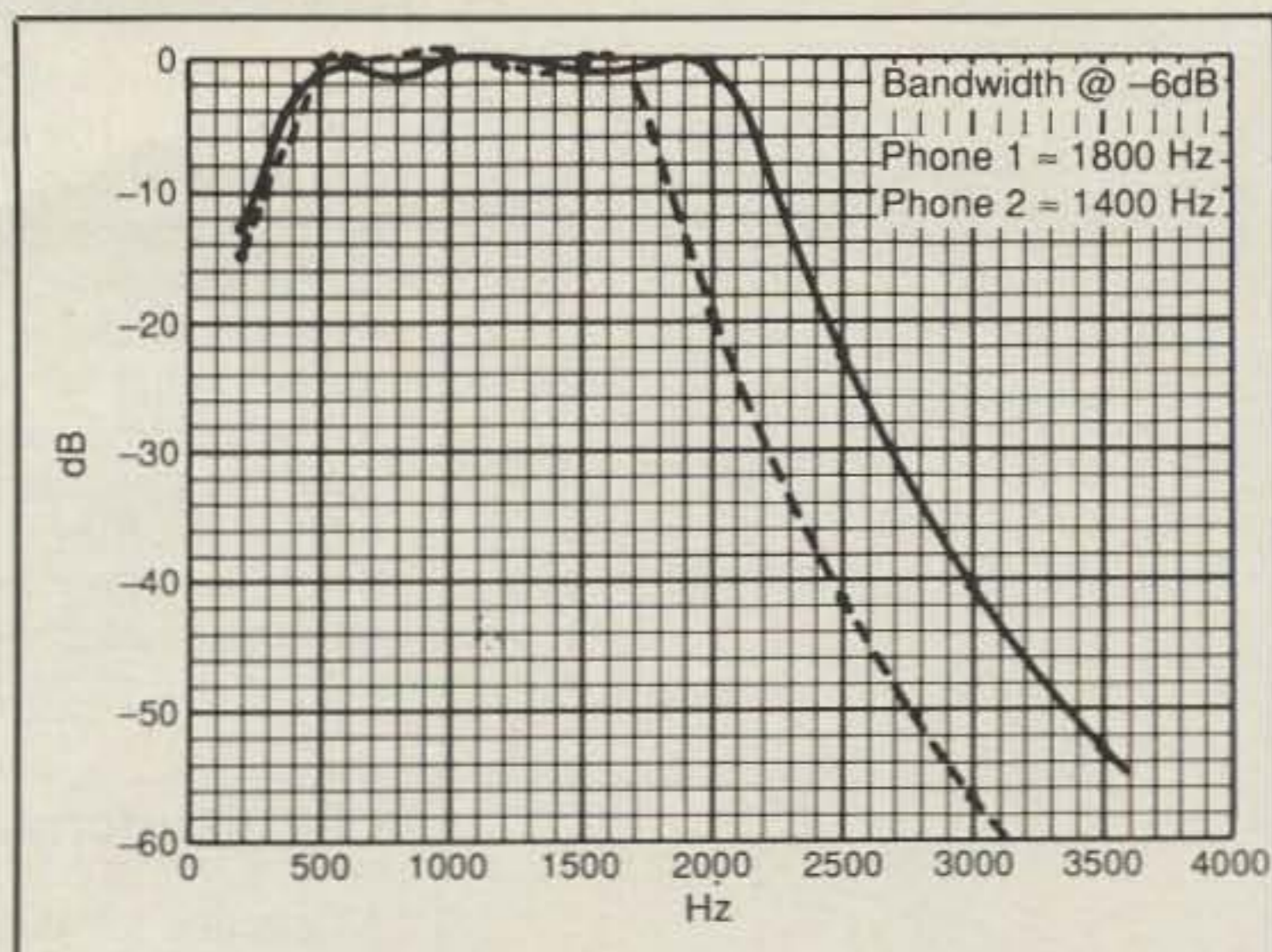


Fig. 3- Phone filter response curves.

operation I was physically and mentally exhausted. Why? That was the question I set out to answer.

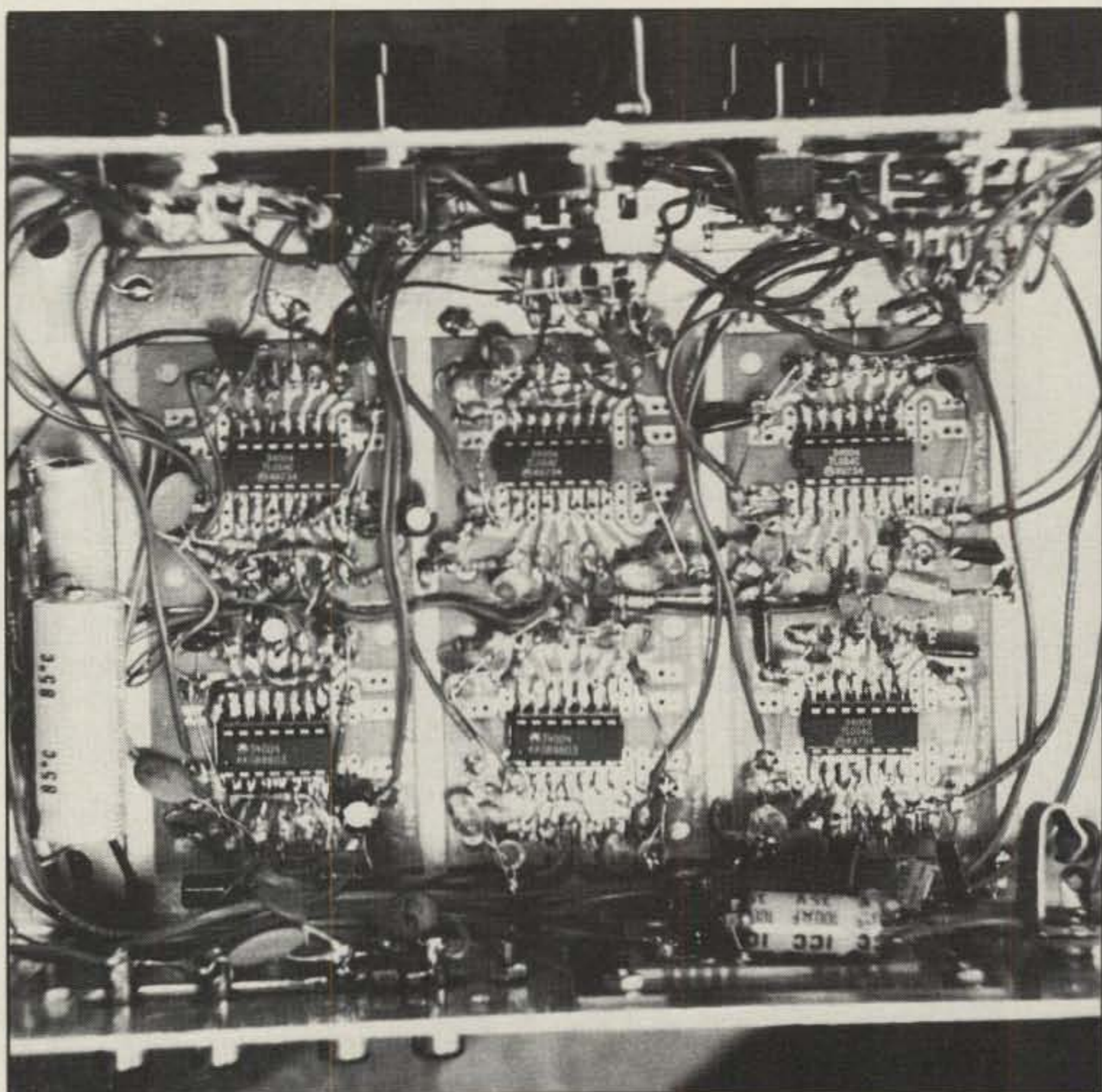
If you look at the selectivity curve of an RC active filter, you find the familiar bell curve. Increasing the number of sections will produce steeper skirts and decrease the bandwidth. When you use such a filter, you will automatically tune for peak response, which means you will always hear the same pitch, which after a period of time will produce physical and mental fatigue.

Compare the curve of the RC active filter with the curve of a crystal filter. One thing becomes obvious: The curve of the crystal filter is flat. The flat portion of the crystal will allow you to tune a few Hertz above and below the passband center with no loss in signal strength and that is all that is necessary to prevent fatigue. This concept is known in industry as "human engineering."

The audio filter described here has a response that looks like a crystal filter. Since it closely simulates the response curve of a crystal filter, I sometimes refer to it as a "synthetic crystal filter." It has several desirable features: two CW bandwidths, two phone bandwidths, and two notch filters that can be used independently or in conjunction with either CW or phone filter. Another feature for contesting—filtered audio can be routed to either ear with unfiltered audio supplied to the other ear.

I know what you are thinking "If the filter will do all that, then I'm going to need 1% components that I'll never be able to find." Nope! All components are 5% off the shelf values and are readily available. Interested? Read on.

I came across an interesting article on computer-aided audio filter design by Dana Geiger, KE2J.¹ His article had two things that really stimulated my interest—the computer program for filter analysis and the concept of stagger-tuned stages to produce a flat-topped curve



The interior view shows the "modified ugly" technique of wiring and the general layout and construction techniques.

that approaches the curve of a crystal filter. His article is well written, and it really opened the door for me to continue my investigation of audio filters.

I rewrote the computer program (it was written for the Apple computer) for my Commodore 128. I was then ready to "build" various filter designs on my computer. I found I could more closely simulate the curve of a crystal filter by using

four sections instead of the three-section design of KE2J. These filters are great, and Dana Geiger deserves our thanks.

Well, that takes care of the CW requirements, but what about phone? I attacked the problem by writing a program similar to the CW program but with a wider bandwidth so I could simulate the response of a phone filter. I began to "build" phone filters on the computer. I found that four

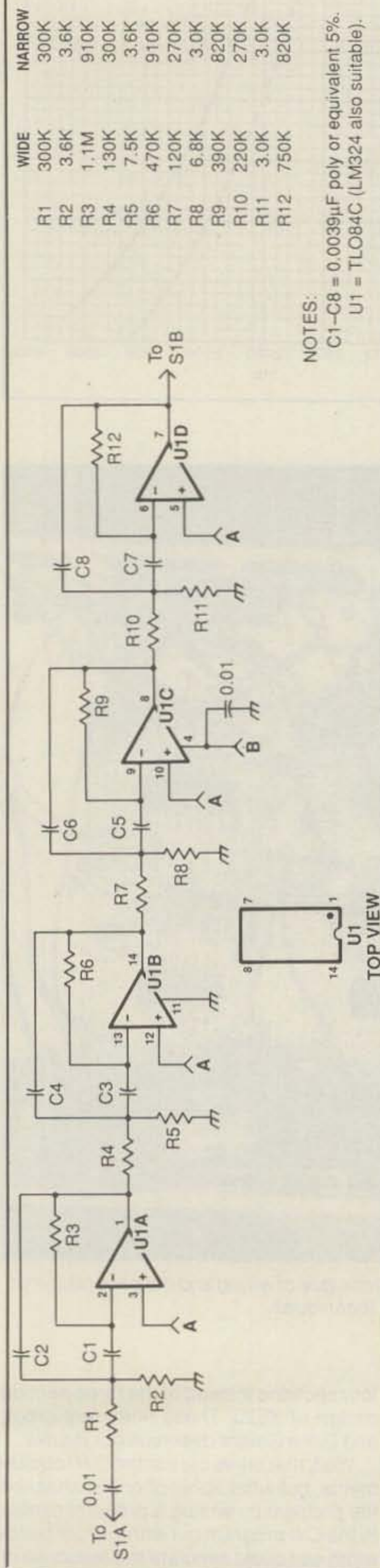


Fig. 4—Schematic for the CW filters. All resistors are 1/4 watt, 5% tolerance.

stagger-tuned sections produced the best results. The phone filters consist of one stage of bandpass filtering followed by three stages of unity gain lowpass filtering, stagger-tuned, of course. Again let me emphasize that stagger-tuning is the key to the flat passband.

The notch filters are standard "textbook" designs using the "state variable" technique. They provide a sharp 40 dB notch, and they are great for removing unwanted heterodynes that may appear in the audio passband.

Circuit Information

All circuits for the CW filters are band-pass types, and each filter consists of four such filter sections in a cascade arrangement. The filter sections for the CW-1 filter are stagger-tuned to four different frequencies, while the filter sections for the CW-2 filter have two sections at the same low frequency and two sections at the same high frequency. Each filter has a nominal 0 dB insertion loss which will allow placement in an existing rig if you care to do so.

The phone filters differ from the CW filters because only the first stage is a bandpass type and the remaining sections are unity gain lowpass types. Again, insertion is a nominal 0 dB.

The two notch filters are standard "state variable" designs. Component values were chosen to give two different frequency responses approximately 150-1950 Hz for the low notch and 300-3200 Hz for the high notch. Breaking the frequency response into different ranges provides for less critical tuning.

The audio amplifier was provided for overall gain flexibility, as well as for proper impedance matching for stereo headphones or an external speaker.

Construction Notes

Each circuit was built using the "modified ugly technique" described in my earlier articles.² Each filter is built on one half of a Radio Shack dual experimenter's circuit board. Clean the pads with fine steel wool and then turn the boards over and apply electrical tape to cover the holes. Next mount the proper size IC socket on the foil side of the board. The board is ready for mounting on a piece of copper-clad circuit-board material which is used as a ground plane for the entire assembly. If you use double-sided material, drill a small hole and pass a wire through the board and solder. This will prevent unwanted capacity between the sides of the board.

I suggest each filter be built and tested individually. I also suggest you start with the CW-1 filter. After the circuit is built, check the board for wiring mistakes and

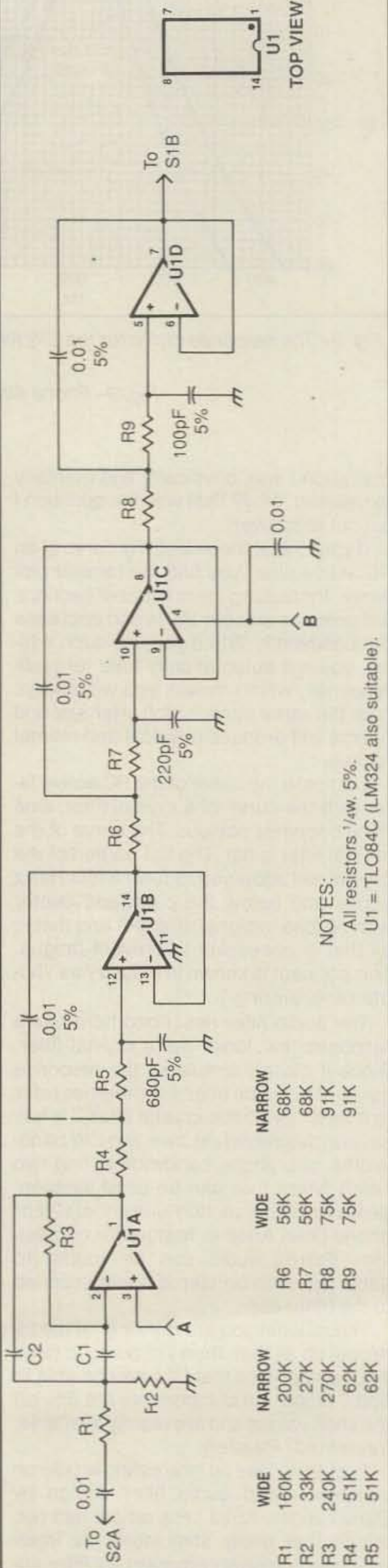


Fig. 5—Schematic for the phone filters. All resistors are 1/4 watt, 5% tolerance.

Sometimes the worst thing you can do to someone is to tell them they can't do or have something for an arbitrary reason. However unfair it might be, it can be the catalyst that creates a brand-new DXer.

Indomitable Radio Female

BY ROBERTA M. DAWSON*, KB7IRF

Bubbling with excitement, I made sure every amateur in my acquaintance was aware that my first contact as an amateur radio operator was with JTØDX in Mongolia. What a thrill! Of course, I have an unfair advantage over many other Novices since I have been DXing for more than 12 years—second hand. Just like used cards, second-hand amateur radio gives you much of the grief and little of the joy.

My husband is an Extra class amateur and has been a contester and an avid DX chaser since the early 50s. After our marriage 12 years ago, I began serving food in the ham shack, recopying illegible logs, sleeping—at times with one eye open—during noisy contests, and waking at all hours of the night to alarm clocks or phone calls beckoning the elusive rare contact.

Many of our married friends are two-ticket couples. But for 12 years I promised myself never to become involved in so obsessive a hobby. I never wanted to tantalize others with the latest gem plucked from the mines of the amateur frequencies. But things piled up and one thing lead to another and . . .

Every year Bill, W7TVF, and I made the pilgrimage from our home in Nevada to Visalia, California to attend the Northern/Southern California International DX Convention. We have missed only two since 1979. We always register early to ensure having the annual patches to sew onto the jackets we obtained one year in the same manner. Even though I was not a "call carrying" official amateur, I had always paid for a complete convention package and enjoyed all the programs with my husband.

Then at the 1988 convention discrimination finally reared its ugly head. When we picked up our pre-registration packet, only moments after they were made available. I made the horrifying discovery. There were two of everything—programs, prize tickets, banquet tickets—but there was only one annual convention patch. My heart sank.

Quickly Bill suggested I go back and inform the registration committee there had been a mistake. I was, of course, wearing my fully adorned blaze-orange jacket at the time. Immediately I was referred to the man at the end of the table, who was reportedly in charge of such things.

As I approached, I heard the convention official explaining to the man in front of me, "This year there was a shortage of patches. We underestimated the number of registrations. We made the decision to award patches only to those who hold a callsign."

Instinctively I gasped and spoke around the gentleman's shoulder. "But if we have paid the full registration and were among the first to register, we should get a patch, callsign or not. I've got one for every year," I said while displaying my jacket.

"Ah . . . right," the man now standing beside me muttered in amazement.

The convention official said, "But we haven't enough patches for everyone."

As I inhaled to speak and raised an index finger for emphasis, the official quickly shoved a patch in my direction saying simply, "Here." Knowing when I was well off, I grabbed the patch and sped away to relay the incident to my spouse and our friends.

In 1989 I made the decision that if my pre-registration fee was not equal to anyone else's by virtue of a callsign, then I would simply not attend. But I did attend. I could not deprive Bill of his enjoyment for so silly a reason as a patch. But on princi-

ple I did not pay for nor participate in any of the precious amateur radio functions. The shine was off the car and oxidation had ruined the finish.

It was fortunate for me, however, that I had many other positive experiences involving amateur radio. Many groups do not discriminate against a person for not having a callsign. Rather, they look at the lack as a prospect for the future, not a handicap for life. They made me feel welcome.

Last June while we were attending a VHF contest "party" at Mount Wilson, just north of Pioche, Nevada (DM28—reasonably rare for grid chasers), I made a life-changing decision. While I had great fun, enjoying the camping out and the camaraderie of the group, I could not participate in the actual contest. I decided I would put a stop to that when I returned home.

Purchasing the Gordon West Novice course as soon as we visited Las Vegas, I began to study. By August 15th I was ready, and two of our long-time radio friends were thrilled to administer the code test and the AMECO Amateur Radio Novice Class written exam purchased at the local "candy store." I passed.

Then the long wait began. Who would I be in amateur radio? A snafu in the paperwork caused a minor delay, but at last, one day short of six weeks later, I received my amateur radio name. My callsign came back KB7IRF. I said it out loud. Then I rattled it off in code. It sounded really good. Since I like code, I wanted a call that had a good sound.

I decided right away that I will keep this call, at least until I become an Extra. Then I will decide whether to change. It is my radio "name," after all.

That evening, while I was waiting for a schedule with a friend, N6QPY/7, who wanted to be my very first contact, Bill said, "Do you want to work a rare one for your first country?"

*Star Route Box 71623, 3220 East Easy St., Pahump, NV 89041

"Who?" I foolishly said.
 "JTØDX in Mongolia. I just worked him on 10 meters. Do you want to try?" Bill answered.

"Do you think I can?" I asked. "Is he in the Novice band?"

"Sure, come on," Bill grinned.

It took four or five calls. The signal coming in through the four-element cubical quad at 50 feed was thunderous. I could not have heard him better if he were sitting on my lap hollering in my ear instead of through the headset.


Finally, I heard, "The Radio Foxtrot, go ahead."

Like a seasoned veteran I answered, "JTØDX, this is Kilo Bravo Seven India Radio Fox. You are five and nine in Nevada."

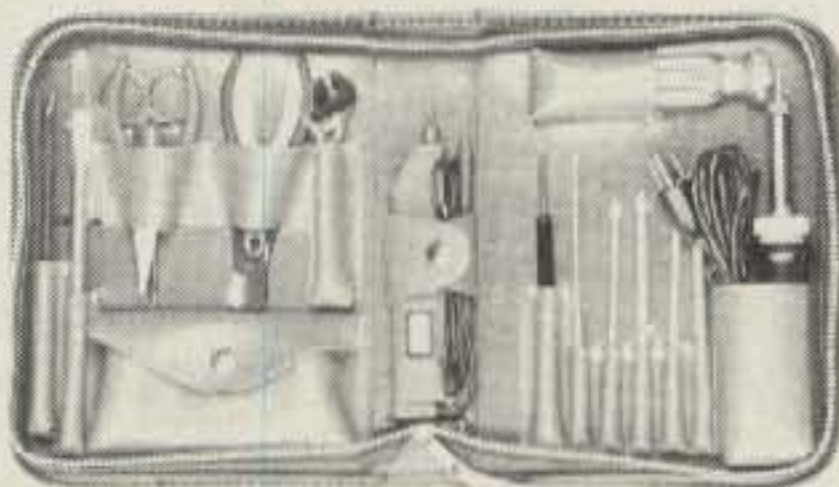
"Kilo Bravo Seven India Radio Foxtrot, QSL the five and nine, you are five and nine. QRZ?"

My body vibrated with the thrill of my first amateur radio contact and my first-hand experience chasing DX.

I apologized to Anne, N6QPY/7, when we made our contact. She was so excited for me that my first contact was such a good one that she did not mind being number two in my log book. Her husband, Bob, W6WBY/7, accepted number three with a gleeful laugh.

Soon it will be time to register for the 1990 California International DX Convention. This year I should get a patch for sure. 

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FEATURES INCLUDE:

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Front panel switching allows rapid selection of antennas, or to an external dummy load, or permits bypassing the tuner.

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Please send all reader inquiries directly.

Here's a nifty addition for what must be a zillion Bird 43s out there.

Add An SWR Chart To Your Bird 43 Wattmeter

BY SCOTT NEUSTADTER*, N4PYD

The Model 43 Bird Wattmeter is looked upon as *the* standard RF wattmeter—the one to use when you want your antenna to be "right." Unfortunately, it does not provide a direct readout of SWR. Lugging the factory charts up to the top of your tower is a sure way to lose the charts, or worse, drop the Bird while 60 feet up!

My solution for this plight was to solve the SWR equation for various values in a single chart and create a ratio that can be solved in your head (even while 60 feet up)!

The mathematics for the SWR calculation are fairly simple using the two parameters, forward and reflected power, the Bird gives you.

$$SWR = (1 + T) / (1 - T)$$

where T = square root (reflected power/forward power)

The simple ratio which works for any power level and can be solved in your head is forward power/reflected power. This ratio involves dividing a smaller number into a larger number. Therefore, the ratio is always one or more (simple math for "elevated" brains).

Using a spreadsheet program on my PC it was very easy to develop a chart that allows you to use the actual forward or reflected power or the simple ratio to determine the SWR. The chart was printed using compressed print at eight lines per inch so that it could be affixed to the back of the Bird using clear plastic laminate, the kind used to protect photos and identification cards. Nothing extra to take up or drop from the tower!

I used 100 watts as the input power, as the majority of my antenna work is on HF. If the math bothers you or you only work lower power, you could place two of the charts with different forward power levels on the back of your Bird. The available space is only 2½ x 5". You may have to limit the range of your charts in order to

Fwd	Ref	Fwd/Ref	SWR
100	0.05	2000.00	1.05
100	0.25	400.00	1.11
100	0.5	200.00	1.15
100	1	100.00	1.22
100	2	50.00	1.33
100	3	33.33	1.42
100	4	25.00	1.50
100	5	20.00	1.58
100	6	16.67	1.65
100	7	14.29	1.72
100	8	12.50	1.79
100	9	11.11	1.86
100	10	10.00	1.92
100	11	9.09	1.99
100	12	8.33	2.06
100	13	7.69	2.13
100	14	7.14	2.20
100	15	6.67	2.26
100	16	6.25	2.33
100	17	5.88	2.40
100	18	5.56	2.47
100	19	5.26	2.55
100	20	5.00	2.62
100	21	4.76	2.69
100	22	4.55	2.77
100	23	4.35	2.84
100	24	4.17	2.92
100	25	4.00	3.00
100	30	3.33	3.42
100	35	2.86	3.90
100	40	2.50	4.44
100	45	2.22	5.08
100	50	2.00	5.83
100	60	1.67	7.87
100	65	1.54	9.32

SWR chart for the Bird 43 wattmeter. You can clip this out or copy it, laminate it in plastic, and affix it to the back of your wattmeter.

place two, but any forward/reflected ratio above 5, SWR = 2.62, is probably too high! You can also "shrink" the charts if you have access to a Xerox® machine with the reduction feature and your eyes are good enough.

I have used the chart for tuning numerous antennas from Field Day installations to 2 meter mobile setups. I have an extra copy of the chart in my shack as well for when the Bird is in use as a station monitor.

*9710 Dortmund Dr., Huntsville, AL 35803

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Propagation Peak! Don't Miss The Exciting 10-Meter DX

- Rock-Stable Digital VFO, Full 10-Meter Coverage
- Selectable 25 or 5 Watts ■ 10-Frequency Memory

Hams are working the world with this top-value rig and here's what they're saying about it: "Great audio . . . Sounds like a much bigger radio . . . Best mobile I've ever owned . . . Easy to install." Realistic HTX-100 is a compact SSB/CW transceiver featuring handy pushbutton QSY from the mike, RIT and an effective noise blanker. It operates USB or semi break-in CW with sidetone. Requires 12VDC at 7 amps. With bracket, fused DC cord and one-year limited warranty. The Tandy® Service Plan extends your warranty to five years for just pennies a month—details in store.

259⁹⁵

NOTE: You must have a valid FCC Amateur Radio License to legally transmit with this transceiver.

4" Speaker



Instant RX audio improvement for HTs and mobiles. Includes mounting bracket, 10-foot cord, 1/8" plug. #21-549 13.95

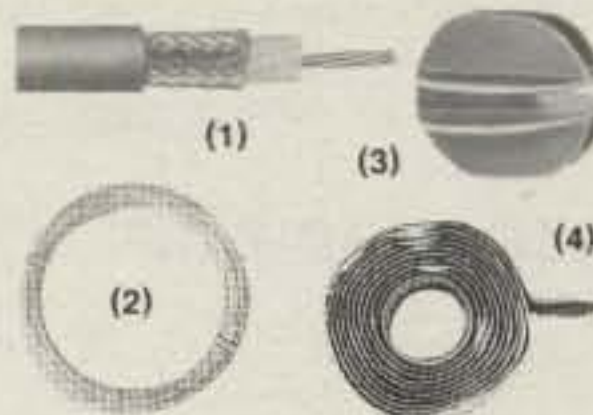
SWR/FS Meter



19⁹⁵

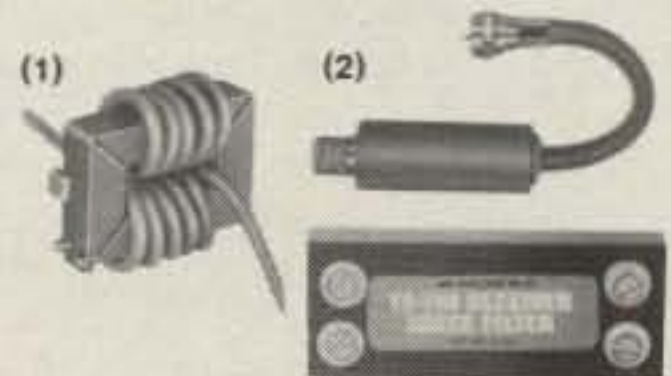
Combination SWR/field strength meter by Micronta®. Handles a kW, 3 to 30 MHz. #21-525
5-Ft. RG-8 Patch Cable. #278-969, 6.19

Antenna Buys



(1) RG-8. #278-1323 Per Ft. 42¢
(2) Antenna Wire. 70 ft. of 14-gauge stranded. #278-1329 5.79
(3) Insulators. High strength, low loss. #278-1333 2/69¢
(4) Outdoor RF Connector Sealant Tape. 60" roll. #278-1645 2.49

RFI-Busters



(1) Toroid Choke Cores. No-cut installation. Just wind and snap together. #273-104 Set of 2/7.95
(1) 75-Ohm High-Pass Filter. Effective! Installs inline at input of TV, VCR, stereo FM receiver. #15-579 3.95
(2) 300-Ohm High-Pass Filter. For TV or FM input. #15-581 5.95

WWV and WX Receiver



Crystal controlled. Receives WWV time and propagation reports on 5, 10 or 15 MHz, VHF weather up to 50 miles away. Battery extra. #12-148 39.95

Ham Calculator

39⁹⁵

Built-In Electronic Engineering Functions

Makes upgrade math easy! Computes and displays in V, A, mA, mW and Ω units. #65-983

Hookup Helpers



(1) 8-Pin Mike Plug. For TNC, mike, phone patch. #274-025 2.19
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(3) Shielded Adapter. 1/8" jack to 1/4" plug. #274-325 1.59
(4) Headphone Adapter. Adapts mini stereo phones to 3/32" earphone jack on HTs, scanners. #274-381 1.99

Mini Audio Amp

11⁹⁵

- Built-In Speaker
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Galvanized steel towers available in heights up to 64 ft., depending upon wind loading. These towers are supplied complete with concrete base stubs, top plate, and rotor plate. They are supplied in convenient 8 ft. sections. BX models are rated at 6 sq. ft. of wind loading, the HBX at 10 sq. ft. and the HDBX at 18 sq. ft. **An outstanding tower value.**

(6 sq. ft. model)		
BX64	64 ft.	\$499
(10 sq. ft. models)		
HBX40	40 ft.	\$289
HBX48	48 ft.	\$374
HBX56	56 ft.	\$489
(18 sq. ft. models)		
HDBX40	40 ft.	\$349
HDBX48	48 ft.	\$464

(Ratings based on 10 ft. boom.)



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Rohn 25G is the work horse of amateur radio and has held up countless arrays. 45G and 55G are well suited for heavier loads. Guy these towers according to specifications and they will serve you well. We stock the full line of accessories.

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BAS25G	Brng/Assy shelf	\$84.95
BPC25G	Base plate	\$64.95
SB25G	Short base	\$34.95
45G	10' section	\$149.95
45AG2	Tube top	\$159.95
45AG3	Tube top	\$159.95
45AG4	Flat top for TB3	\$159.95
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SB45G	Short base	\$64.95
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Guy brackets/assemblies, anchors, equalizer plates, house brackets, side arm assemblies, and multiple masts in stock.

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FK 2548	CALL	FK4544
FK2558	FOR	FK4554
FK2568	PRICES	FK4564

Rohn fold-over towers are shipped freight prepaid from the factory. Freight additional on other towers.

TOWER HARDWARE

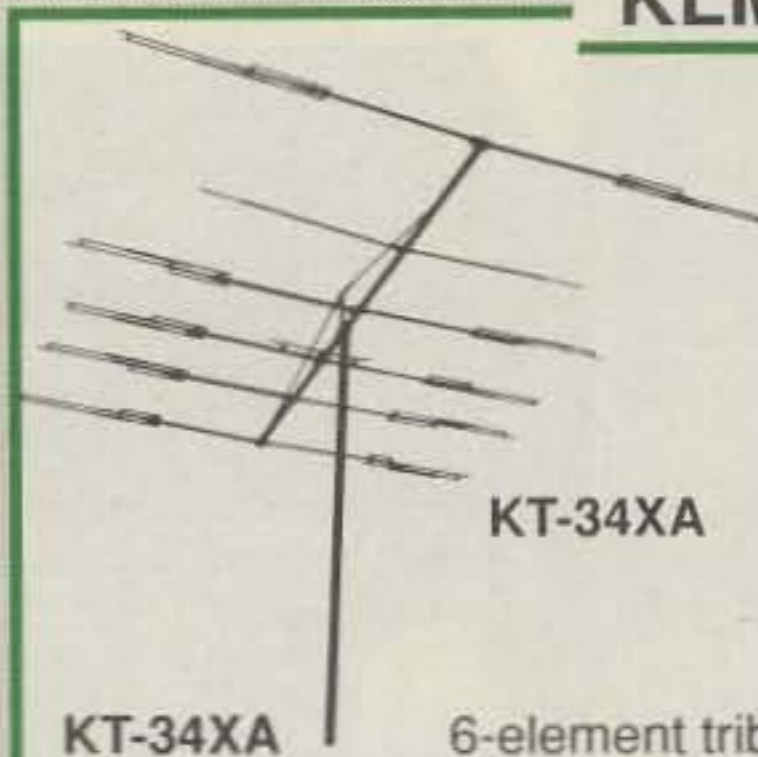
3/16 EHS Guywire	\$0.15/ft.
1/4 EHS Guywire	0.18/ft.
CCM clamps 3/16"	0.39
1/4"	0.49
Thimbles; 1/4TH	0.49
Turnbuckles:	
3/8 E&E; E&J	7.95 / 8.95
1/2E&E; E&J	13.95 / 14.95
Rohn TB-3 Thrust bearing	64.95
Preformed "Big Grips"	
3/16" & 1/4"	2.99 / 3.49
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(Heavier material available)

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We have a complete inventory of cable and accessories.

These guy systems are designed to eliminate interaction between your antenna and guy system. They are electrically transparent and available in strengths equivalent to popular guy wire sizes. Phillystran is an effective alternative to breaking-up your guy wires into non-resonant lengths with insulators. **Call for pricing.**

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No compromise 6-element triband beam.

Broadband performance.

Linear loading and high-Q air capacitors used in place of traps.

Boom length = 32 ft.

Windload = 9 sq. ft.

KT-34XA	6-element triband beam	\$599.00
KT-34XA/HDB	KT-34XA with heavy duty boom	\$749.00
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10M-4	4-element 10 meter beam	\$179.00
10M-6	6-element 10 meter beam	\$274.00
15M-4	4-element 15 meter beam	\$189.00
15M-6	6-element 15 meter beam	\$439.00
20M-4	4-element 20 meter beam	\$344.00
20M-6	6-element 20 meter beam	\$744.00
40M-2	2-element 40 meter beam	\$399.00
40M-3	3-element 40 meter beam	\$589.00
40M-4	4-element 40 meter beam	\$749.00

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HY-GAIN CRANK-UP TOWERS

16 Sq. Ft. Models:	
HG-70HD	70 ft., 4 sections
HG-54HD	54 ft., 3 sections
9.5 Sq. Ft. Models:	
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HG-37SS	37 ft., 2 sections

SPECIAL PRICES:
On Hy-gain tower, antenna, and rotator packages.

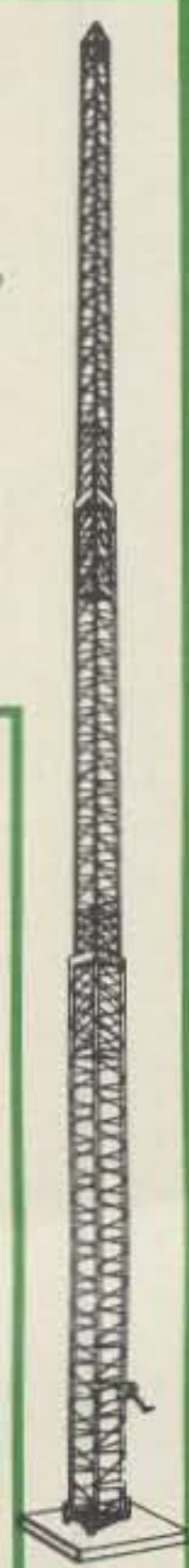
ACCESSORIES

HG-COA Coax Arms	HG-TBT Thrust Bearing	HG-GP Gin pole
HG-5, HG-10, & HG-15 Masts.		

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- Self-supporting up to 120 feet.
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- Hinged bases for easy tilt-up.
- Fold-over options available.
- Light, strong, corrosion free aluminum.
- Convenient 8 foot sections.

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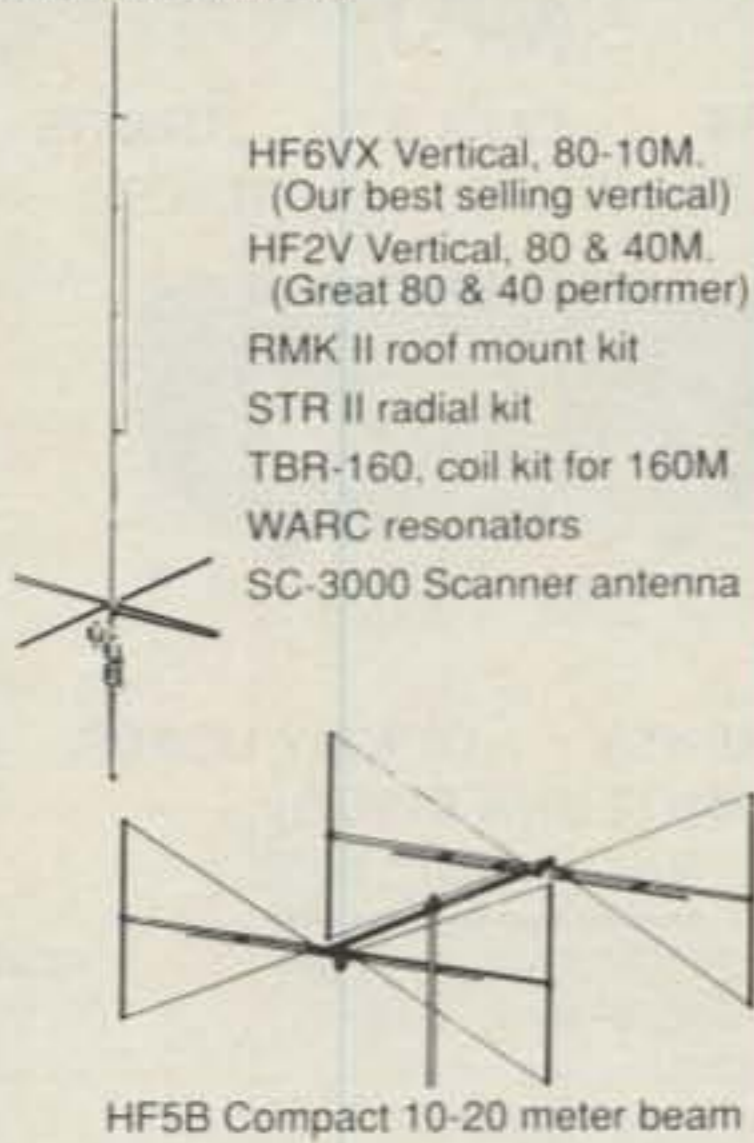


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ALPHA-DELTA

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Transi-Trap Surge Protectors for
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X-500MA, X500A, & X-300A
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Choose from five models --
1.8 - 1300MHz

Coaxial Switches, Dummy Loads,
Duplexers, Triplexers, Surge
Protectors.

M² ANTENNAS

2 METERS

		LIST PRICE
2M-5WL	17 el, 33' boom; SSB/CW; <i>It smokes!</i>	\$169.00
2M-18XXX	18 el, 36' boom; SSB/CW; <i>More smoke!</i>	\$219.95
2M-CP14	14 el, 9'10" boom; circular polarization.....	\$149.00
2M-CP22	22 el, 18' boom; circular polarization.....	\$225.00

6 METERS

6M-5	5 el, 15'9" boom; 6 meter heat.....	\$140.00
6M-2WL	9 el, 39'6" boom; 6 meter <i>smoke</i>	\$379.00
6M-2.5WL	11el, 50'4" boom; <i>A whole lotta smoke!</i>	\$449.00

432 MHZ

432-13WL	39 el, 30'3" boom; optimum performance.....	\$229.00
----------	---	----------

These computer optimized Yagis offer clean patterns, optimum forward gain, N-connectors, and a water-proof feed system. They're great for high-performance single antennas or offer outstanding performance in stacked arrays. Ask anyone who owns one. M² Antennas are now distributed by *rfe* at prices that give a lot of dB's per dollar. Call for your today!

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TH5 Mk2: 5-el tribander
Explorer-14: tribander
Discoverer: 40 Meter beams
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204BAS: 4-el, 20 M. beam
203BAS: 3-el, 20 M. beam
155BAS: 5-el, 15 M. beam
105BAS: 5-el, 10 M. beam
103BAS: 3-el, 10 M. beam
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18ATV/WBS: 80-10 M. vertical
V2S; V3S; & V4S
64BS & 66BS: 6 Meter beams
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Complete inventory. Call for prices.

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6BTV 80-10 mtr vertical.....\$139.95
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G7-144 2 mtr base antenna.....124.95
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Complete mobile systems.

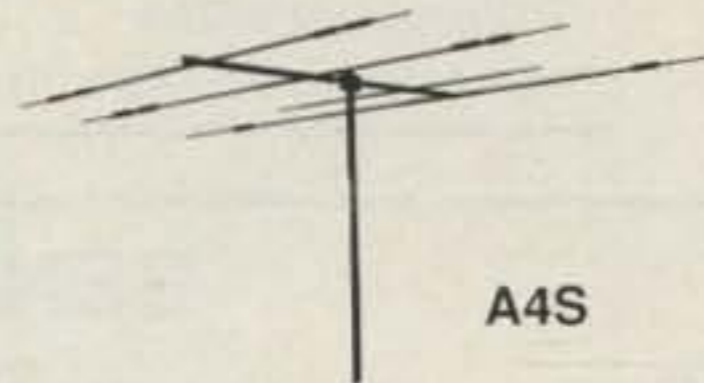
We stock a full line of mobile mounts, masts, and resonators. Give us a call.

LARSEN

Whips, loading coils, and mounts.
2 meters, 440 MHz, and dual-band
in stock.

CUSHCRAFT

A3S Tribander
A4S Tribander
R5 (10,12,15,17,20) **SPECIAL!!**
AP8 (80 - 10 Vertical)
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40-2CD 2-el 40M. beam
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ARX-2B Ringo Ranger II
A147-11 11-el 146-148MHz
215WB 15-el wide band 2M
32-19 19-el. 2M beam
4218XL 18-el 2M Boomer
424B 24-el 432MHz
AOP-1 OSCAR pack
Call for prices on the entire line!



A4S

ROTATORS



TELEX/hy-gain

AR-40	3.0 sq. ft.
CD 45 II	8.5 sq. ft.
Ham IV	15 sq. ft.
T2X	20 sq. ft.
HDR-300	25 sq. ft.

220 Volt Models in Stock.

YAESU

G-400RC Light/medium duty.
G-600RC Medium duty.
G-800SDX Medium/heavy duty.
G-1000SDX Heavy duty.

Elevation & az-el. rotors:

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G-5400B Az-el.
G-5600B Az-el.

M²

MT-3000 This is a heavy duty
elevation rotor for **LARGE** VHF
and EME arrays

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Solid: 12 ga...\$0.12/ft.; Solid: 14 ga...\$0.09/ft.; Stranded 14 ga...\$0.10/ft.

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Standard(6-22, 2-18).....\$0.21 Heavy Duty(6-18,2-16).....\$0.38/ft.

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Connectors installed for additional fee.

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Power up for the spring VHF / UHF season!

MFJ

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 ACCESSORIES SWITCHES



989C TUNER

TNC UNITS DUMMY LOADS
 ANTENNA BRIDGES

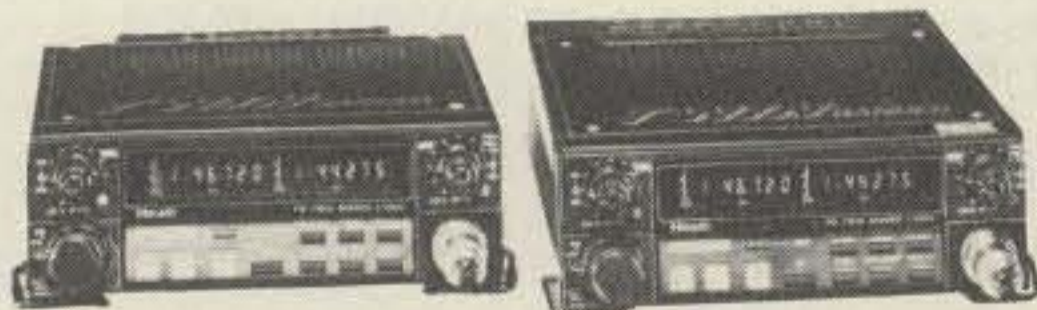
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HEATH



SB-1000 Linear Amplifier Kit



HW-24/HW-24H Twin Band Mobile Transceiver / Repeater

20 memory channels with VHF/UHF operation. Two internal VFO's. Repeater function. The HW-24 runs 10 watts; the HW-24H runs 50 watts. Not a kit.

Dual Band Handhelds

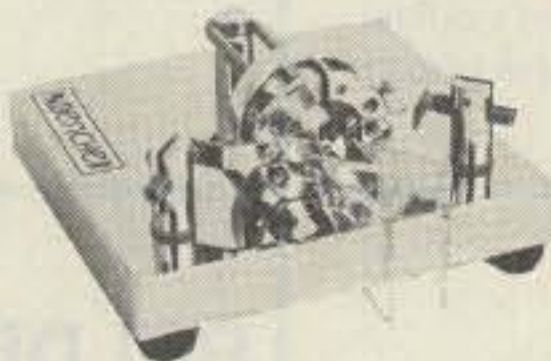
SA-2060 Delux Antenna Tuner Kit

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NEW! CONTROL LINE PROTECTORS. Now you can protect your rotor from surges and spikes on control lines just as the famous Alpha-Delta Transi-Traps have protected equipment connected to your coaxial cables for years. Call for prices.

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RS-20M.....109.95	RS-35M.....159.95	RS-50M.....219.95
VS-20M.....124.95	VS-35M.....174.95	VS-50M.....232.95

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Mast mounted, rf switched, Gaas fet, preamps.

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2-Meter On-Glass Antennas.....\$39.95

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We service amateur equipment.

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OMNI V

Features a 12 band crystal mixed local oscillator for the ultimate in receiver cleanliness. Dual VFO's, 25 tunable memories, full QSK, optional FM board, crystal filters selected independent of mode, output adjustable from 20 to 100 watts. **A GREAT RIG!**



Model 425 Titan Linear Amplifier



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IC-735

160-10M, General Coverage Receive, Dual VFO & 12 Memory Channels, QSK, Compact.



IC-2SAT

Keyboard, versatile scanning, 48 memory channels, clock, built-in NiCd's, & much more!



IC-765

160-10M with General Coverage Receiver; 99 Tunable Memories, Band Stacking Registers, Full QSK, 10 Hz Readout, DDS, & More. **Check out the great reviews on this radio!**



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SPECIAL!! On this and other ICOM 2 meter mobile transceivers. Call us!

ALINCO



DR-570T

Compact, dual band transceiver with 45W on 2M and 35W on 70 cm.. Full duplex cross band operation, 20 memories, 4 scanning modes, 16 key DTMF mic, extended rcvr coverage.

DJ-500T Dual Band Handheld

- 144.000-147.995 / 440 - 450 MHz
- Cross Band Full Duplex
- 2.5W VHF & 2.0W UHF
- (6 watts & 5 watts with optional battery)
- 16 Digit Auto Dialer
- 20 Memory Channels
- Programmable Odd Offsets
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All authorized amateur operating modes. Two independent radio connection ports. PakMail™ Mailbox with selective control of third party traffic. WEFAX transmission and reception. Plus many more features.



AT-300 & 3000 Tuners

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The VHF, UHF, & OSCAR machine. It does it all.



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- FT-212RH 45W 2M FM Transceiver
- FT-712RH 35W 440 FM Transceiver
- FT-709R 4W, 440 FM HT
- FT-4700RH 2M/440 Dual band mobile
- FGR-8800 150KHZ - 30MHZ Receiver

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CQ REVIEWS:

The AEA Model AT-300 Antenna Tuner

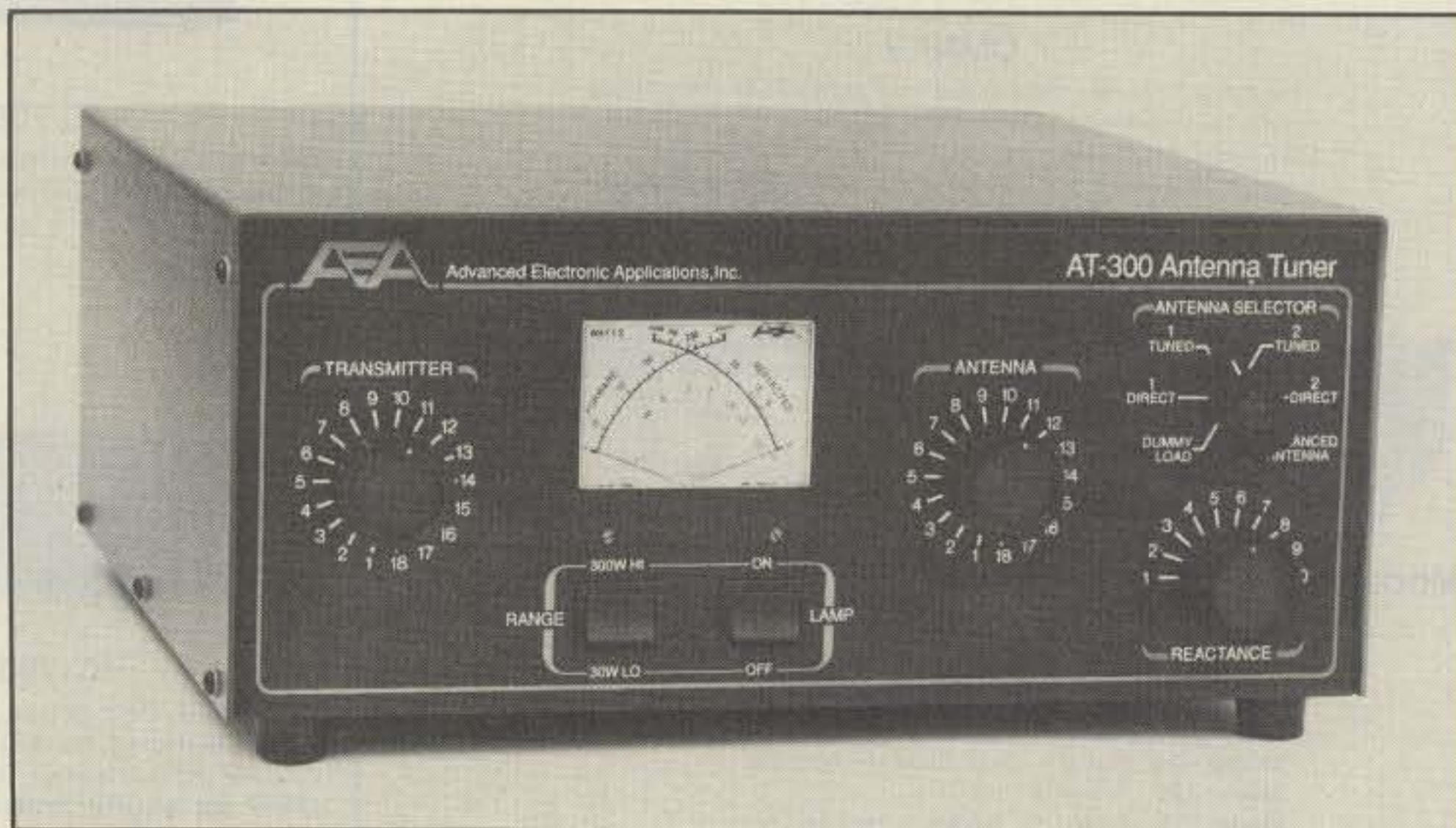
BY LEW McCOY*, W1ICP

When Advance Electronic Applications (AEA) brought out their new antenna tuner (Transmatch), I had the opportunity to review the unit for CQ. The Model AT-300 is a departure from the conventional two capacitor, one inductor (Walt Maxwell, W2DU) circuit. I have shown both types in fig. 1 at (A) and (B). Before going ahead, let me backtrack a little into the history of the antenna tuner so you have a better idea of the whys and wherefores.

Back at the inception of the Novice license in the very early 1950s, my main job in the Technical Department of the ARRL was writing articles for the new Novices. We quickly realized at the time that Novices were getting into trouble with second harmonic radiation from 80 meter operation because the harmonics fell just outside the 40 meter band, causing problems to commercial services. The FCC asked the League to concentrate on educating the Novices about the problems, and more important, the cure. It fell to me to do the job.

The solution was to have better harmonic rejection from the rigs of that day, and the simple answer was antenna tuners, because most of these circuits would provide at least 30 to 40 decibels of harmonic rejection, which was more than adequate. I soon found myself describing tuners at least twice a year, and in some years even more often. At about the same time in the technical history of amateur radio, 50 ohm, multiband coaxial output became popular. Therefore, the search was on for a bandswitching—or multiband—antenna tuner that would work into 50 ohms and match a wide variety of antenna loads. The first of these circuits was called the 50 ohm Transmatch, which eventually became the basis of all modern tuner circuits. As an aside, the name "antenna tuner" was never really appropriate, because one doesn't "tune" an antenna, but rather matches an antenna system. Hence the word *Transmatch* was coined.

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



Front view of the antenna tuner.

I tried both the circuits shown in fig. 1 back in those days, and my conclusion was that while the two-inductor approach had better harmonic rejection, it was much tougher to get the parts—particularly switches. The use of two inductors and a single capacitor worked just as well as two capacitors and a single tapped inductor in most cases as far as matching was concerned. The main reason I never used the two tapped inductors was simply that it entailed using switches with multi-contacts, and they were hard to come by, as I stated above. Of course, AEA solved that problem by manufacturing their own switches. I am sure that arguments will go on over the merits of the two systems, but from my viewpoint . . . Let me tell you about my tests with the Model AT-300.

The Model AT-300 is rated as multiband, or rather continuous coverage from 3.5 to 30 MHz, which of course includes MARS frequencies. It does not cover 160 meters. Fig. 2 is the circuit diagram of the 300. The circuit uses the two tapped inductors; both have 18 positions with a 240 pF maximum capacitance variable (35 pF minimum). Additionally, the unit will handle two coax-fed antennas plus either a balanced or single-wire feed. The antenna switch also provides a switch position for a dummy load and two

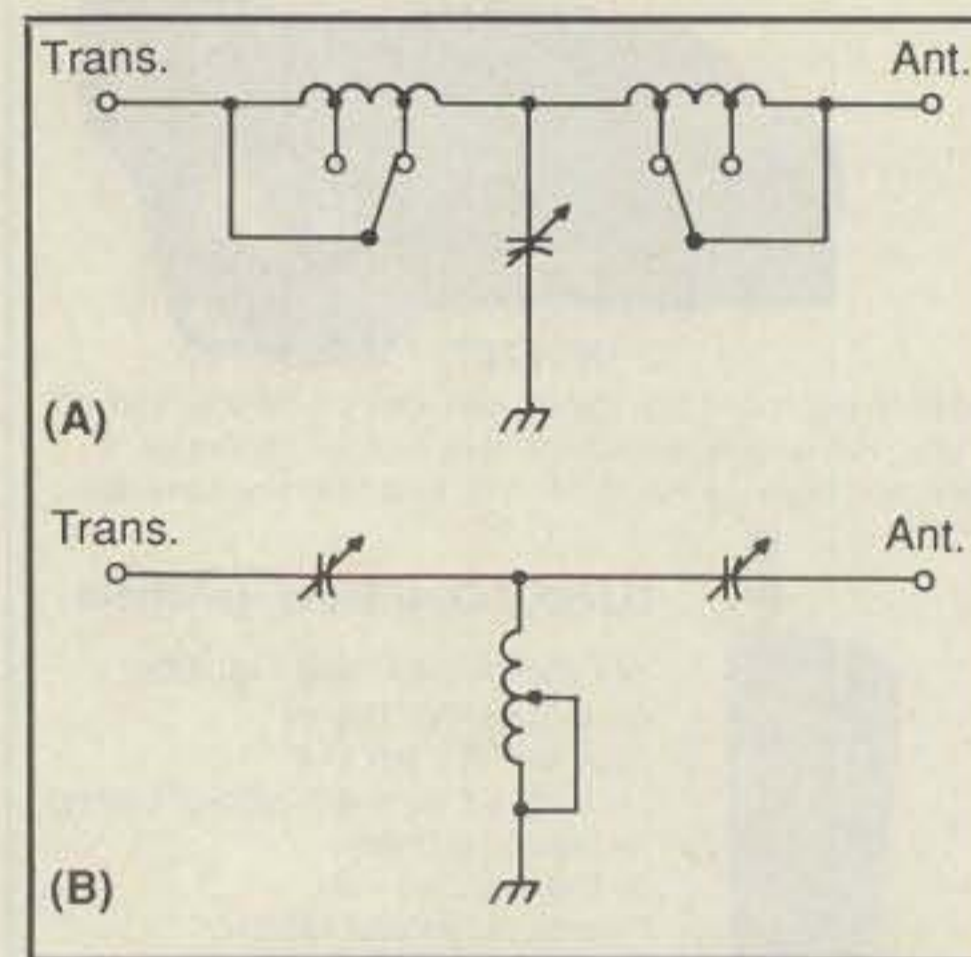


Fig. 1—At (A) is the circuit for the two-inductor-type tuner, while at (B) is the two-capacitor type.

positions (coax feed antennas) for direct feed, bypassing the tuner. There is a two-position rocker switch that selects the range of FORWARD and REFLECTED power displays. HIGH selects forward power of 300 watts, 60 watts full scale reflected. Low selects 30 watts full scale and reflected 6 watts. The meter is a dual-needle type.

My first test was with an 80 meter double extended Zepp with open-wire feed-

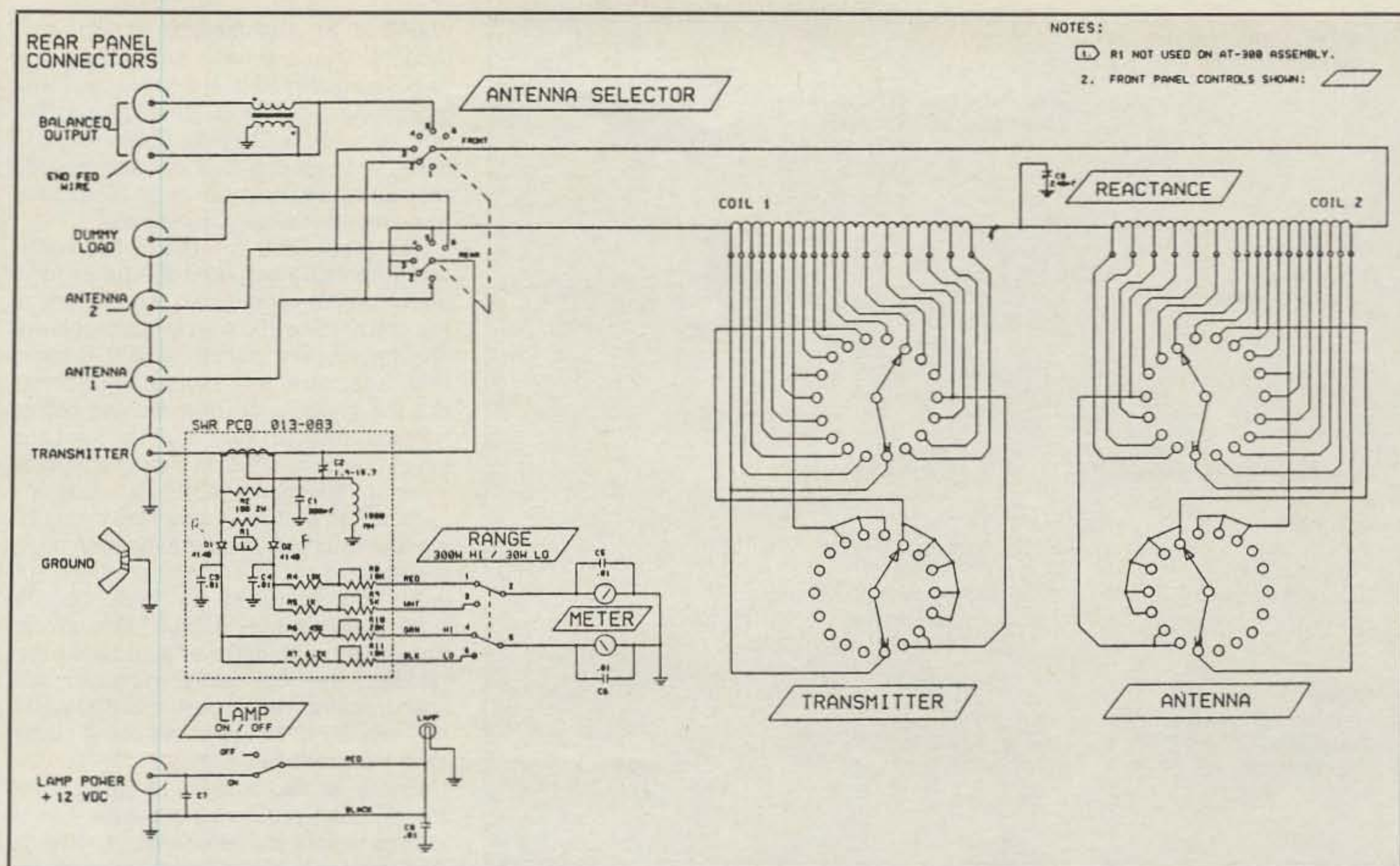
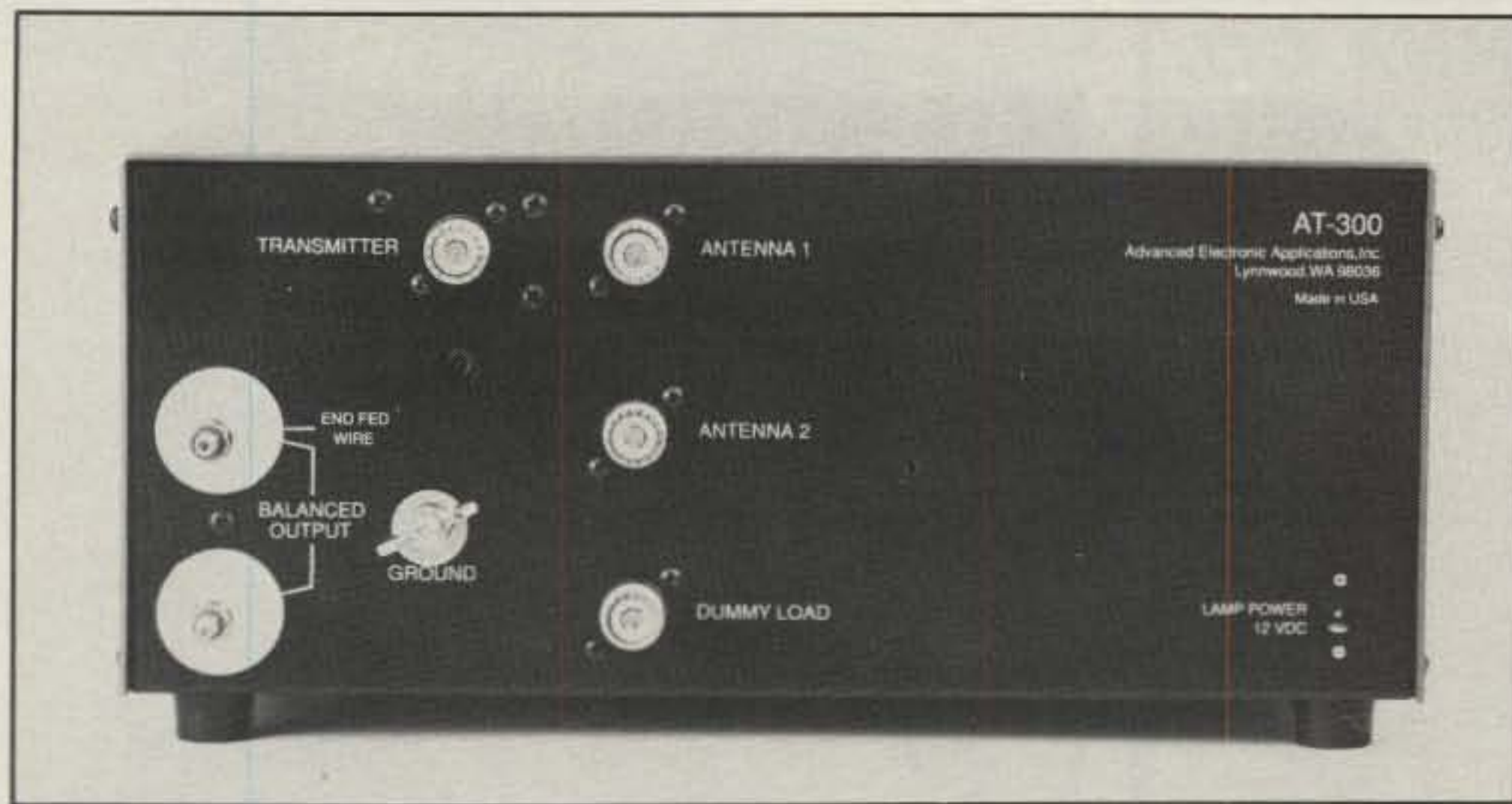


Fig. 2—Circuit diagram of the Model AT-300. At the upper left at the balanced input is the toroidal transformer for converting from single to balanced input.



Rear view of the Model AT-300. At the bottom left are the two isolantite feed-throughs for the balanced input. To the left of center are the three coax antenna inputs.

ers. This antenna presents a very wide variety of loads, and I consider it excellent for testing Transmatch ranges. I carefully went through each band, including the WARC bands, and found that in most instances I could achieve a perfect match, 1 to 1. Even in those cases where I could not, the match was less than 2 to 1, which is adequate for nearly all modern transmitters.

Next I went to what I call a really acid test. I connected two clip leads with

about 3 feet of wire and went to 3550 kHz. This antenna would present a ridiculously low impedance, only a fraction of an ohm. I was pleasantly surprised when I achieved 1 to 1 match! Next I connected an 1800 ohm reactive load (wire wound) resistor and found I could match that. Then I went to a 3600 ohm load and matched that. That was enough to satisfy me—almost.

I had the 3600 ohm load connected across the balanced terminals and adjusted for a match on 15 meters. I heard

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Other

Frequency Coverage 3.5-30 MHz
 Power Maximum 300 W continuous
 Dimensions 5.8"H x 12.8"W x 15"D
 Weight 9.0 lbs

Table 1 - These are the manufacturer specifications for the Model AT-300.

W4PC in St. Petersburg, Florida, so I thought what the heck and gave him a call. You guessed it. He came back and gave me a nice report. Next, believe it or not, I worked a ZL, New Zealand on 10 meters! I assume that my dummy-load resistor was coupling enough RF to other antennas, but who really knows?

The Model 300 is rated at 300 watts, and I carefully adjusted the tuner for a match on the various bands and then ran the power up to 300 watts—no problems. The instruction manual, which is more than adequate and well written, points out the importance of matching before running power, or you are likely to get arcing of components. You should also keep in mind that some antenna loads are "sharp," in that you cannot QSY very far without retuning. I had that happen on 80 meters and got an arc when running 300 watts, but that was my fault, not the tuner's. As a matter of fact, I actually ran the power up to 500 watts and the tuner handled the load okay. However, the manufacturer rates the unit at 300 watts, so I would not recommend going higher than their ratings.

There is also a lamp to light up the meter, but it requires a separate 12 volt source which I will admit I didn't bother to try. The Model AT-300 is housed in a black cabinet, 5.8"H x 12.8"W x 15"D. 

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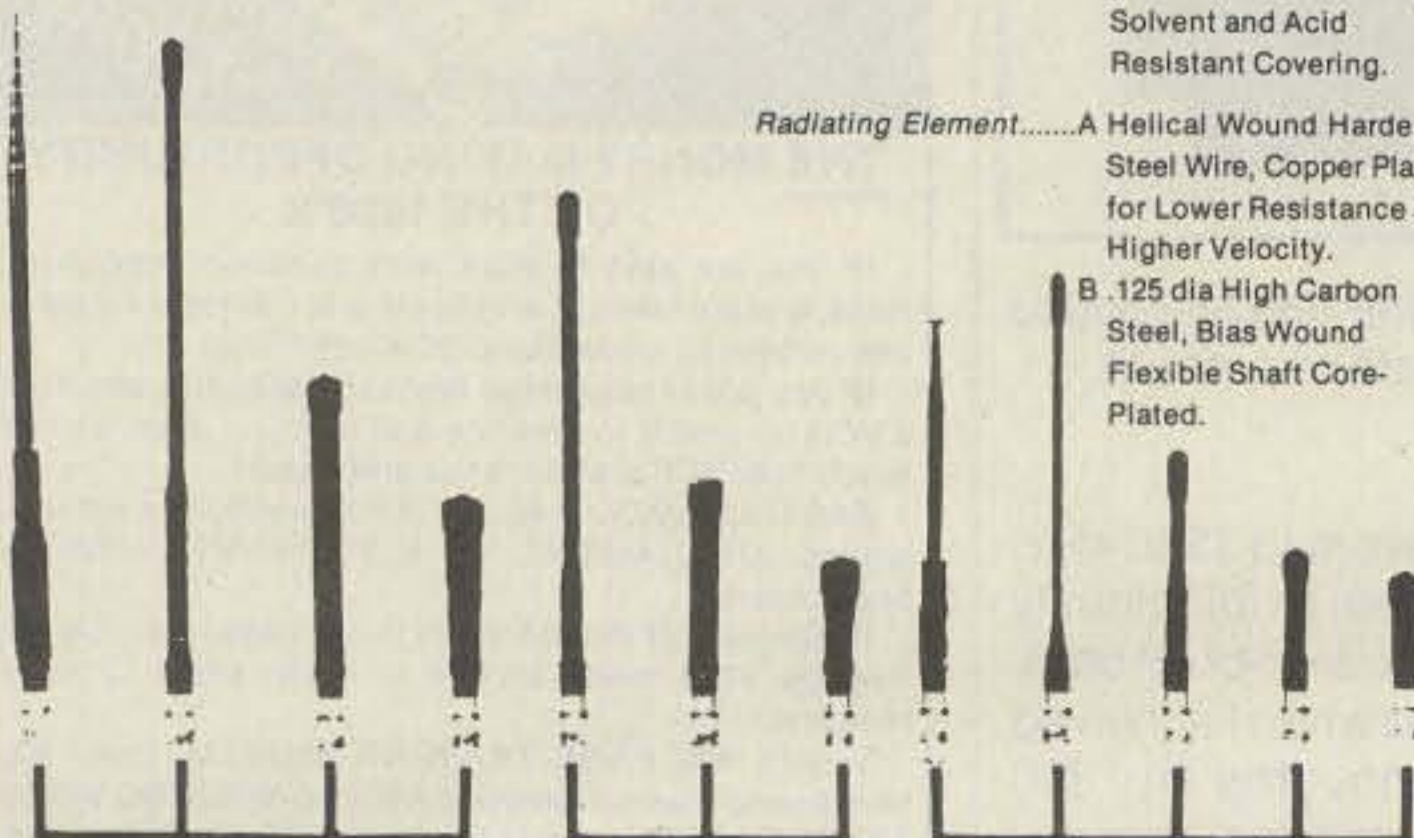
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CIRCLE 142 ON READER SERVICE CARD

With great weather in the offing, it's time to think of HF mobile. WA2VQW shows us how to build a 15 meter mobile antenna out of readily available components.

The DX Dowel

How To Build A 15 Meter Mobile Antenna

BY MICHAEL MARDIT*, WA2VQW

April is a particularly good time for low-power DX communication on 15 meters. I've developed more than a casual interest in mobile operations, due mostly to my activity on the 14.336 mobile net. I have endeavored to test my skills at the prospect of working 100 countries on 15 meters while operating mobile during the spring and summer with only 20 watts average output power SSB (as determined by RF ammeter and calculation, under key down conditions, into 50 ohms).

While there are many good commercial mobile antennas on the market, purchasing an antenna is not my style, and besides, mobile antennas are easy to make at a fraction of the cost. The antenna now in use cost me about \$6.00 to make, was constructed mostly of materials readily available in my local lumberyard and hardware store, and went together quickly and effortlessly during a Saturday afternoon. The antenna is of the continuously loaded helix variety and is constructed of five basic parts as listed in the parts list and shown pictorially in figs. 1 and 2 (refer to fig. 1 and 2 before beginning construction).

Fabrication

The first step is to turn down the head of the cap screw so that it can be jam-fitted to one end of the pipe nipple. This is accomplished by placing three layers of masking tape around the shaft of the screw (to protect the threads), placing the screw in a $\frac{3}{8}$ inch drill or drill press, and while spinning the screw, carefully filing down the outside edge of the cap to reduce its diameter. When finished, the cap of the screw should be able to be jammed into one end of the pipe nipple in such a manner as to allow the bottom of

the cap to be flush with the bottom of the pipe. Now with a propane torch, heat up the area of the pipe assembly which contains the cap screw and melt enough solder into the pipe to fill the pipe $\frac{1}{2}$ inch over the top of the head of the screw. The solder when properly applied will fill the hex indent at the top of the cap screw and bond the screw to the pipe. Be careful not to melt solder on the inside pipe walls. I drilled a $\frac{3}{8}$ hole in a scrap of 2 x 4 lumber to support the screw and pipe assembly during the soldering process and to hold them vertical. After cleaning out the flux residue with solvent, the antenna support mount is now ready to accept the dowel.

Insert the dowel into the open end of the antenna mount so that the bottom of the dowel is resting on top of the solidified solder. Using a sharp number 51 drill bit, drill two holes 90 degrees apart through the dowel-pipe assembly as shown in fig. 1. Insert the two #14 wires through the assembly; this may be accomplished by placing the end of the wire on the hole and tapping lightly with a tack hammer. File the ends smooth. They may be soldered to the surface of the pipe if you wish.

The top 2 inches of the dowel is now dressed with a layer of PVC tape so that the PVC tubing will force fit onto the dowel. Now wrap a single layer of PVC tape along the entire length of dowel and PVC tube-assembly. This covering of tape will serve two purposes: It will keep the magnet wire from sliding as it is applied to the dowel, and it will keep moisture from entering the wood.

The magnet wire or other form of #18 solid wire is now ready to be applied. Begin by soldering one end of the wire to the top side of the nipple and start to wind the wire. Make a tight winding and space according to fig. 2. When complete, insert the end of the wire through the small hole at the top of the PVC tubing and secure it in place. Finally, wrap the whole winding with PVC tape, and plug or caulk the top section of PVC tubing.

I'd like to thank Bob, N2DVQ, for generating the artwork.

Operation

The antenna was mounted on a standard spring/swivel ball mount, which is avail-

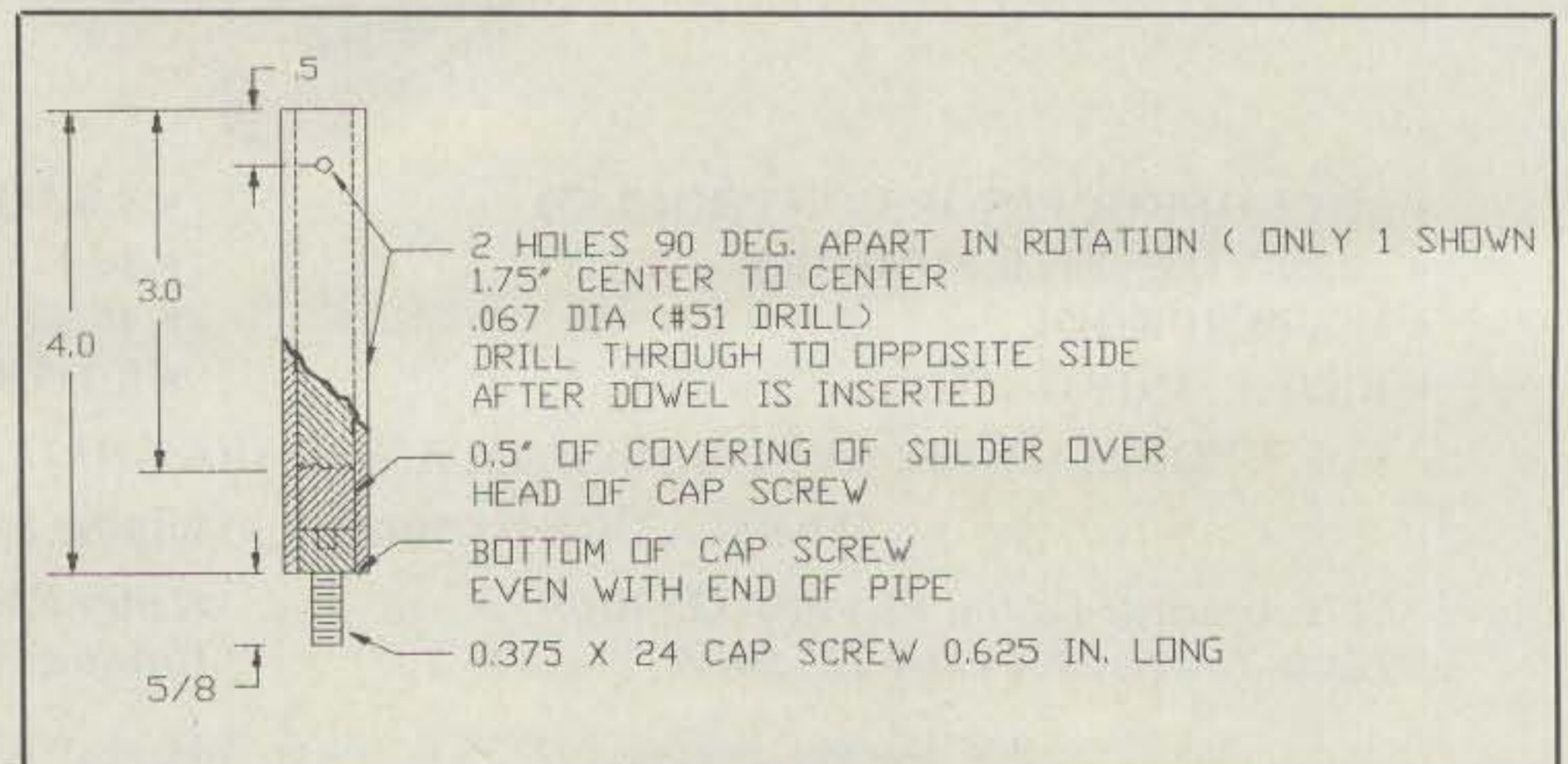


Fig. 1—Mechanical details of the 15 meter mobile antenna base section.

*642 Challinor Dr., Yorktown Heights, NY 10598

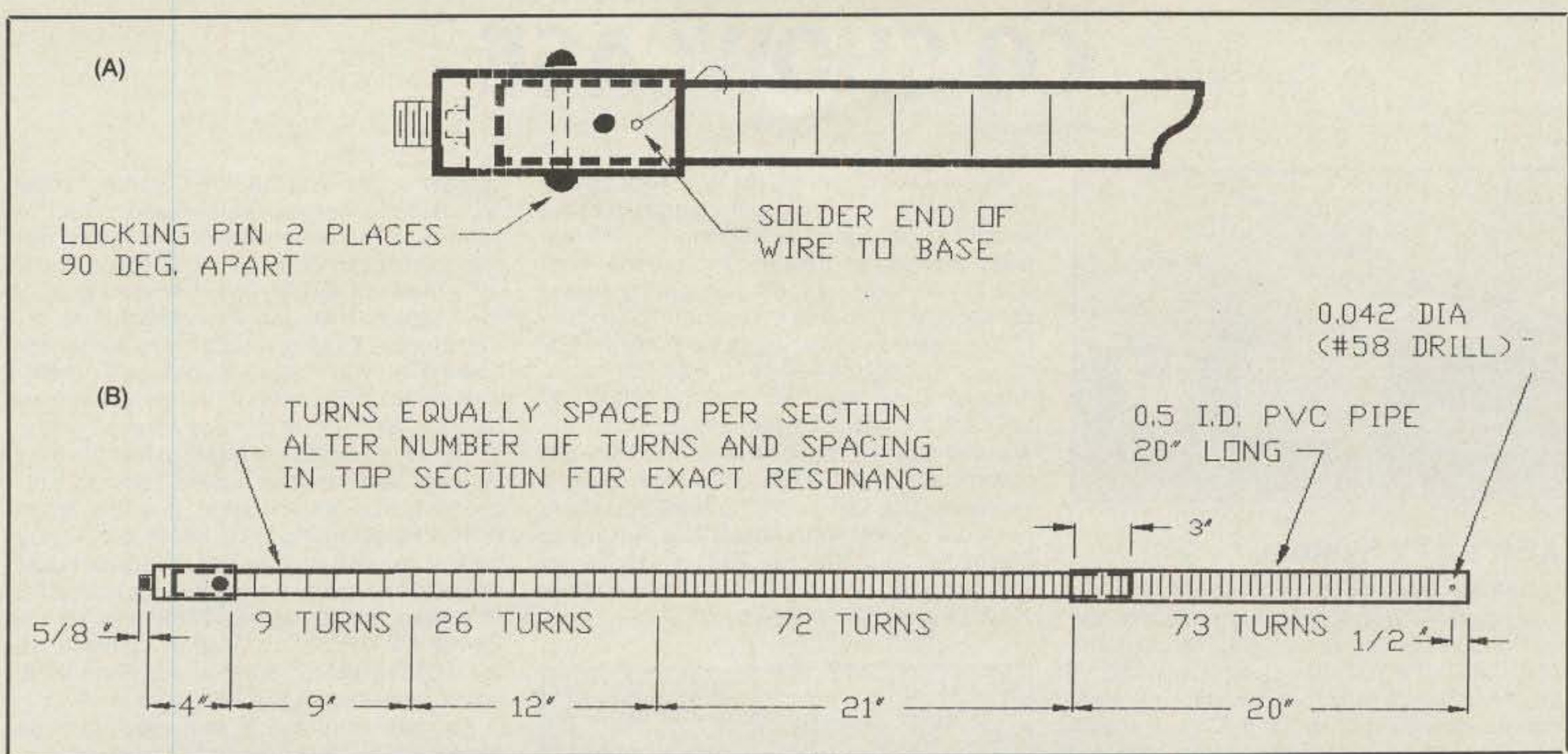


Fig. 2- (A) Base section antenna connection. (B) How to wind the wire helix.

able from Radio Shack. I mention this because the ball and spring are part of the antenna's overall electrical length.

Using the SWR bridge in my Argonaut 509 and running 2 watts output, as measured with an RF ammeter, the SWR was checked at 50 kHz points across the band. Absolutely no reflected power could be observed anywhere on the band and a 1:1 match was recorded.

In my mobile installation the Argonaut drives a 6146 linear amplifier to 20 watts average power output for the needed boost.

In New York, the New York State Police take a dim view of mobile antennas "swinging around in the breeze." With nylon mason cord I tether my mobile antennas to the plastic coat hangers at the inside rear of the vehicle and place some vinyl sleeving at the points on the cord where the rear doors close. This method has proven to be very effective. While allowing for some movement, it holds the antenna basically vertical and appears to reduce the QSB associated with gross antenna displacements, while keeping the state police happy.

Results

The ability of this mobile antenna to work DX with low power is impressive. Most of the stations I work reward my efforts with S6 to S9 signal reports and say "excellent signal for a mobile." In the last 6 months I've worked 96 countries on 15 meters, including great DX such as BY4RB, A92BE, S92LB, and HL5FEE. My greatest DX versus output power, however, was VK3ZJ. While parked with the engine off, running

1/2 watt output power, he gave me a 5 x 5! (QSL in hand.) The only problem I've encountered, in fact, is that it's hard to convince some people that I'm really mobile!

I'm quite satisfied with my weekend project; although it's not quite the "coil of wire on a broom-stick handle," it's pretty darn close, and most important it works!

Parts List

One 3/8 x 24 x 5/8" socket head cap screw threaded to the bottom of the head. (Screw with round head that is hex indented.)

One 4 inch piece of 1/2 inch brass water pipe, 1/2 inch inside diameter, commonly referred to as a pipe "nipple" (does not have to be threaded).

One 4' x 1/2" hardwood dowel of sound condition.

One 20 inch piece of 1/2 inch ID PVC water pipe.

About 25 feet of #18 solid-bare or enameled wire.

Misc: PVC tape, 2 inches #14 solid wire, etc.

References

"Continuously Loaded Helical Whips," *Radio Amateurs Handbook*, 1971 ed., page 481.

"Mobile and Maritime Antennas," *ARRL Antenna Book*, 15th ed., chapter 16.

"Short Wave Coils," *Radiotron Designers Handbook*, F. Langford-Smith, 4th ed.—1953, pages 463-474.

"Dielectric Constants," *Introduction to Electrical Engineering*, Mueller, 3rd ed.—1957, page 337.



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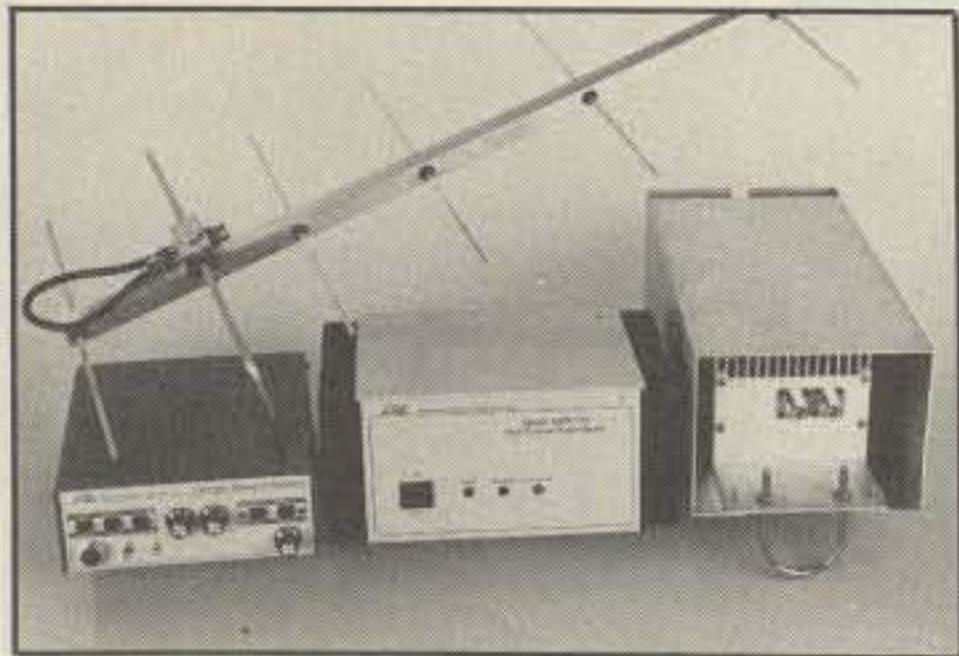
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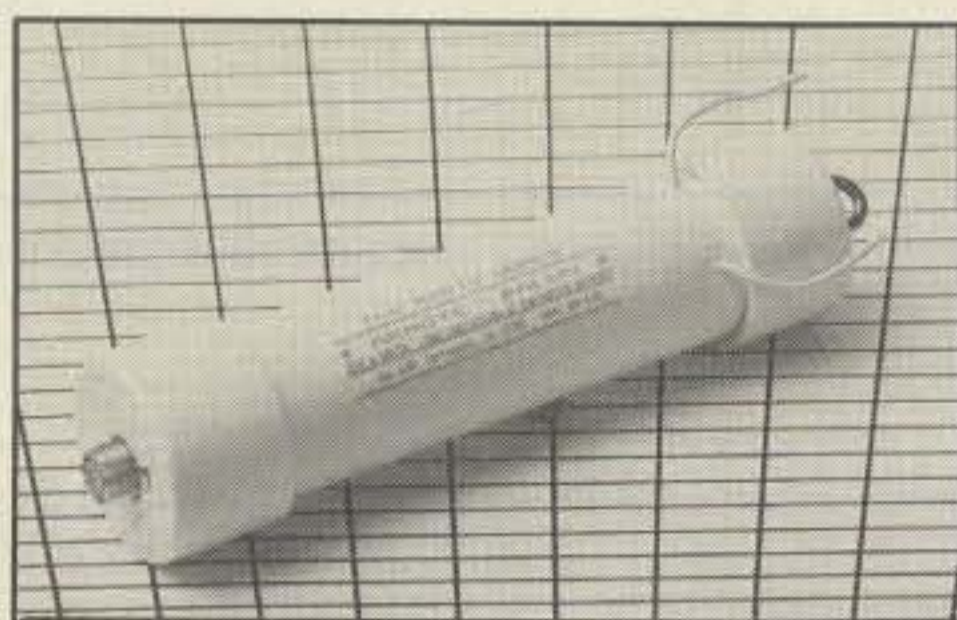
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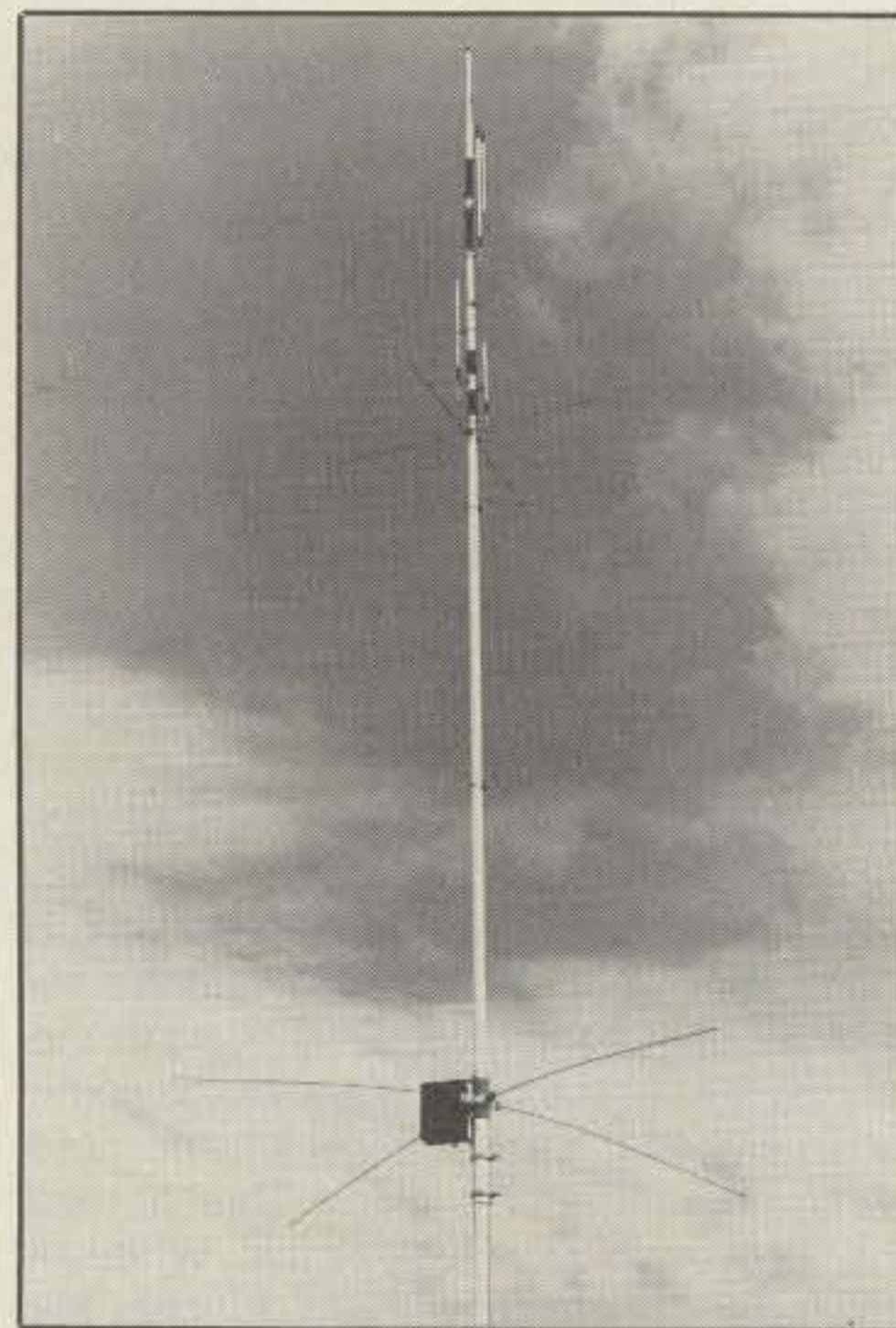


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The R5 is suited for limited-space applications such as apartments, condominiums, and

(continued on p. 112)

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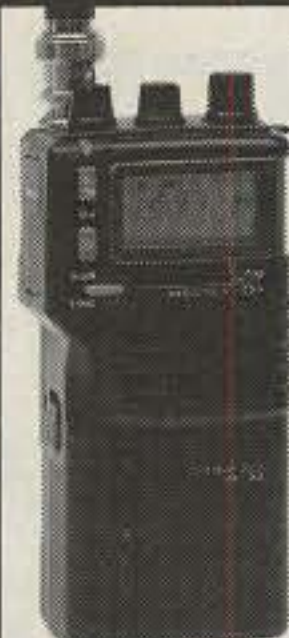
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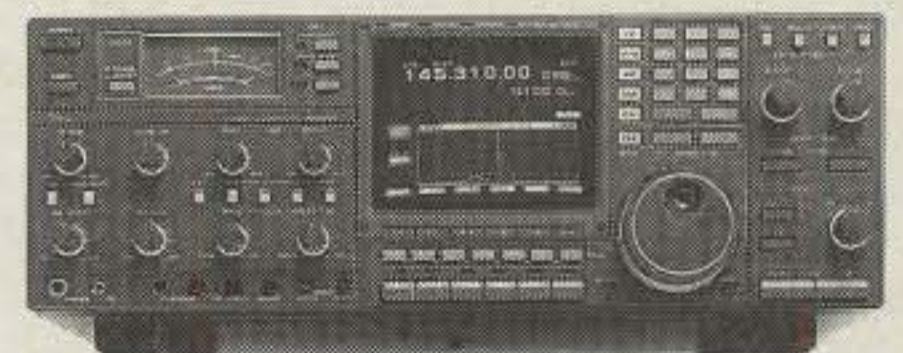
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CQ REVIEWS:

The Ameritron AL-80A Linear Amplifier

BY PETER O'DELL*, WB2D

The Ameritron AL-80A is a solid-built, attractive amplifier that will provide yeoman service for the casual operator. A single 3-500Z tube in grounded-grid configuration produces at least 850 (CW) watts out on 160-15 meters. Like most other amplifiers on the market in the U.S. these days, it is easily modified for 10 meter service, but more about that later.

Ameritron ships the AL-80A in two packages: one with the amplifier itself and a second with the 3-500Z. The user must remove thirteen Phillips-head screws to take the cover off. (How did we ever get along without cordless screw drivers?) It only takes a few minutes, and the instructions are clear and easy to follow. The plate-cap connector has a parasitic suppressor circuit (resistor and inductor) attached to it. Make sure that the solder lug is properly oriented as you slip the plate cap over the plate connector. You'll need a small flat-blade screwdriver for the set screw. That's all that there is to it.

That whole operation should take even an inexperienced newly licensed amateur no more than a few minutes. While the cover is still off, there are a couple of other procedures that should be considered.

First of all, the AL-80A can be used with either 110 or 220 volts AC. It is shipped from the factory configured for 110 volts AC. Although I have friends who've used amplifiers with two 3-500Zs on 110 VAC, I would never do it if there was any way of getting 220 VAC to the amplifier. Converting the AL-80A to 220 VAC operation is a simple matter of moving two jumper wires on a terminal block. Again, the instructions are clear and straightforward. It took me about 2 minutes to make the change.

A second consideration is whether to modify the unit for 10 meter operation. If you supply Ameritron with a copy of your license, they will provide you with the in-



The Ameritron AL-80A amplifier. The panel sports a clean, sleek look that should blend in nicely in any station.

formation for making the conversion. A simple hand-tool is all that is required to enable 10 meters on the AL-80A. This operation will take you about 10 seconds. Once you've completed these operations, you're ready to put the cover back on and fire up the unit.

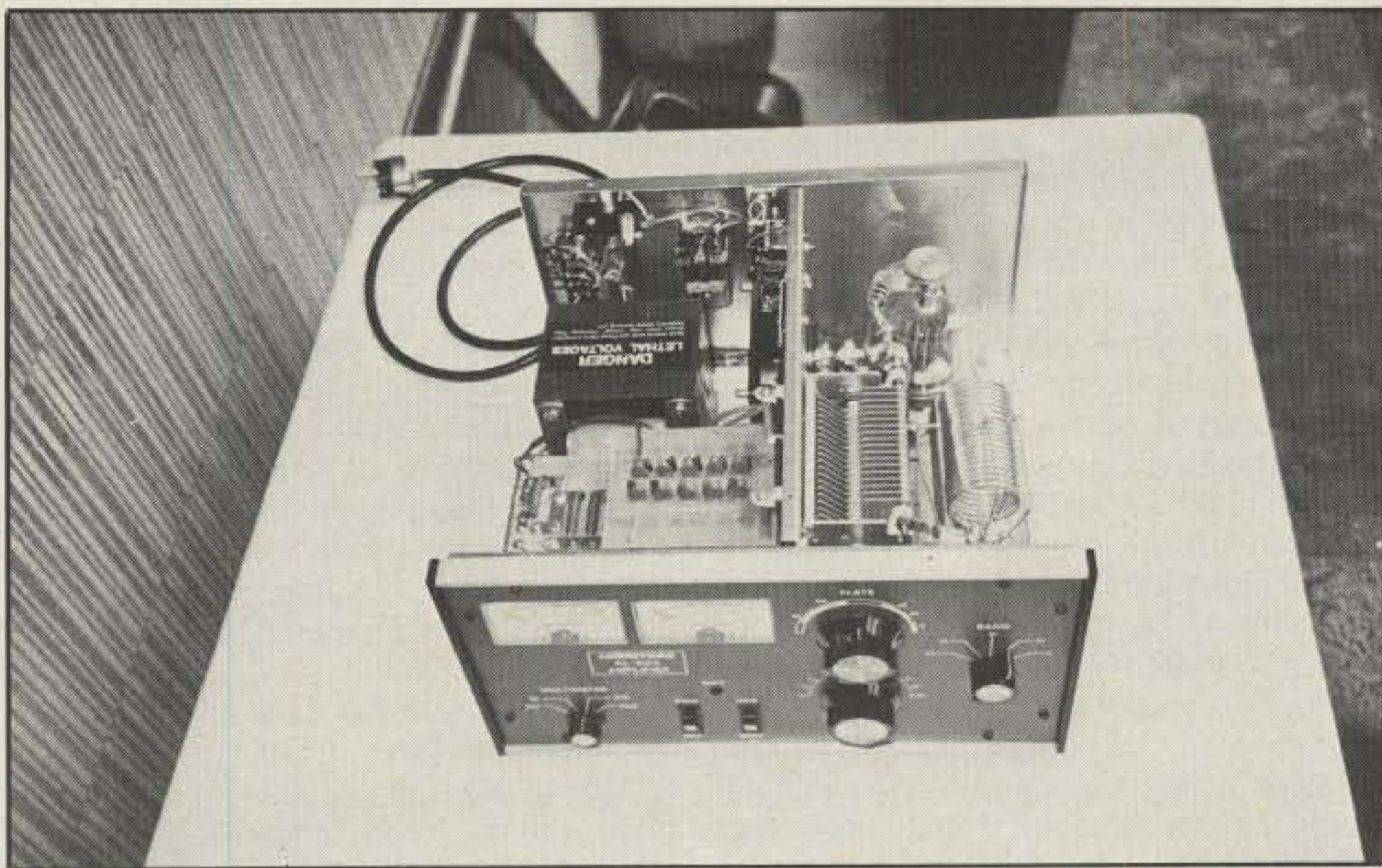
Connections

Connecting the amplifier to the station could not be simpler. On the rear panel you will find two SO-239 (standard UHF female) connectors for RF input and output. Simply connect the existing station antenna (or jumper to an antenna switch or tuner) to the output connector. By the way, if the AL-80A is your first amplifier and you've been using RG-58 or some other small-size cable for your antennas, you might consider switching to RG-213 or similar for all connections between the amplifier and antenna. (This becomes an important consideration if you are using a tuner to match an antenna with an SWR

greater than, say, 2:1.) You'll need a jumper to connect the transceiver to the amplifier input jack. That takes care of the RF connections.

The AL-80A is equipped with a relay that switches the amplifier inline when you key the transceiver. Most, if not all, transceivers are equipped with a relay or transistor switch that is activated when the PTT switch closes. An RCA jack on the AL-80A provides a means for using the transceiver switching circuitry to actuate the amplifier relay. An ordinary audio-type jumper can be used for the amplifier end of the cable. The other end will depend on the requirements of the transceiver being used. The user must supply his own cable. Under normal conditions it should take no more than a few minutes to connect the relay circuit—even if it is necessary to fabricate a jumper from scratch. Your transceiver switching circuit must be capable of "sinking" 100 ma, and virtually all are, to activate the relay.

*Special Projects Editor CQ



Inside the AL-80A. Solid construction techniques and first-quality components should add up to years of service.

A second RCA jack provides for connection of the ALC circuitry. Again, the exact jumper configuration depends on the mating jack of the transceiver. You should use a shielded audio-type cable to connect the 0-20 volt (negative) to the transceiver. The ALC adjustment control is also located on the rear panel. Proper adjustment should take no more than five minutes. Once it is set, you will only need to repeat the procedure if you change transceivers.

In addition to the ALC control and these jacks, you will find some miscellaneous items on the rear panel. The power cable exits the unit through a strain-relief-type grommet. A grounding post with a wing nut is available for making a good ground connection. Two fuse holders are accessible, also. Finally, another RCA jack provides 12 VDC at 100 ma for powering miscellaneous dial lamps or similar uses. Connections should be a breeze, even for an inexperienced operator. Ameritron provides a large, clear pictorial diagram of the rear panel and associated connections in the owner's manual. Additionally, everything is clearly marked in large white letters and numerals on the rear panel.

Meters and Switches

The Ameritron AL-80A has two illuminated panel meters. A grid-current meter provides constant reading of the grid-current. Not only does grid current provide an excellent indicator of proper operation of the amplifier, it will also tell the operator if conditions are placing the 3-500Z in danger. Although the 3-500Z is one of the most rugged and durable power am-

plifier tubes used in the amateur service, it can quickly be destroyed by excessive grid current. It was a relief to be able to constantly monitor grid current without having to play with switches.

The second meter is a multi-function unit that the user switches among plate voltage, plate current, peak RF watts, and ALC. Switching is accomplished with a convenient and clearly marked rotary switch. The peak-reading RF wattmeter was only slightly more "optimistic" than the laboratory-grade Coaxial Dynamics wattmeter that I checked it against.

Both of the AL-80A meters are large and easy to read. Backlighting, clear scale markings, and size make it easy to discern operating conditions with just a glance, even in a dimly lit shack. The front panel is attractive without any sacrifice of functionality.

In addition to the meters, you will find the ON/OFF and STANDBY switches, which are of the rocker variety, on the front panel. The rotary BANDSWITCH is also located on the front panel. It is equipped with a 10 meter position, although the panel is only marked for 160 through 15 meters. Without performing the 10 meter modification, though, the 10 meter position will be inoperative. A bright red indicator lights when the amplifier is placed in the transmit mode. Of course, the PLATE and LOAD controls are on the front panel also. One very pleasant note here is that these controls are equipped with vernier drives that makes it very simple to peak the meter readings.

Operation

For those readers who have only used solid-state rigs, tuning a tube-type ampli-



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fier may seem a little intimidating. If you grew up with tubes, about all you have to do with AL-80A is follow common sense. But if "dipping the plate" sounds like some sort of dishwashing detergent advertising copy to you, you'll be happy to know that Ameritron has included complete, clear, concise tune-up instructions for you to follow. Ameritron provides a chart for presetting all the controls for each band before tuning up. I see no point in covering the instructions in detail here; suffice it to say that they are more than adequate for even the most inexperienced operator.

On-the-air performance has been considerably more than I expected, to tell the truth. Before hooking up the AL-80A, I was mentally comparing it to my Heath SB-220, which I've used for the last 10 years or so. Since the 220 uses two 3-500Zs and the AL-80A only has one, I expected substantially less from the AL-80A—what you would normally get with a 3 dB difference. In practical terms, what I found was a big difference between the transceiver barefoot and with the AL-80A inline; but I found the difference between the AL-80A and the SB-220 to be less than I would have guessed. There's no question that the SB-220 will put out more watts than the AL-80A, but stations on the other end find it far more difficult to notice that difference than they do the differ-

ence between barefoot and with the AL-80A.

Initially during the review I was involved in an effort to get a zoning variance to put up a modest tower. Since my interests are primarily chasing DX, I limited my operation to 75 meters late at night and occasional forays into 10, 15, and 20. Using a Kenwood TS-680S to drive the AL-80A, I worked any station that I could hear in the 3790-3800 DX window. Usually on the first or second call, too! The antenna that I use is the Create Design CV-48 vertical. Long Island is a giant sandbar, so soil conductivity doesn't explain it away. The amplifier is effective!

Incidentally, most if not all modern HF transceivers have more than enough power to drive the AL-80A to full output. Also, unlike some other amplifiers the AL-80A input circuit is well matched. What this means is that the SWR between the transceiver output and amplifier input is low enough such that the transceiver does not start automatically cutting back its power output.

Once I got the variance and the tower up, operation on the higher bands became equally impressive. Using a modest antenna and tower combination I've been able to work some very good DX with the aid of the AL-80A. It won't necessarily make you king of the hill, but it should put you up near the front of the pack, assuming that you have reasonable antennas.

Construction

The AL-80A is built around a rugged steel chassis. A color TV set operating in the same room shows no sign of any leakage from the cabinet. The accompanying photo shows the clean layout inside the unit. During the testing period I found that the built-in fan kept the unit running cool. I can't imagine any operator ever finding it necessary to mount a second outboard fan to keep the AL-80A cool. Phone operators will be interested to note that the fan is whisper quiet; no one will ask you if you are operating from a B-29.

The plate and load capacitors have wide spacing to ensure longevity. And the coils are silver plated to keep things cool as the RF flows through. Weighing in at 22 pounds, the power transformer has a core of hypersil steel EI laminations. The power-cord connections are completely by-passed to prevent any stray RF leaking out that avenue.

Operating weight for the AL80-A is 48 lbs. It measures 8 $\frac{3}{4}$ "H x 14 $\frac{3}{4}$ "W x 15"D. Price is \$995. Ameritron offers the PIN-5 QSK kit for use with the AL-80A. Factory installation is available for the PIN-5. For more information, contact Ameritron, 2375 Dorr Street Suite F, Toledo, OH 43607 (telephone: sales 601-323-9715, technical 419-531-3024).

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“Travels With CQ”

BY ALAN M. DORHOFFER*, K2EEK

Many of you read with apparent interest “Travels With CQ” in my editorial each month. I’m always asked, “How’s the food?” or “What’s good?” and even on occasion when I’ve made a major purchase at the fleamarket, “How are you gonna get that home?”

Well, the truth of the matter is that almost no one asks the

right questions in our travels. One of the right questions and the one that would probably be the most interesting is “How’d you get here?” It’s no secret that we do a lot of traveling each year, and I guess most people assume that we simply fly to whatever destination. Sometimes we do fly, but most of the time we actually load up the CQ Caravan and drive off.

We’ve been using the CQ Caravan for a number of years now, and it has allowed us to be at more places than we could fly to. We have used the caravan at shopping malls, schools,

*Editor, CQ

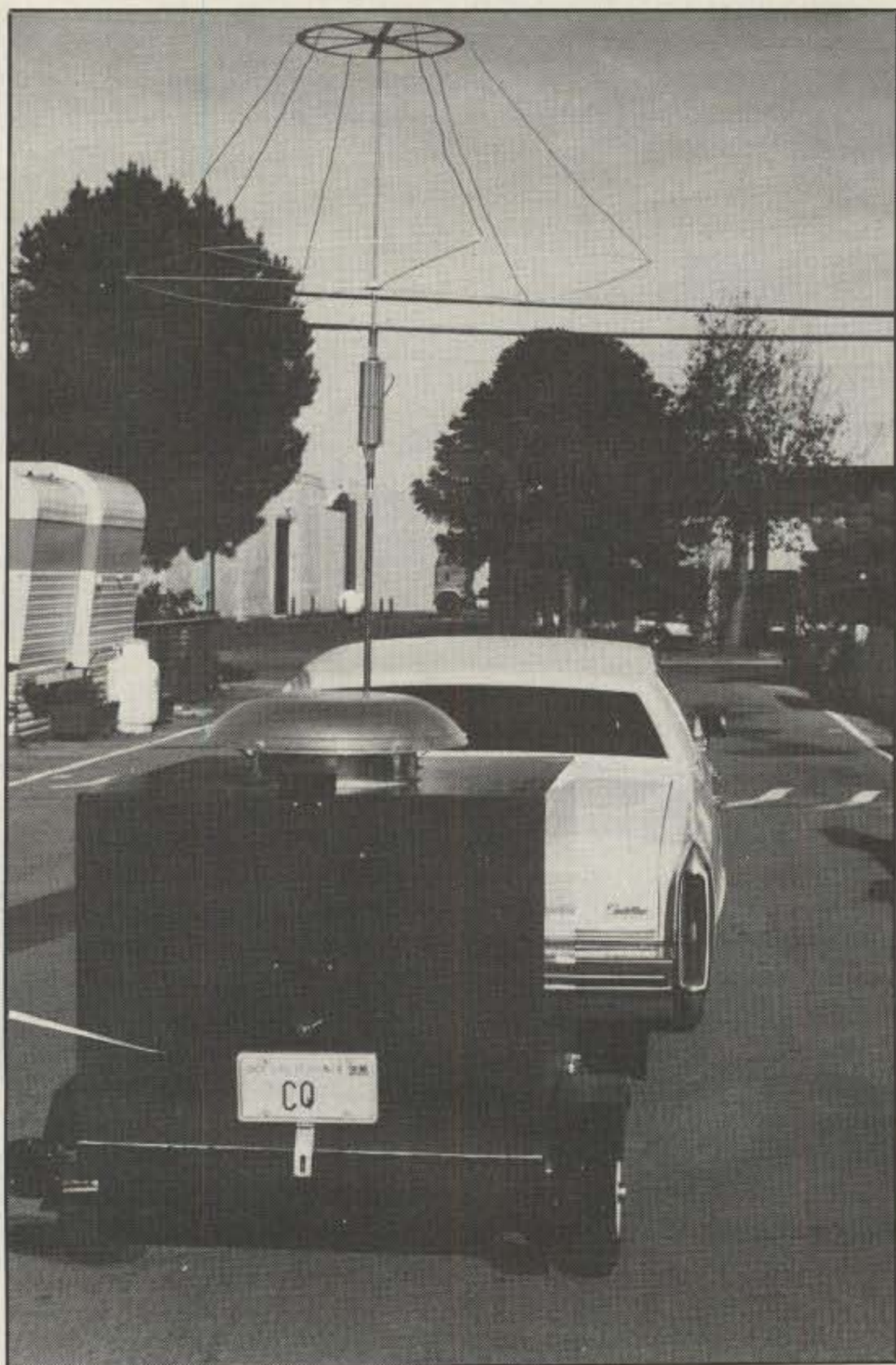


Fig. 1— This view shows the small CQ trailer (notice the catchy license plate) behind the luxury sedan. I believe Dick was at the wheel in this shot. The eye-catching (as well as bug-catching) antenna is quite obvious.



Fig. 2— Once the trailer hood is lifted, the reason behind the big signal becomes evident. No, it's not our spare clothes. It's the reason receivers cringe in fear—a multi-band KW-plus mobile amplifier able to move anywhere, even park in front of your house.

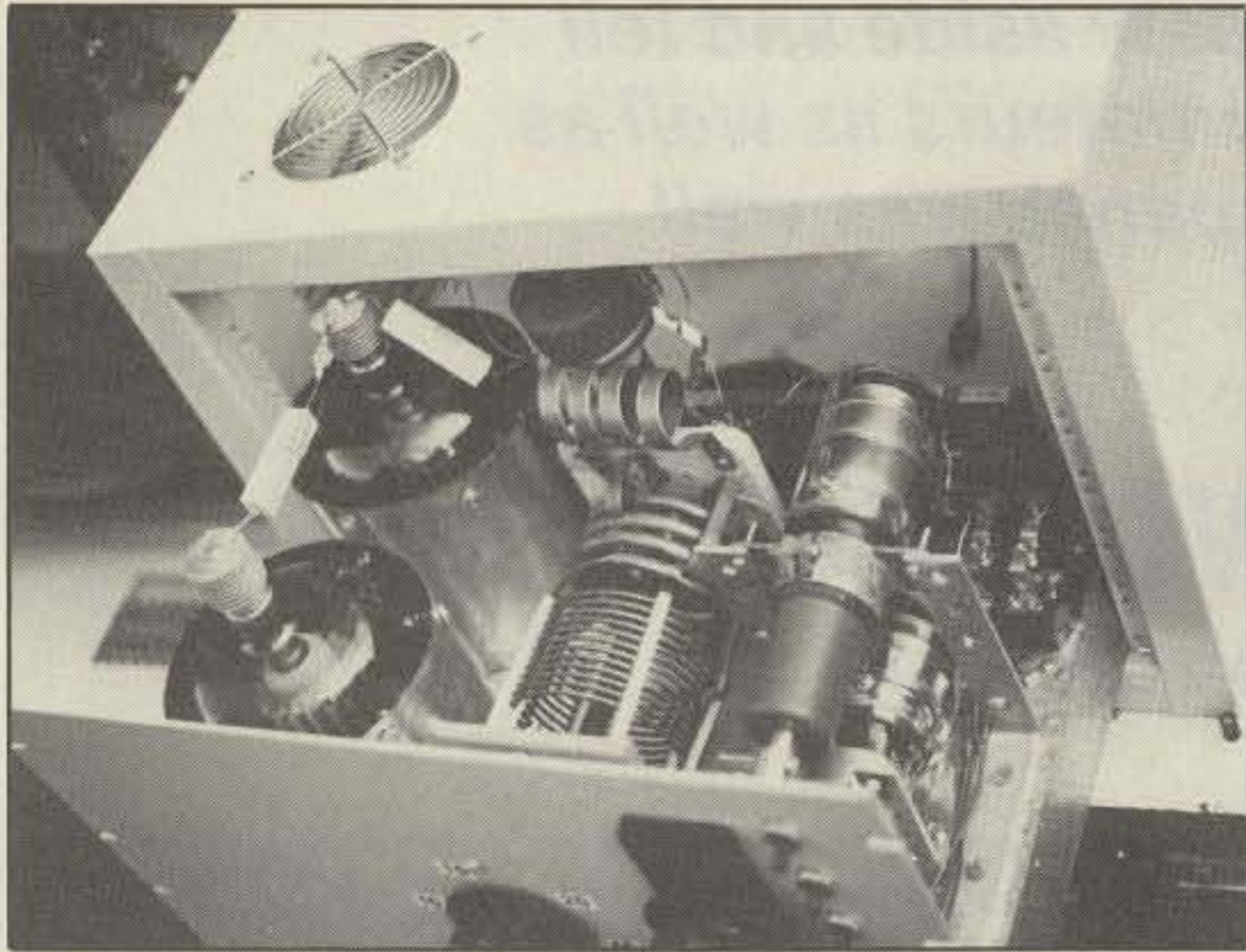


Fig. 3— Able to breach huge pile-ups at a single call, a pair of shock-mounted 4-1000s loaf along at 1500 watts PEP output. You've got to hand it to CQ Labs; they turn out one heck of a product.

parking lots, and wherever people congregate, demonstrating amateur radio as we go. The caravan is basically a large (luxury) sedan with an accompanying small trailer. Following close by is a large (50 foot) RV which is our actual living quarters and is where we keep our large selection of books and magazines. The RV is driven by our Master Chef, Jean-Claude, who prepares our gourmet meals at hamfests and at truck stops.

What makes traveling this way a pleasure rather than a chore is that we can operate the CQ Club Station anywhere we go. Zipping down the highway at of course the legal limit, we can also run the legal limit mobile, thereby making the trip a real pleasure. The mobile station is handy as a practical demonstration of amateur radio wherever we go. So, as I said, we have hit most shopping malls in the country and have even been the birthday party surprise for some big-name big-gun DXers.

Obviously, the mobile antenna draws immediate attention wherever we go. It's the first thing people notice. The antenna is a huge capacity hat which is attached to a smaller hat. It has no whip on top. When people ask what it is, bingo—you have them, and a quick demonstration of amateur radio right on the spot.

The big draw and the absolute crowd-pleaser is contained within the small CQ trailer. At hamfests anywhere, or at club meetings and picnics, it never fails to be received with gasps, "oooohs," "ahhhhs," and a few other things we can't say here. Once the trailer-hood is drawn back (fig. 2), you can see the reason—a custom-built (by CQ Labs) mobile KW (and then some). The unit on the left is the amplifier, and the unit on the right is the power supply. Between them you can see the ductwork for the 8.5 KW gasoline-driven generator. Everything, of course, is remotely controlled from within the sedan.

The interior view of the amplifier shows the reason for the big signal some of you hear and the reason why we usually rack up huge scores on Field Day operating portable. We run a pair of 4-1000s, loafing along at 4000 volts. The metal cans around the tubes are shock-mounts which come in handy on bumpy roads and highways.

So, what some of you have always thought is absolutely true. Dick, Arnie, and I have been living the Life of Riley, traveling around the country in the lap of luxury, eating gourmet meals, and operating a world-class rig to top it off. Now you know how the food really is, and the reason why the bands are always open wherever we go.

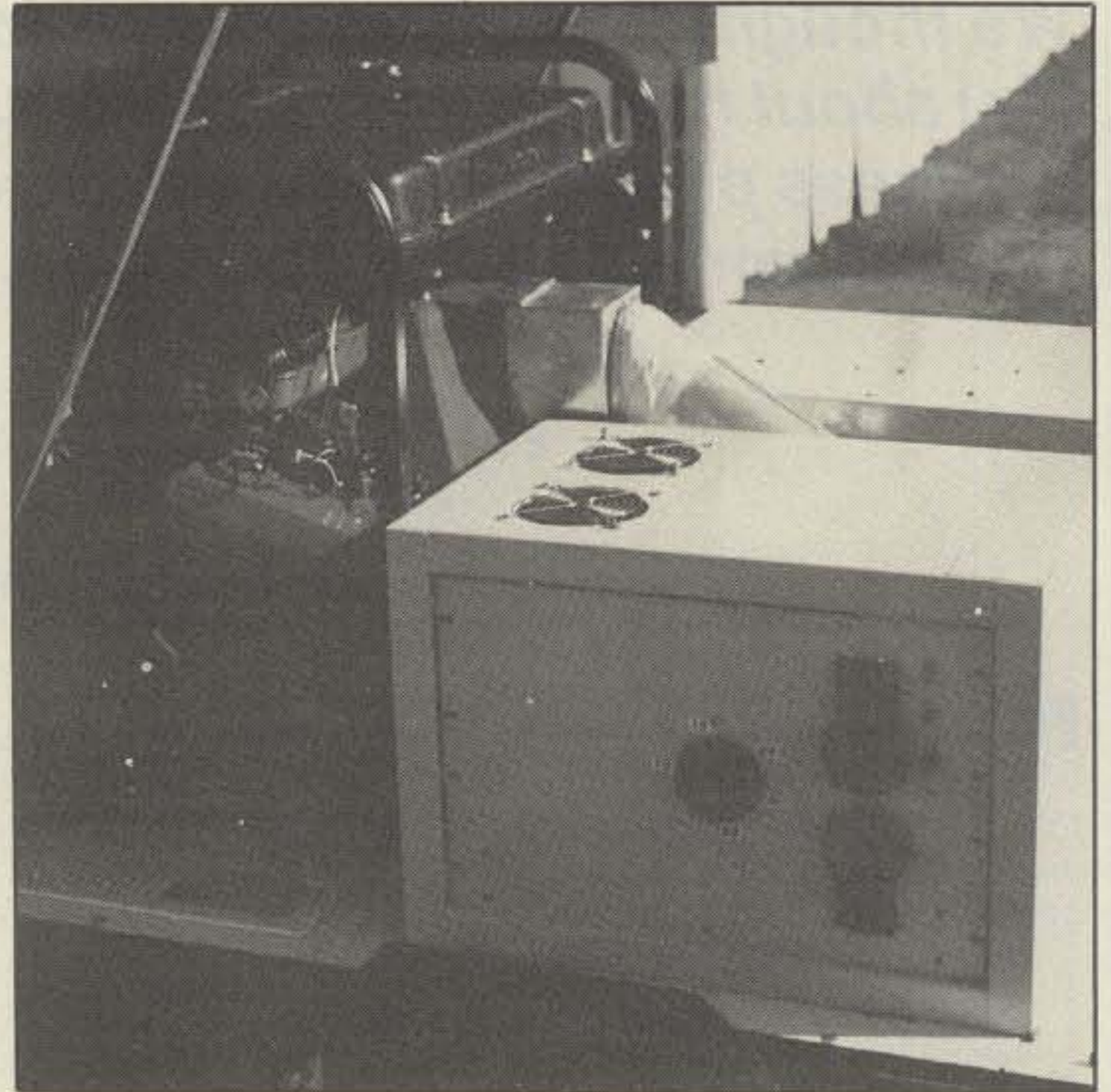


Fig. 4— This view shows the 8.5 KW gasoline-driven generator along with a front view of the amplifier. The whole setup is remotely controlled from within the sedan. The exhaust is vented down through the floor of the trailer while air comes in through two intakes, one on top and the other on the front side of the trailer.

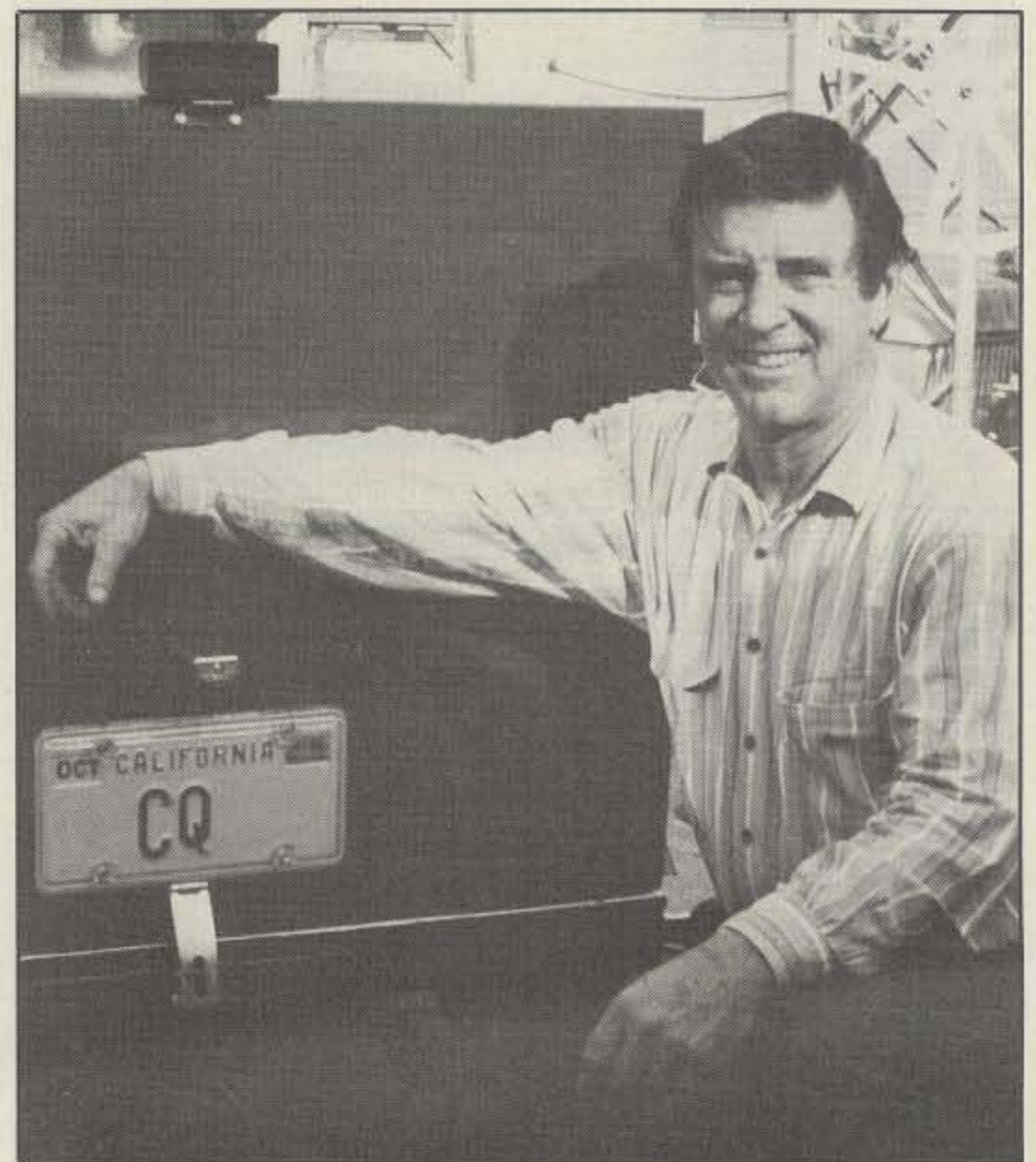


Fig. 5— If you've read this far and haven't figured it out, shame on you. Here's the head of "CQ Labs," and the man who actually built and owns this fabulous mobile setup, Bob "Trix" Harris, KH6XE. It took Bob a little over two months to build this setup, and from all reports it was worth the effort. Thanks, Bob, for sharing this with us. Even though this is April, the trailer, amplifier, and antenna are real and as described.

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

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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.

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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.

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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.

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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.

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The AL-80A special *Step-Start Inrush*

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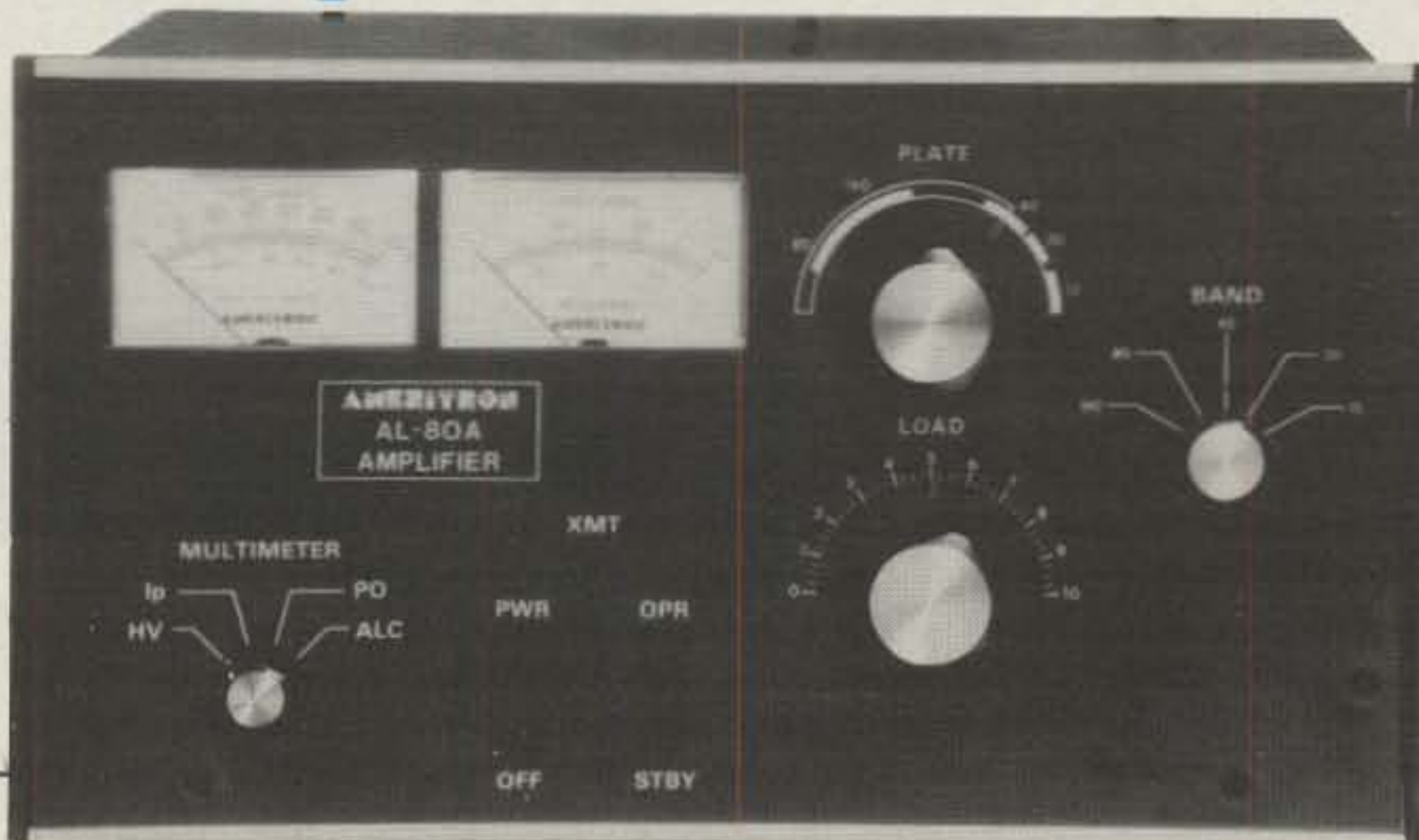
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KL7IBA presents an analysis of why certain 160 meter dipoles are difficult to match and tune and how they cause tuner arcing under high power excitation.

160 Meter Dipole Matching

FRANK N. VAN ZANT*, KL7IBA

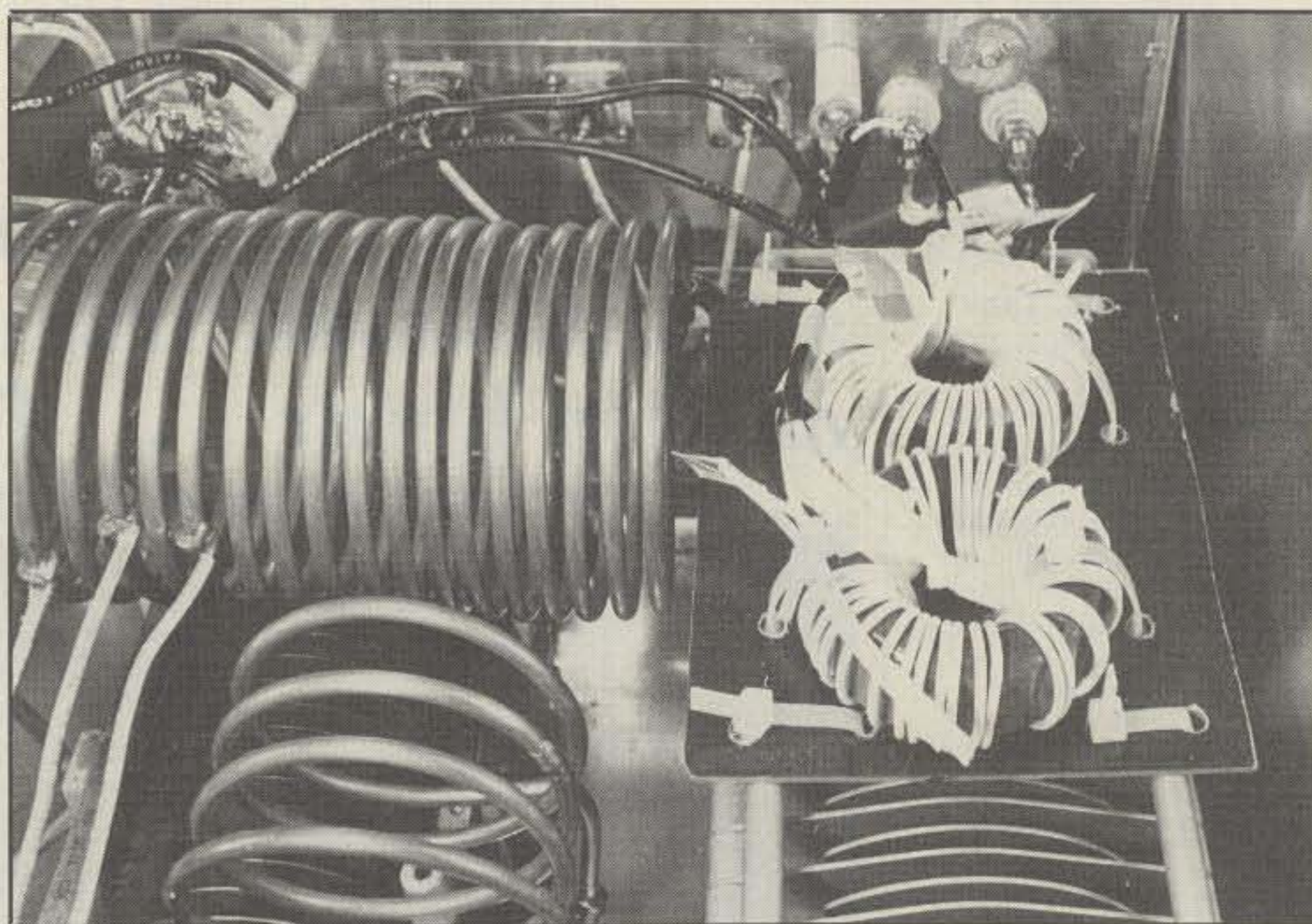
I have spent a considerable amount of time over the past two years participating in an evening roundtable on 1898 kHz. Although the roundtable was dubbed "The Over The Hill Gang" by W0BO, there are many younger amateurs installing 160 meter antennas and amplifiers who check in all the time during the winter months. Some members of this group have started to use increasingly higher power to improve their signals throughout the W0, W5, and W7 regions, which make up the main area of participation. In moving from a barefoot 100 watt mode of operation to high power (1 kilowatt mode), a number of these amateurs have run into a new problem: arcing in antenna tuners that would normally be rated for 1.5 kilowatt operation.

A great shower of speculation and advice poured forth from all quarters on the cause and solution of the problem. The problem did not manifest itself at many stations with seemingly similar antenna installations. My own inverted Vee, with either open-wire feedline or coax, created the same condition in three different heavy-duty antenna tuners. These tuners would take everything you could pour to them on 80 through 10, but 160 did them in. It would be staggering to guess at how many hours have been wasted in lengthening/shortening antennas and feedlines, rebuilding tuners, and juggling balun coils in an attempt to find a solution.

One of the key elements missing in the search was a basic, fundamental scientific measurement and analysis of the facts of the errant antennas and their tuners. The following paragraphs will present an analysis of typical amateur installations where this problem has occurred and several alternative solutions for the problem.

Typical 160 Meter Antenna Installations

Most amateurs with the 160 meter high-power arcing problem live in houses, in



View of the 9:1/4:1 step-up/step-down balun which aids in converting a very low-Z load to an impedance level that the tuner can handle. The circuit diagram is shown in fig. 1.

town, and on average-size lots. Antenna space is limited both as to mast height, number of masts, and length of flattop. Their antennas are at the most 50 to 55 feet high overall or are inverted Vees with an apex at 50 to 60 feet. Most of these amateurs want to feed the antenna with open-wire line so they can tune the antenna for multi-band operation. This requires the use of a tuner for appropriate tuning and matching. It is the rare amateur in town, or more likely one in the country, whose antennas are 70 feet high or

above. These are the fortunate ones in most cases—at least for 160 meter operation. We'll see why in a minute.

Knowing the foregoing facts, we can model three dipole antennas operating at 1900 kHz by using the MN version of the MININEC antenna analysis program as modified by Brian Beasley, K6STI. For this exercise we will choose (1) a normal dipole with an overall height of 70 feet, legs of 124 feet on either side of center, and fed by 90 feet of 450 ohm TV-type "open wire" feedline; (2) the same anten-

Antenna Description	Height	Feedpoint Impedance	Feedline Length	Feedline Z at Xmtr	Impedance after 4:1
Dipole #1	70 ft.	34 - j6	90 ft.	191 + j945	48 - j236
Dipole #2	50 ft.	19 - j8	61.5 ft.	35 + j415	9 + j104
Inverted Vee	50 ft. Apex 10 ft. ends	14.7 + j92	61.5 ft.	46 + j678	12 + j169

Table 1 - Results of antenna analysis programs.

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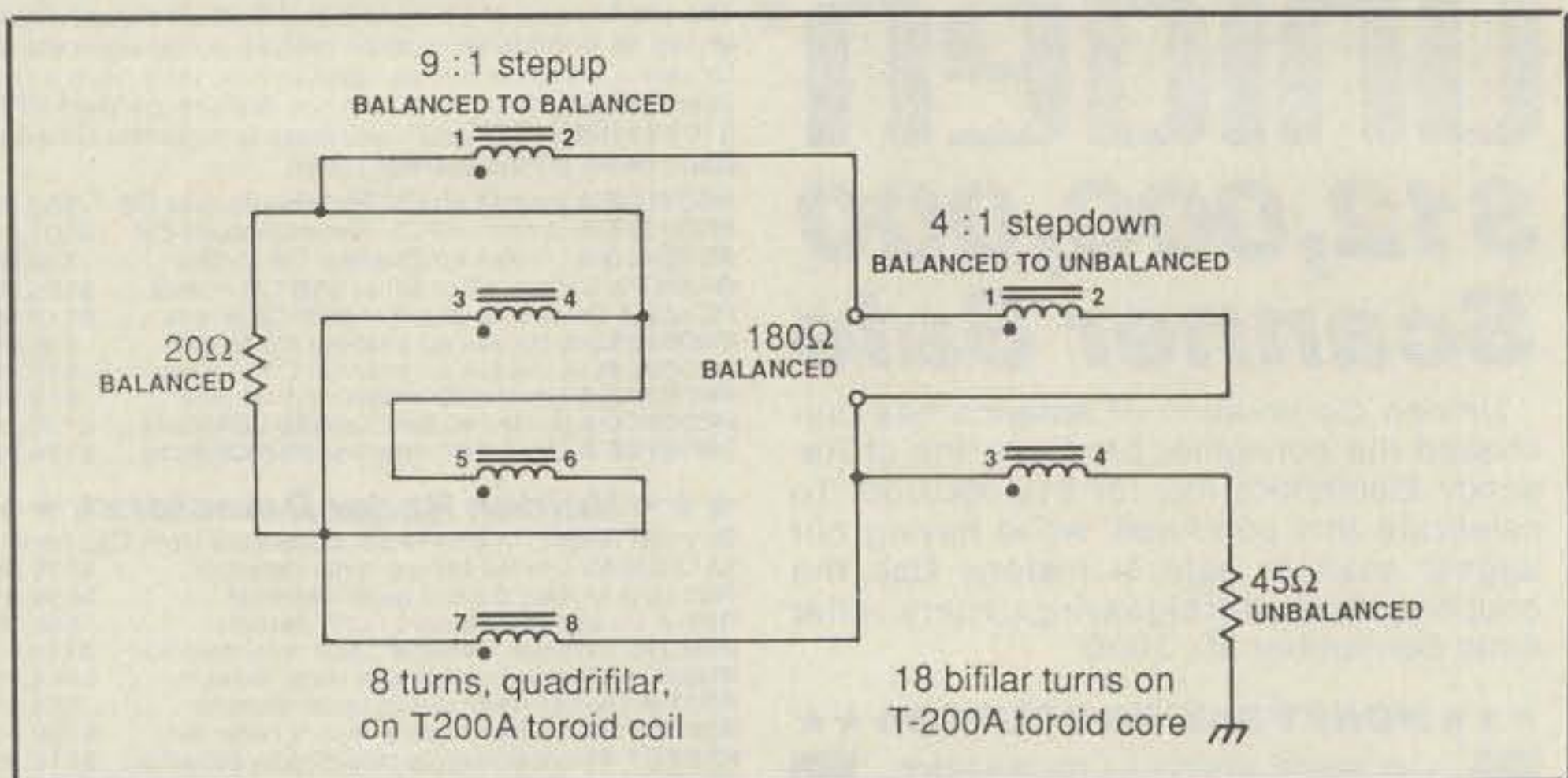


Fig. 1 - Diagram of a step-up/step-down balun used to achieve a usable impedance level for 160 meter antenna tuners.

na with a height of 50 feet and a 61.5 foot 450 ohm TV-type feedline; and (3) an inverted Vee with an apex at 50 feet and ends at 10 feet, also fed with a 61.5 foot 450 ohm TV-type feedline. All three antennas will operate over poor, rocky soil which is predominant in this region. (One of our major first guesses was that soil conditions had a lot to do with antenna impedance and thus the arcing problem.) We will also assume that the tuner has a balanced to unbalanced 4:1 reduction balun installed, as most commercial and homebrew tuners do.

Table I presents some interesting measurements from which several conclusions can be drawn. The first observation is that the higher antenna with the longer feedline has physical dimensions that result in a *de-facto* impedance transformation, via the 4:1 stepdown balun, that is well within the range of the antenna tuner

to handle. This assumes that the antenna tuner incorporates components that are rated for a high power level.

The second observation is that dipole #2 and the inverted Vee dipole #3, by their very physical dimensions, force an impedance transformation, via the feedline and 4:1 balun, that presents a very difficult matching problem to the antenna tuner. The tuner sees a very low impedance. Even assuming that a match is achieved, the resultant loaded operating Q of the tuner tank circuit is quite high, and as such, the induced RF voltages may exceed the breakdown ratings of the tuner's capacitors.

It was suggested by several of the group that the low impedance was the result of soil conditions, and that possibly if the ground conditions were highly conductive at RF, or if radials or a ground screen/counterpoise were installed un-

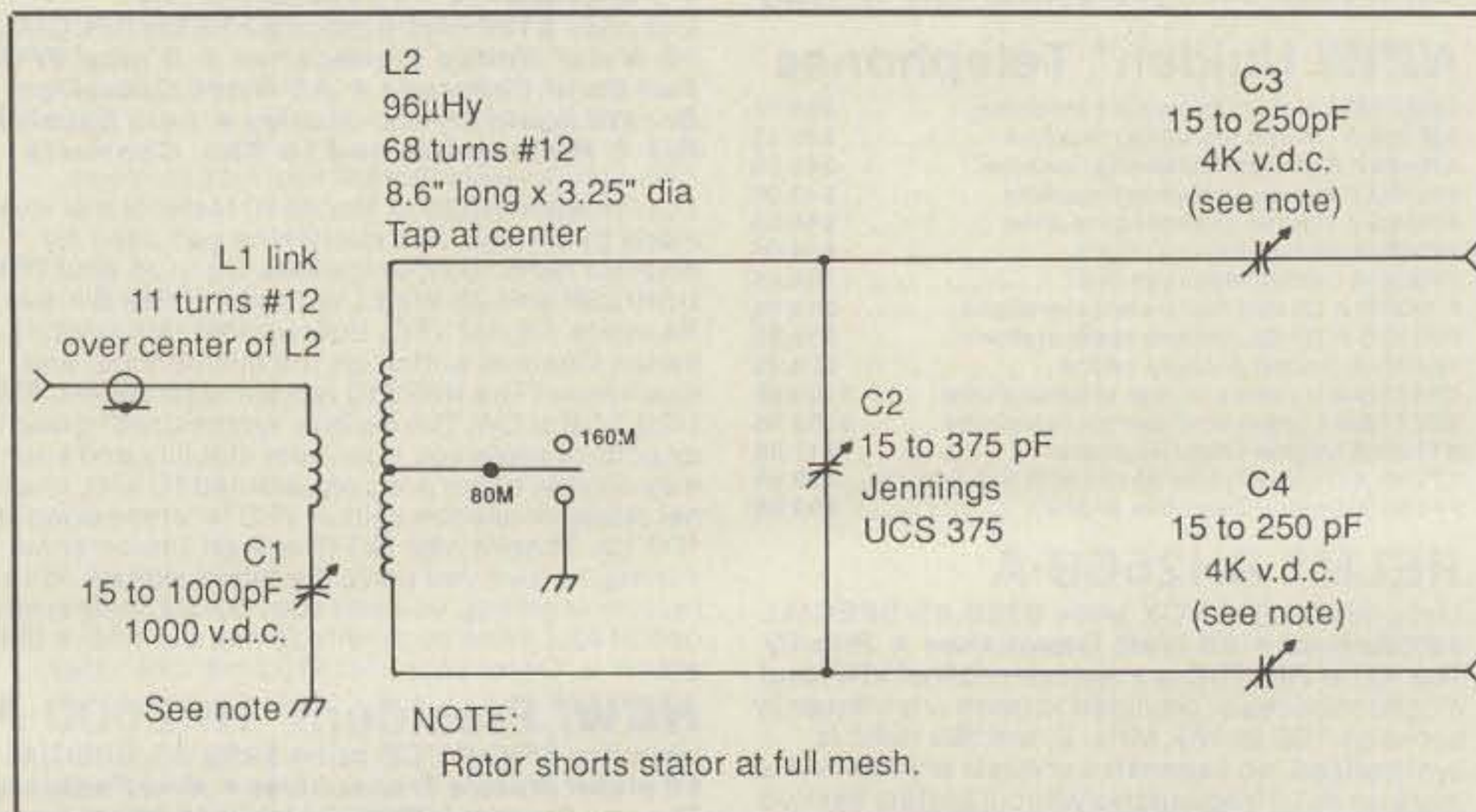


Fig. 2 - Diagram of a 160 meter/80 meter antenna tuner that will handle a low-Z load on 160 and a high-Z load on 80. Series tuning is used on 160. C2 is set at minimum capacitance. C1 is adjusted with C3 and C4 to achieve a match. On 80, C3 and C4 are shorted out. L2's center tap is grounded and tuning and matching are done by C1 and C2. If the 80 meter load is low Z, then ground at the center tap of L2 and tune with C3 and C4.

der the dipole, then the antenna feedpoint impedance would change and the problem would go away. The 50 foot high antennas were then modeled over perfectly conducting ground, and, to my surprise, the antenna feedpoint impedance did not change one iota when compared to modeling over poor soil. Now this may be a peculiarity of the MN program because it flies in the face of the classical reference charts that plot antenna impedance versus height above perfectly conducting ground and regular ground.^{1,2} However, what did change with MN was the radiation patterns, both azimuth and elevation, with considerable improvement in gain in the maximum radiation directions and a lowering of the vertical radiation angle.

At the average installation with the 50 foot antenna height, the feedline falls very close to being $\frac{1}{8}$ wavelength long. This is a key point. Now let's see what the antenna handbook has to say about that (a partial quote):

"When the load has appreciable reactance it is not always possible to adjust the (matching) circuit to resonance . . . as compared with the setting it would have with a purely resistive load. . . . Such a situation occurs . . . when the reactance is high compared with the resistance in the series-equivalent circuit. . . . The very considerable detuning of the circuit that results is often accompanied by an increase in Q, sometimes to values that lead to excessively high circulating currents in the circuit. This causes efficiency to suffer. *An unfavorable ratio of reactance to resistance in the input impedance of the line can exist if the SWR is high and the line length is near an odd multiple of one-eighth wavelength (45 degrees).*"

The last statement is almost exactly what we have with our 50 foot high 160 meter antennas. We can also demonstrate the foregoing problem by merely shorting the output terminal of our antenna tuner, tuning it for a resonance, and then feeding even a modest amount of RF to it. The result is a high Q matching circuit that readily arcs. The short circuit output is not too far removed from the 9 or 10 ohm load, not even considering reactance, presented to it by our average 160 meter antenna/feedline combination.

All of the above conditions are presented to our antenna tuner by our average (50 foot high, 60 foot feedline) 160 meter antenna/open-wire-feedline combination. Somehow the matching circuit must be designed to accommodate the high reactance and low resistance presented to it by this combination.

Curing High Power 160 Meter Antenna Tuning Arcing

Now that we have quantified the parameters of the various antennas and have seen how the arcing problem comes about, we can develop several solutions to the problem.

Solution 1 is to change baluns in the an-

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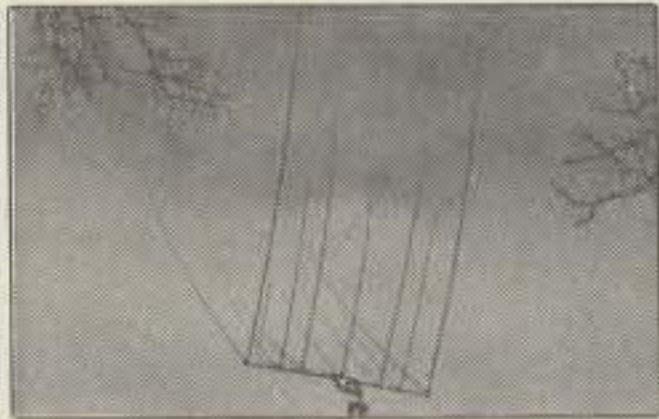
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tenna tuner. Assuming that you want to retain the balanced feeders, then you must install in the tuner a balanced (feedline) to unbalanced (tuner) 1:1. The 1:1 may work alone if your feedpoint impedance is 20 or 25 ohms and not too reactive. However, it may be necessary to follow it by an unbalanced to unbalanced 1:4 step-up balun.

The 1:1 balun, air wound on a 1 inch diameter PVC white plastic plumbing pipe about 9 inches long, with no. 14 formvar wire or even 12-gauge plastic-covered house wire, is shown as part of the SPC tuner in the *ARRL Antenna Book*. It may provide a better match between the tuner and the feedline. However, I had more trouble with arcing between the windings of that balun on 160 than I did with the tuner I was trying to cure. A diagram of this balun is found on pages 4-6 and 4-9 of the 14th Edition of the *ARRL Antenna Handbook*. This may or may not work in every case, but it is cheap and worth a try.

The combination that worked great for me was a 1:9 balanced to balanced step-up balun followed by a 4:1 step-down balun. The 1:9 balun was wound on a T200-2A (double height) powdered iron core using Teflon[®] covered stranded wire of at least 16-gauge. No. 14 gauge formvar can also be used, but the Teflon[®] insulated wire is preferred because of its superior breakdown voltage characteristics. I used the 1:9 step up followed by a

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APPENDIX I

IMPEDANCE ALONG FEEDLINES

by ON4UN

THIS PROGRAM CALCULATES THE IMPEDANCE, VOLTAGE AND CURRENT ALONG A FEEDLINE, INITIALLY IN 1 DEGREE INCREMENTS. REQUIRED INPUTS ARE THE LINE IMPEDANCE, THE LOAD IMPEDANCE AND THE LOAD CURRENT OR VOLTAGE. LIMITS AND INCREMENTS CAN BE ADJUSTED FOR BETTER RESOLUTION

CABLE IMPEDANCE Zk > ? 450

LOAD IMPEDANCE

RESISTIVE PART Z > ? 50
REACTIVE PART Z > ? 0

LOAD VOLTAGE

ENTER 0 IF LOAD CURRENT WILL BE INPUTTED
ABSOLUTE VALUE > ? 0

IMPEDANCE ALONG FEEDLINE

by ON4UN

Zk = 450 ohm	REAL PART	IMAG PART	MAGNITUDE	ANGLE
SWR= 9				
IMPEDANCE (ohm) =	50	0	50	0
CURRENT (Amp) =	1	0	1	0
VOLTAGE (Volt) =	50	0	50	0

LENGTH DEG.	IMPEDANCE		CURRENT		VOLTAGE	
	RESIS.	REACT.	AMPL.	ANGL.	AMPL.	ANGL.
1	50.015	7.758	1	.111	50.606	8.928001
2	50.06	15.52	.999	.222	52.379	17.447
3	50.136	23.292	.999	.334	55.207	25.252
4	50.241	31.077	.998	.445	58.934	32.184
5	50.378	38.88	.996	.557	63.397	38.217
6	50.545	46.707	.995	.669	68.449	43.409
7	50.744	54.561	.993	.782	73.962	47.857
8	50.975	62.447	.99	.895	79.836	51.67

<<< Press any key >>>

IMPEDANCE ALONG FEEDLINE

by ON4UN

Zk = 450 ohm	REAL PART	IMAG PART	MAGNITUDE	ANGLE
SWR= 9				
IMPEDANCE (ohm) =	50	0	50	0
CURRENT (Amp) =	1	0	1	0
VOLTAGE (Volt) =	50	0	50	0

LENGTH DEG.	IMPEDANCE		CURRENT		VOLTAGE	
	RESIS.	REACT.	AMPL.	ANGL.	AMPL.	ANGL.
33	70.718	287.131	.841	4.127	248.649	80.291
34	72.342	298.107	.831	4.286	255.028	80.646
35	74.066	309.331	.822	4.449	261.339	80.983
36	75.899	320.817	.812	4.615	267.579	81.305
37	77.846	332.581	.801	4.786	273.745	81.612
38	79.918	344.641	.791	4.961	279.835	81.906
39	82.123	357.014	.78	5.141	285.848	82.187
40	84.47	369.719	.769	5.326	291.779	82.457

<<< Press any key >>>

4:1 balanced to unbalanced step down to achieve a resultant 1:2 step-up that cured the arcing in a large tuner. This combination is shown mounted in the tuner in fig. 1. A diagram of the 1:9 and 4:1 combinations is shown in fig. 2.

Solution 2, for tough cases, not only incorporates solution 1, but also will dictate the replacement of the antenna tuner capacitors with higher voltage capacitors.

Some of the so-called kilowatt antenna tuners have capacitors that have only 4 to 5 kilovolt plate spacing. In one of my tuners the output variable capacitor was replaced by a 7.5 KV vacuum capacitor to cure the arcing problem.

Solution 3 calls for the building of a separate antenna tuner for 160 only, or possibly a 160/80 meter combination. With appropriate design, it does not need 10 kilo-

IMPEDANCE ALONG FEEDLINE by ON4UN

Zk = 450 ohm	REAL PART	IMAG PART	MAGNITUDE	ANGLE
SWR= 9				
IMPEDANCE (ohm) =	50	0	50	0
CURRENT (Amp) =	1	0	1	0
VOLTAGE (Volt) =	50	0	50	0

LENGTH DEG.	IMPEDANCE		CURRENT		VOLTAGE	
	RESIS.	REACT.	AMPL.	ANGL.	AMPL.	ANGL.
41	86.972	382.779	.758	5.517	297.628	82.716
42	89.639	396.214	.747	5.713	303.393	82.965
43	92.486	410.049	.735	5.915	309.07	83.205
44	95.528	424.31	.723	6.124	314.659	83.436
45	98.78	439.024	.711	6.34	320.156	83.66
46	102.262	454.222	.699	6.564	325.561	83.876
47	105.994	469.937	.687	6.795	330.871	84.085
48	109.998	486.202	.674	7.035	336.085	84.287

<<< Press any key >>>

45° = 61.5 feet at 1.9 Mhz. (.95 velocity factor)

IMPEDANCE ALONG FEEDLINE by ON4UN

Zk = 450 ohm	REAL PART	IMAG PART	MAGNITUDE	ANGLE
SWR= 9				
IMPEDANCE (ohm) =	50	0	50	0
CURRENT (Amp) =	1	0	1	0
VOLTAGE (Volt) =	50	0	50	0

LENGTH DEG.	IMPEDANCE		CURRENT		VOLTAGE	
	RESIS.	REACT.	AMPL.	ANGL.	AMPL.	ANGL.
81	1369.29	1880.594	.191	35.051	444.529	88.992
82	1588.528	1946.033	.177	38.33	445.675	89.105
83	1850.865	1990.062	.164	42.143	446.687	89.218
84	2161.042	1996.915	.152	46.591	447.565	89.331
85	2519.146	1944.197	.141	51.783	448.309	89.443
86	2915.187	1803.178	.131	57.816	448.917	89.555
87	3322.06	1543.328	.123	64.748	449.391	89.666
88	3690.415	1144.132	.116	72.553	449.729	89.778

<<< Press any key >>>

IMPEDANCE ALONG FEEDLINE by ON4UN

Zk = 450 ohm	REAL PART	IMAG PART	MAGNITUDE	ANGLE
SWR= 9				
IMPEDANCE (ohm) =	50	0	50	0
CURRENT (Amp) =	1	0	1	0
VOLTAGE (Volt) =	50	0	50	0

LENGTH DEG.	IMPEDANCE		CURRENT		VOLTAGE	
	RESIS.	REACT.	AMPL.	ANGL.	AMPL.	ANGL.
89	3953.662	613.246	.112	81.072	449.932	89.889
90	4050	-.007	.111	90	450	90
91	3953.661	-613.249	.112	98.928	449.932	90.111
92	3690.412	-1144.137	.116	107.447	449.729	90.222
93	3322.054	-1543.334	.123	115.252	449.391	90.334
94	2915.181	-1803.181	.131	122.184	448.917	90.445
95	2519.141	-1944.198	.141	128.217	448.309	90.557
96	2161.04	-1996.915	.152	133.409	447.565	90.669

<<< Press any key >>>

90° = 123 feet at 1.9 MHz. (.95 velocity factor)

volt components. It will have a range of adjustment to effectively handle the reactances and low-Z loads presented to it. Fig. 3 illustrates one I built that has handled everything you can pour to it. It utilizes the tried-and-true series matching network specifically designed for matching a 50 ohm transmitter output directly to a low-impedance balanced load. The series tuned network operates at a rea-

sonable Q and the peak voltages across the network are considerably less than 3 KV even at high power levels.

Solution 4 sacrifices the open-wire feedline for 50 ohm coax, which effectively turns the antenna into a single-band affair. In order to use 50 ohm coax, you must still employ a matching device at the antenna itself. Otherwise, there will still be a high SWR due to the significant

mismatch between the antenna feedpoint impedance and the coax. WD4FNY/Ø suggested the use of a "hairpin" match to solve this problem. The hairpin match is another form of the Delta match principle. Since the physical dimensions of a delta match or hairpin match mitigate against their use with coax at 1.9 MHz, I suggest using a regular inductor. The "hairpin" itself is a form of inductor but is physically unwieldy in this application. In this case, the match is achieved by using a small inductance coil inserted across the feedpoint of the antenna. This provides the same result as the delta match or hairpin match if the inductance is the same. Of course, the antenna has to be shortened an amount that corresponds to the amount of inductance added in order to re-resonate the antenna at the desired frequency.

To compute the match, the antenna feedpoint resistance must be known. In dipole two (Table I) the feedpoint resistance at 1.9 MHz is 19 ohms. Inspection of fig. 36, Page 5-16, of the 14th Edition of the *ARRL Antenna Handbook* shows that a 20 ohm antenna feedpoint resistance requires 40 ohms of XL for a "hairpin" match to 50 ohm coax. This is the same amount of XL needed for an inductor match. Thus, L equals 40 divided by 2 piF or 3.35 uHenrys.

A three uHenry coil was wound on a T200-2 toroid core and inserted across the feedpoint of WD4FNY/Ø's 160 meter antenna (similar to dipole #3), 50 ohm coax was attached, and the antenna was shortened to re-resonate it at 1.9 MHz. The shortening can be computed by taking away approximately 3 uHenry's worth of wire to make up for inserting the 3 uHenrys of coil. At 1.9 MHz this amounted to removing about 8 feet of wire, 4 feet from each end of the antenna. (At 1.9 MHz, #14 wire has an inductance of .4 uHy per foot³). The net result was that WD4FNY/Ø achieved a perfect 1:1 SWR at 1.898 kHz, which was obviously a 50 ohm resistive impedance at the transmitter end of the feedline. He fed that directly from the amplifier (a pair of 4CX1000's!) without the tuner. (His tuner still needed solution #2 to avoid arcing.)

Conclusion

Three different arcing 160 meter high-power dipole installations have been cured through one form or another of the methods described in this article.

Footnotes

1. ARRL, *The ARRL Antenna Book*, 14th Edition, The American Radio Relay League, Newington, CT, fig. 39, p. 2-20.

2. Ibid, 15th Edition, fig. 16, p. 3-11.

3. RF CAD software, Version 3.72, copyright 1982-1987, Gary A. Field; High Frequency Circuit Design, Inductor Design, Straight Round Wire.



W7JI shows us how to roll our own 160 meter amplifier. If you're going to Dayton this year, bring a parts list along with you.

Bigger Is Better

A Dedicated 160 Meter KW Amplifier

BY LOUIS B. BURKE, JR.* , W7JI

When the last 160 meter season began closing in on me, I tried to get everything in tip-top shape for the winter season. Evaluating the technical status of my operation on the top band and surveying areas for possible improvement provided two projects that required immediate attention—rebuilding my high-voltage power supply and installing some sort of low-noise receiving antenna system.

The power supply project was put on top of my priority list. I began planning the project by looking through *The Radio Amateur's Handbook* for ideas. I realized that I would have to acquire a new high-voltage transformer, a filter choke, and a large filter capacitor. My first thoughts centered around obtaining these components at some of the local hamfests or through other local amateurs.

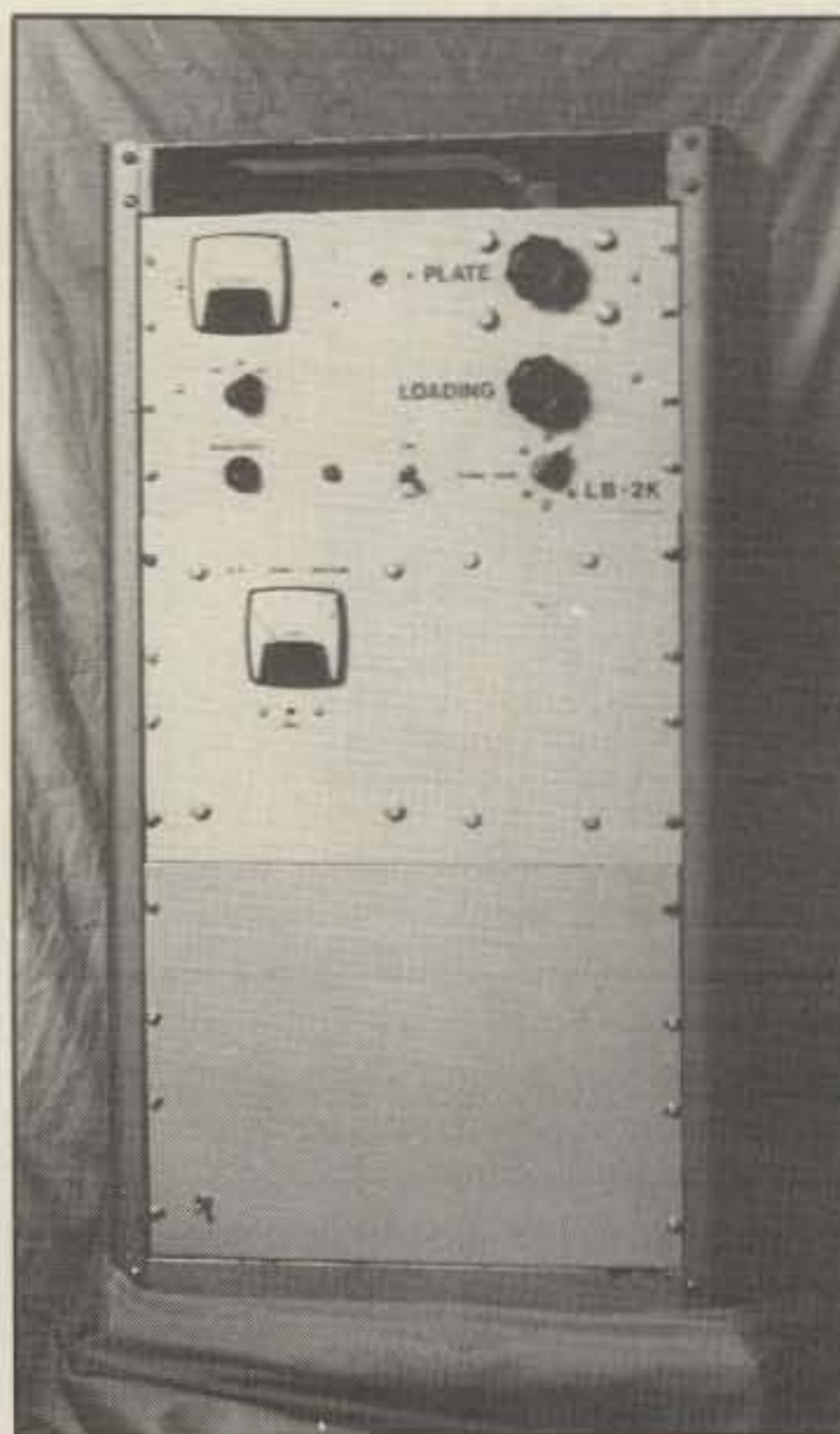
I was fortunate to find several possibilities for the power transformer at very reasonable prices. However, all prospective transformers were quite old and most probably contained PCBs. It didn't take long for me to weigh the economic benefit against sharing my shack with PCB agents.

I made the decision to purchase new parts from the Peter Dahl Company. My decision was rather costly, but I justified it by being assured that no PCBs would be in the rack, and if I should ever lose one of the parts due to failure, it could be replaced with an exact duplicate.

I decided on the following specifications for the major components:

1. Transformer—6000 VCT at 1.0 amp
2. Choke—10 Henry at 1.0 amp
3. Filter Capacitor—53 uFd at 5000 VDC

With such a large filter capacitor my design had to incorporate some sort of "soft-start" in order to keep the diodes from going into a self-destruct mode at



The completed KW amplifier for 160 meters. The bottom rack panel shields the basic power-supply components. The middle panel supports the diode and bleeder stacks, as well as the power-supply meter. The top panel is the 160 meter RF deck.

power up. The *Handbook* contained circuits which would provide a 0.5 second delay at reduced secondary voltage, allowing the filter to charge to about a 1000 volts or so before the full secondary voltage is applied.

There was no reason to design anything since the *Handbook* contains a sufficient number of readily usable circuits. It was just a matter of incorporating various design features into a circuit of my choice. The complete schematic diagram is shown in fig. 1. Looking over the physical size of the various component

parts of the power supply, I soon realized that it would not be advisable to attempt construction of the supply on a standard aluminum chassis. At this point I turned to my computer and loaded up the CAD program and began to design a physical layout for the power supply.

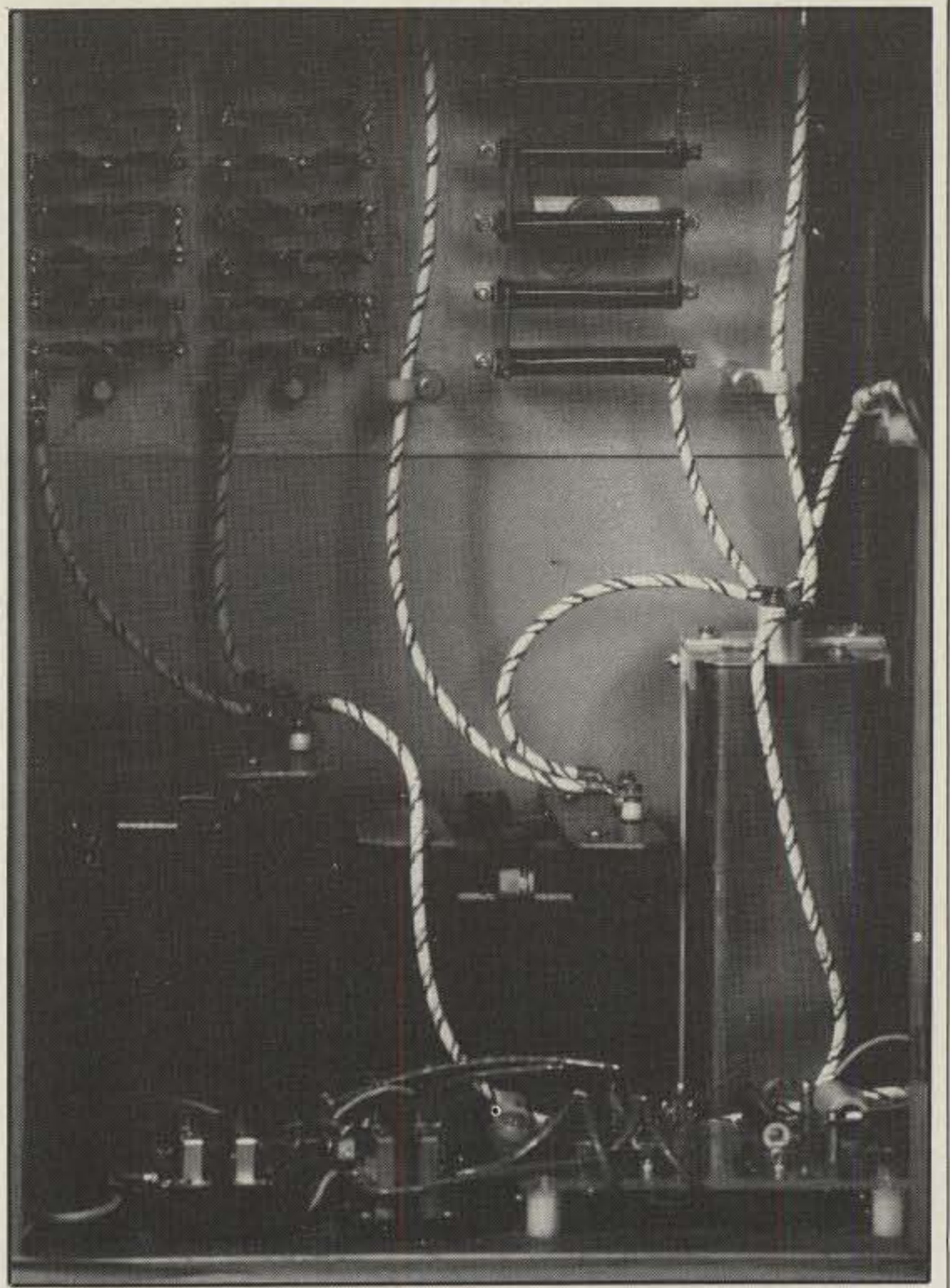
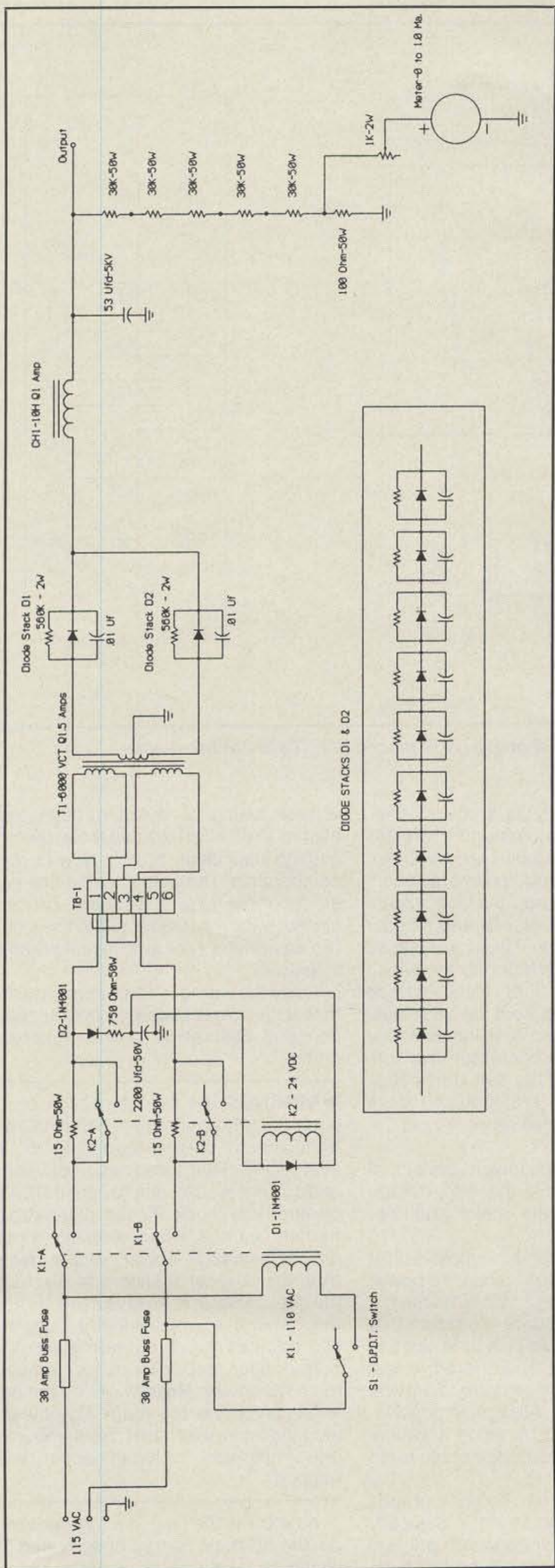
My decision was to take a commercial or more industrial approach and mount the parts in the bottom of the rack much like a commercial broadcast transmitter. Exploring this approach proved to be the answer for a good clean layout, one which could easily be serviced if the need should arise and one which would provide all parts with adequate air circulation.

The use of a CAD program is extremely helpful, since everything can be drawn to scale. It also provides the designer the opportunity to build the project on the computer first, and if something doesn't work out quite right, you can simply erase the drawing and start again—a much more cost-effective method of trial and error than having to scrap a \$40 chassis and start all over again. By the time you actually get to mount the parts and start wiring, it's like *dejavu*. By now you've built the power supply so many times in your head and on the computer screen that the actual construction is mere mechanics, bolting down the parts and running some wire to the various components.

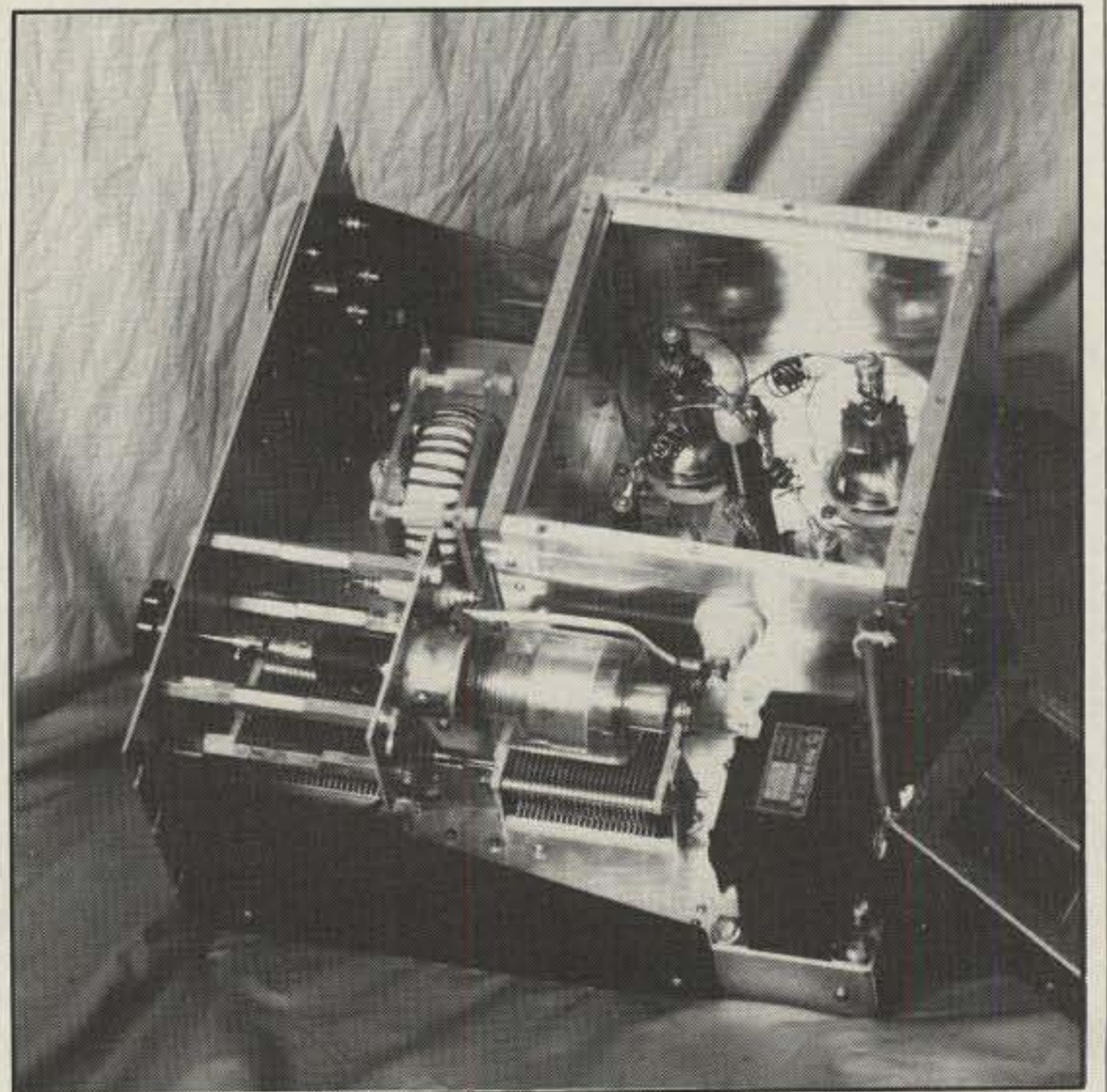
I began by designing the physical layout for the rectifier stacks. I wanted to make sure that I had plenty of head room, so I used 16 diodes all rated at 1 KV, 3 amps. Each diode is shunted with a 0.01 uFd, 1 KV disc ceramic capacitor and a 560K, 1 watt resistor. The physical layout would provide adequate space for component cooling and easy access for replacement. The diodes, capacitors, and

Fig. 1 - Schematic diagram for the amplifier's power supply. The parts are commercially available.

*12837 North 36th Drive, Phoenix, AZ 85029



Interior view of the rack showing the power supply components and diode and bleeder resistor stacks.



Top view of the top-band amplifier. The cover plate for the tube compartment has been removed to show the tubes. There are four individual blower fans, one for each tube mounted on the cover. The torroid can be seen between the tube compartment and the front panel.

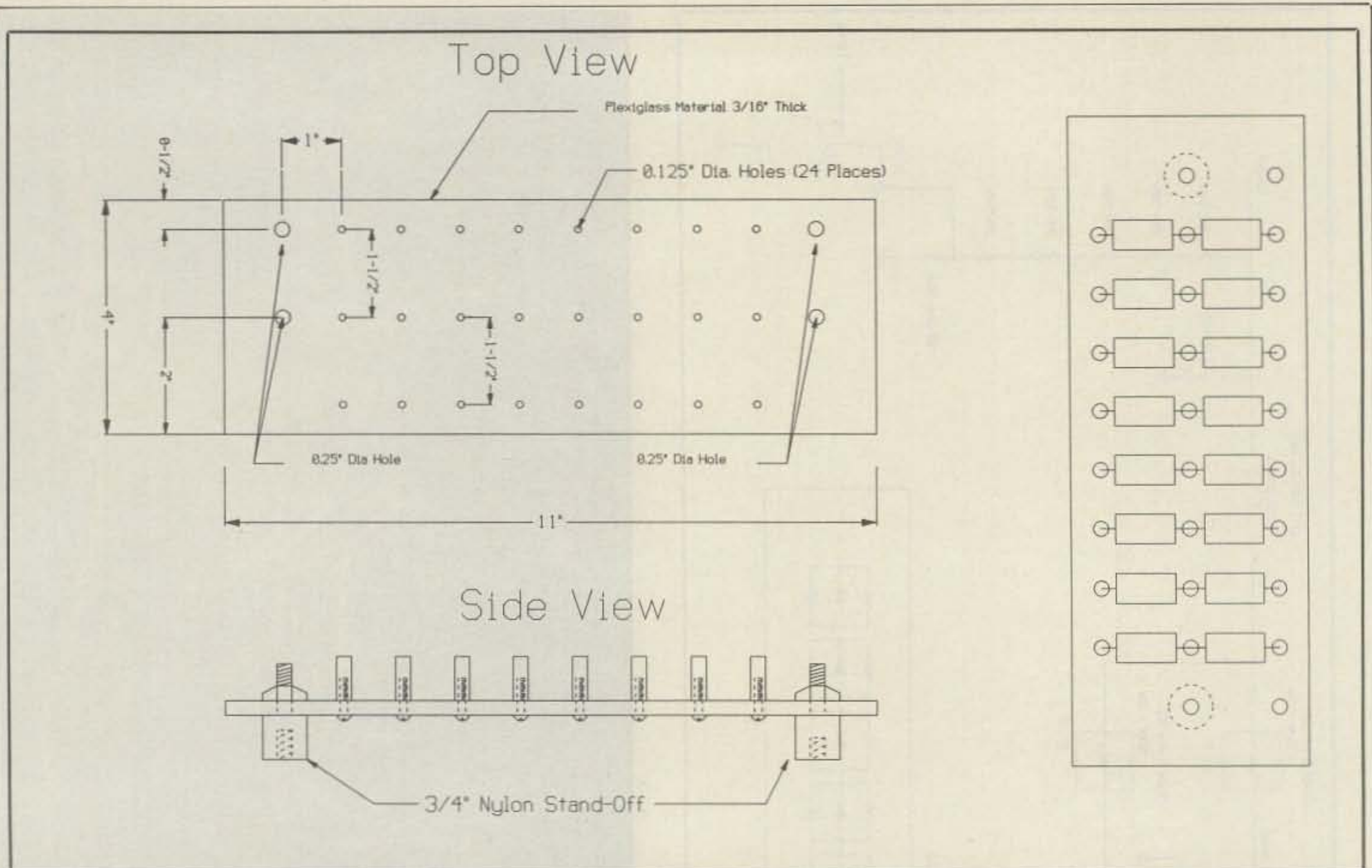


Fig. 2- Mechanical diagram for the diode stacks showing parts placement. There are two stacks.

resistors are mounted on $\frac{3}{4}$ inch metal standoffs. The entire assembly consists of 24 standoffs per diode stack and is mounted on a piece of clear Plexiglass which measures 11" \times 4" \times $\frac{3}{16}$ " (see fig 2). Two each of these assemblies are required for full wave rectification. I elected to use a center tapped secondary in the transformer design in order to reduce the parts count for the rectifier stacks.

Next I began the layout for the bleeder resistor assembly. This assembly consists of five 30K, 50 watt resistors and one 100 ohm, 50 watt resistor. Power-supply metering is accomplished by sampling the voltage drop across the 100 ohm resistor to ground. All resistors are mounted on a piece of Plexiglass measuring 8" \times 9 $\frac{1}{2}$ " \times $\frac{3}{16}$ ". The bleeder resistor assembly was designed for a current flow of 0.02 amps. Each resistor in the series string is required to dissipate 12.0 watts. Using 50 watt resistors provides for a sufficient safety margin to allow the resistors to run cool over long periods of power-supply use.

The combination of diode stacks and bleeder resistor assembly occupies one entire panel measuring 12 $\frac{1}{4}$ " in height. This panel also incorporates the power-supply metering, consisting of a meter and sub-panel adjustment pot. The meter movement is 0 to 1 milliamp. The bottom rack panel measures 14 inches in height

and is used primarily as a cover panel. The only component mounted on this panel is the power supply on-off switch.

The bottom of the equipment rack contains most of the parts, the only exception being the diode stacks and bleeder resistors. The individual parts are placed in a logical order considering the wiring scheme. The outer, or front, portion (looking into the rack from the back side) contains both AC-line fuse holders, the main AC power-line contactor, the soft-start contactor, and the soft-start circuit components which are mounted on a piece of Plexiglass measuring 9" \times 8" \times $\frac{3}{16}$ " (see fig. 4).

Behind these parts, toward the actual front of the rack, are the high-voltage power transformer, the choke, and filter capacitor.

Number eight wire was employed for all AC primary circuitry. Since the power supply would be using 115 VAC as the primary main power source, I thought that number ten wire would be a little close to maximum capacity and therefore decided to use number eight wire to provide a little safety margin. All high-voltage wiring is accomplished by using a Teflon-covered type of high-voltage cable rated at 50 KV.

As can be seen from the photographs of the power supply, wiring is basically separated into low-voltage AC primary wiring and high-voltage wiring. All high-

voltage wiring is routed through cable clamps in an effort to keep the wires from coming into close proximity with other components. The output lead of the power supply is also supported via cable clamps which are mounted to the side of the equipment rack with nylon stand-off insulators.

Once the wiring is completed, it is time to test the power supply for proper operation and calibration of the front-panel meter.

WARNING! The output voltage of this power supply approaches 3000 VDC with a maximum current capability of 1.5 amps ICAS. This combination of voltage and current is sufficient to cause **DEATH** by electrical shock. Please, please be extremely careful when working around any high-voltage power supply. **Never** trust the bleeder resistors to discharge the filter capacitor. Always use a shorting device with a well-insulated handle to short across the output terminals of the output filter capacitor after removing main AC power. **Never** work on the power supply while the main AC power is plugged into a wall outlet. Remember this one simple rule: "If it can happen, it will happen!"

As soon as the on-off switch was turned on, the AC main contactor activated, applying a reduced secondary voltage

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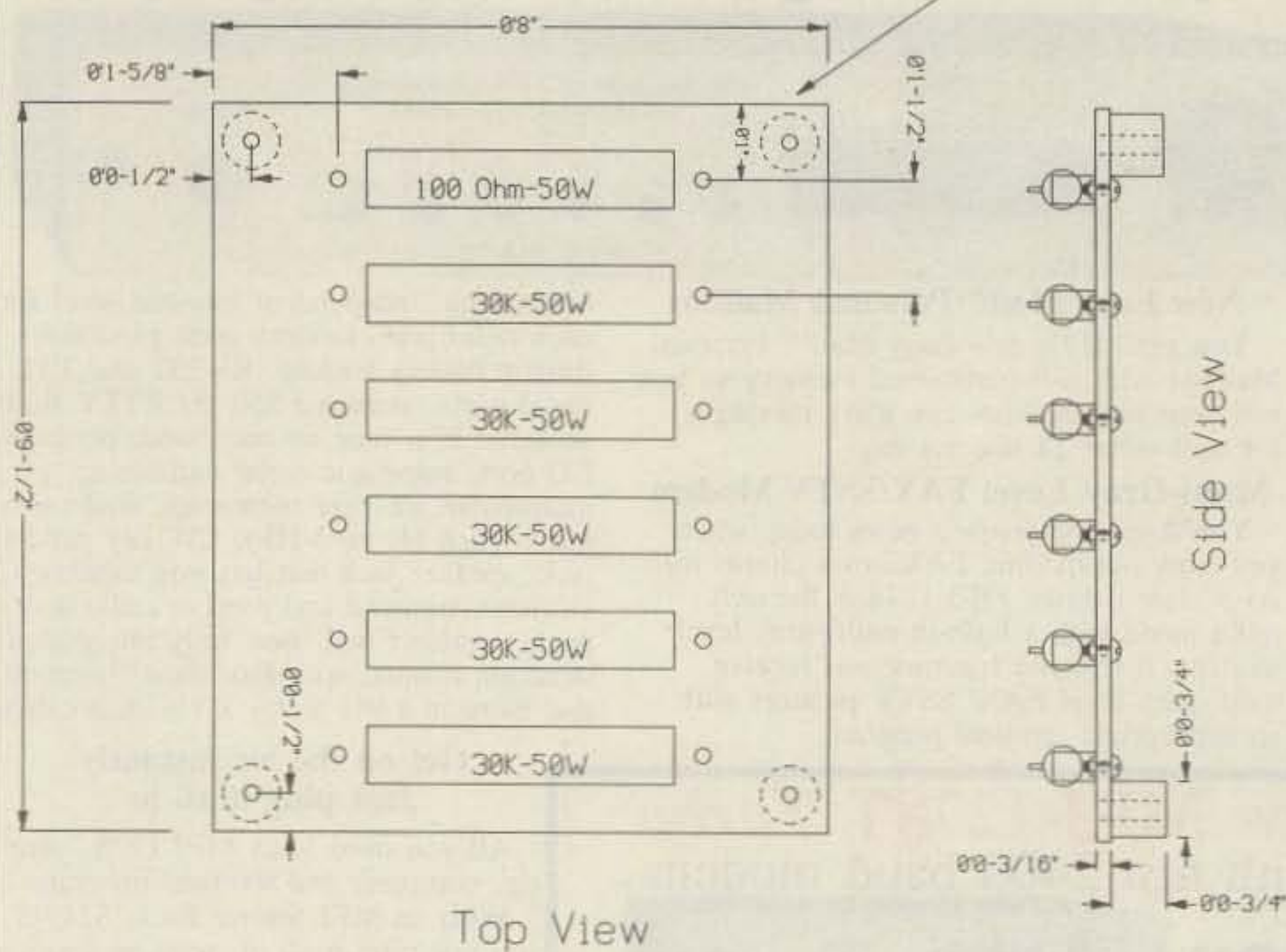


Fig. 3- Mechanical diagram and parts placement for the bleeder resistor assembly.

Material -
3/16" Plexiglass

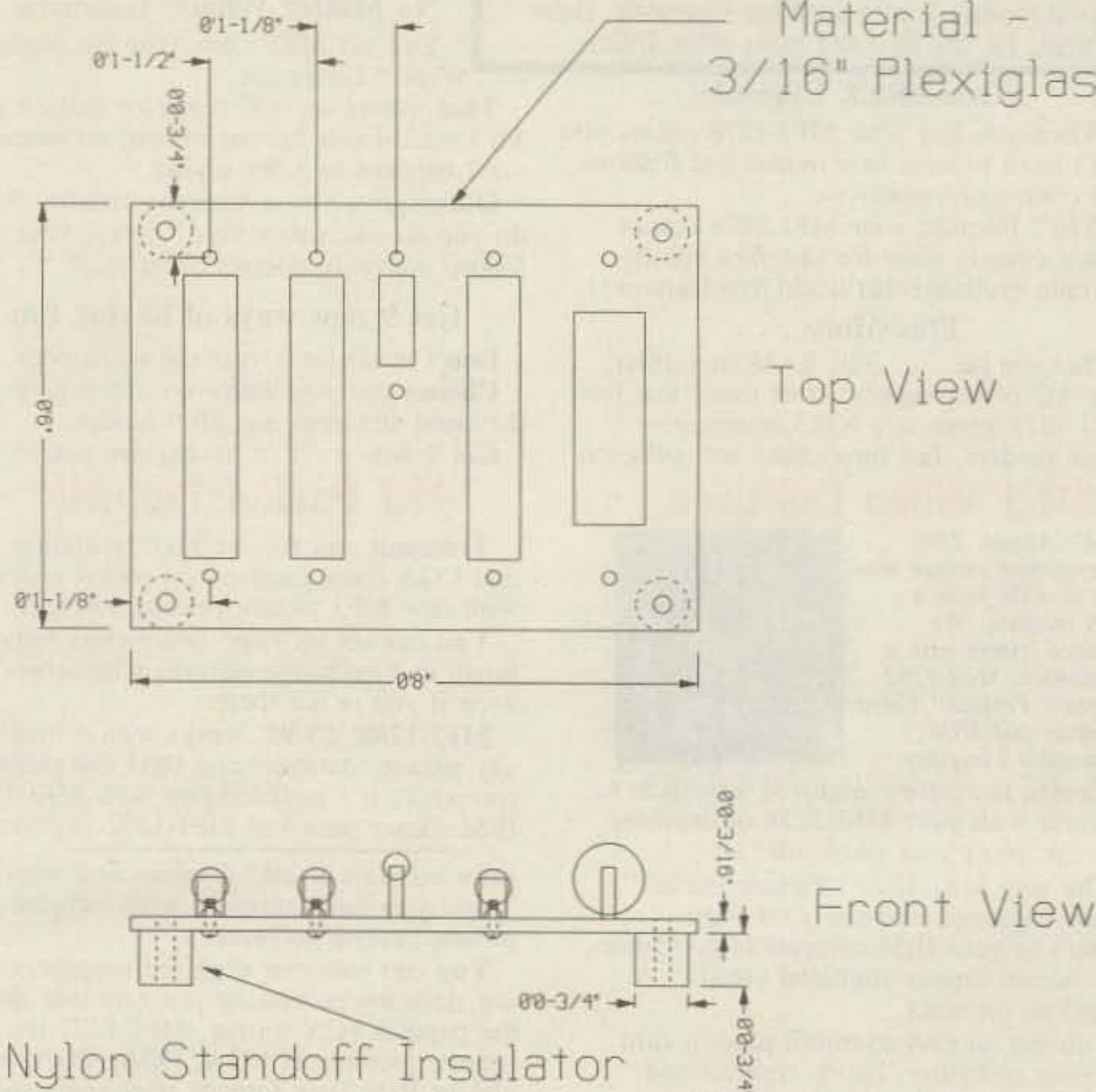


Fig. 4- Mechanical diagram and parts placement for the soft-start circuit, a protective device.

which was noticeable on the power-supply meter. Approximately 1/2 second later the soft-start contactor was energized, supplying full secondary voltage to the system. Everything worked just as expected. What a relief—no loud pops or bangs!

I left the supply running for a few minutes just to make sure that nothing would arc or breakdown, and then turned off the main switch. Watching the front-panel meter I observed the bleeder resistors performing their function of discharging the energy from the output capacitor. When the meter reached zero, I removed the main power cord from the wall socket, and using a large screwdriver with a well-insulated handle, shorted across the terminals of the output capacitor just to make sure there was no charge remaining in the capacitor. While holding the screwdriver firmly across the output terminals of the capacitor, I clipped a test lead across the terminals to provide a short circuit to the capacitor to eliminate any residual charging.

I placed my 160 meter RF deck into the rack space at the top of the rack and secured the front panel to the rack. I then connected the input feedline, the output feedline, the high-voltage cable, and the remote antenna switching cable. The RF deck was now ready to test with the new power supply.

The RF deck consists of two 3-500Z tubes in grounded grid service. I turned on the filaments, allowed a few minutes for the filaments to warm up, and turned on the high-voltage supply. Everything worked great! The improvement was immediately noticeable in the operation of the amplifier. With a Bird model 43 wattmeter in line between the amplifier output and antenna input I tuned up at 1 KW output as indicated on the wattmeter.

The operation of the amplifier was very responsive to maintaining high average output power under heavy audio processing. It was immediately obvious that the new power supply was rock solid and exhibited excellent voltage regulation under load.

Under normal circumstances this would have been a successful ending to the power-supply project. However, during operation over the next few days I became disturbed thinking about the difference between the quality and capability of the power supply and realized that the RF deck simply was not of the same caliber. I could feel the truth creeping into my mind: The RF deck just isn't worthy of sharing the same rack as the new power supply. It just did not do the power supply justice. I was being compelled by sheer pride to build a new RF deck. I realized that I had just fallen into a trap designed and built by myself. After dealing with the excitement that one always experiences when contemplating a new piece of equip-

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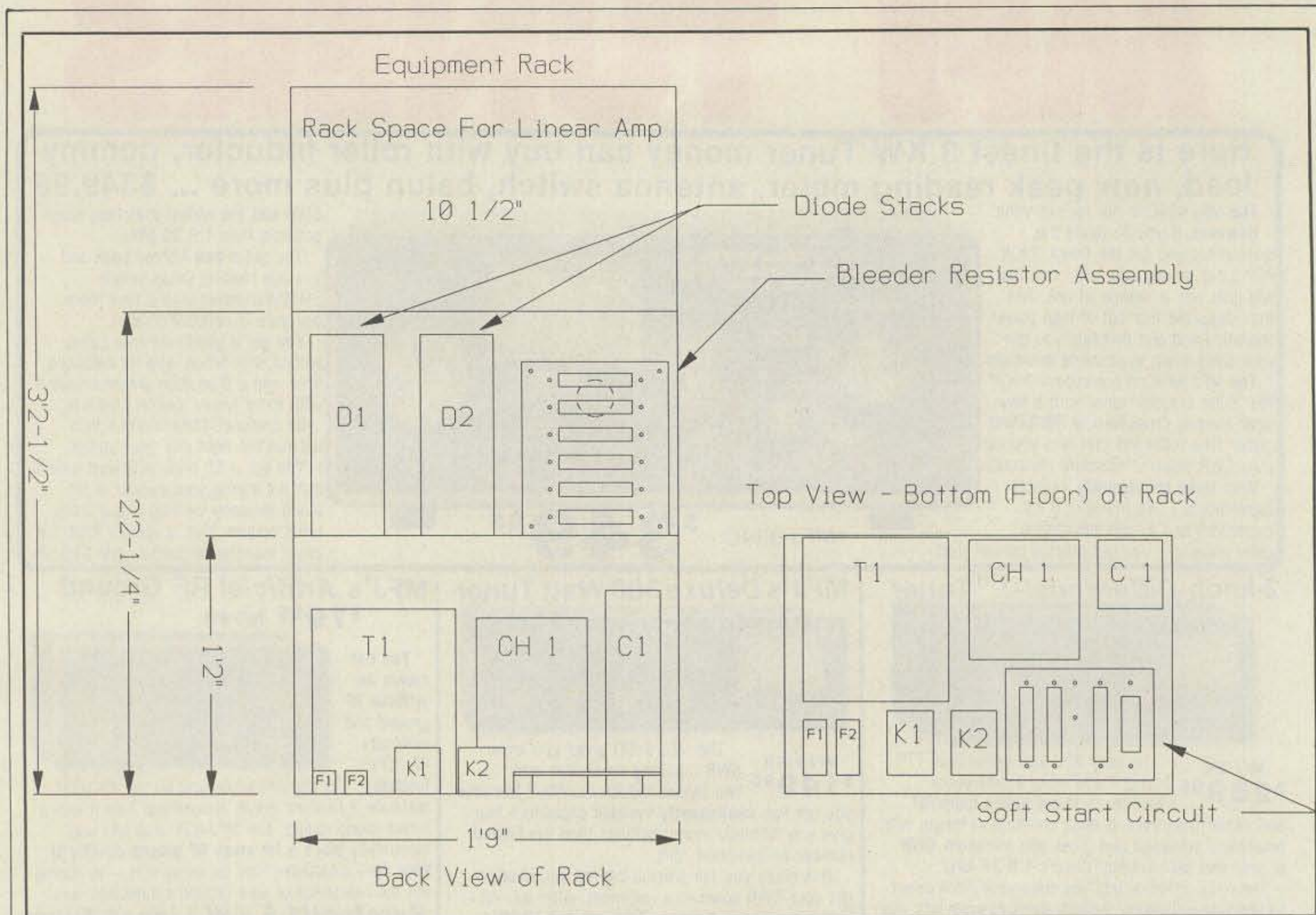


Fig. 5- Parts placement and assembly details for the power supply when mounted in a rack.

ment, I had to give in to my uncontrollable desire and admit, "Yes, the only thing I can do now is build a new RF deck!"

There is really not much to the design of a grounded grid amplifier that bears any special consideration. The only consideration would be how many tubes or what type of tube to use. Since I currently have two homebrew RF decks each using a pair of 3-500s, the thought occurred to me that I could build the new amp with four 3-500Zs in grounded grid.

This was a rather hard decision to make since both of these amps had served me with no failures over a span of eight years. I really hated to think that I would have to junk both amps in order to build the "ultimate" amplifier. I pondered the idea for several days before coming to grips with it. My one concern was the filament requirements of 5 volts at 60 amps of current. The simple solution would be to feed the tubes in pairs through 30 amp filament chokes. I was concerned about the effects of combining the chokes at the RF input point. I wasn't sure that the combined reactance would provide sufficient choke impedance, since it would be approximately 250 ohms at 1.8 MHz.

A complete schematic drawing of the RF deck was drawn and filed away for reference (see fig. 6).

Prior to actually taking out the tools and beginning to dismantle either amp, I turned again to the computer and loaded up the CAD software and began the task of physical design and parts layout. I decided that if I was going to have to junk both RF decks, I may as well make it worthwhile and use all four tubes in the new amplifier. Now all I had to do was see if I could fit everything into one chassis with a maximum panel height of 10 1/2 inches.

The next three days were spent sitting at the computer trying to fit everything onto a 17" x 17" chassis in such a way that wiring would be straightforward. One of the design features that I wanted to incorporate was to enclose the tubes in a tube compartment or enclosure in such a way as to adequately cool all four bottles. Therefore, my first priority was to design the tube enclosure. I wanted to build everything myself so I could keep the cost down and use readily available materials. This meant that I would have to be able to get most material from my local hardware store. I thought that it should be moderately simple to build a frame for the enclosure from aluminum angle and then cover all four sides with aluminum plate material.

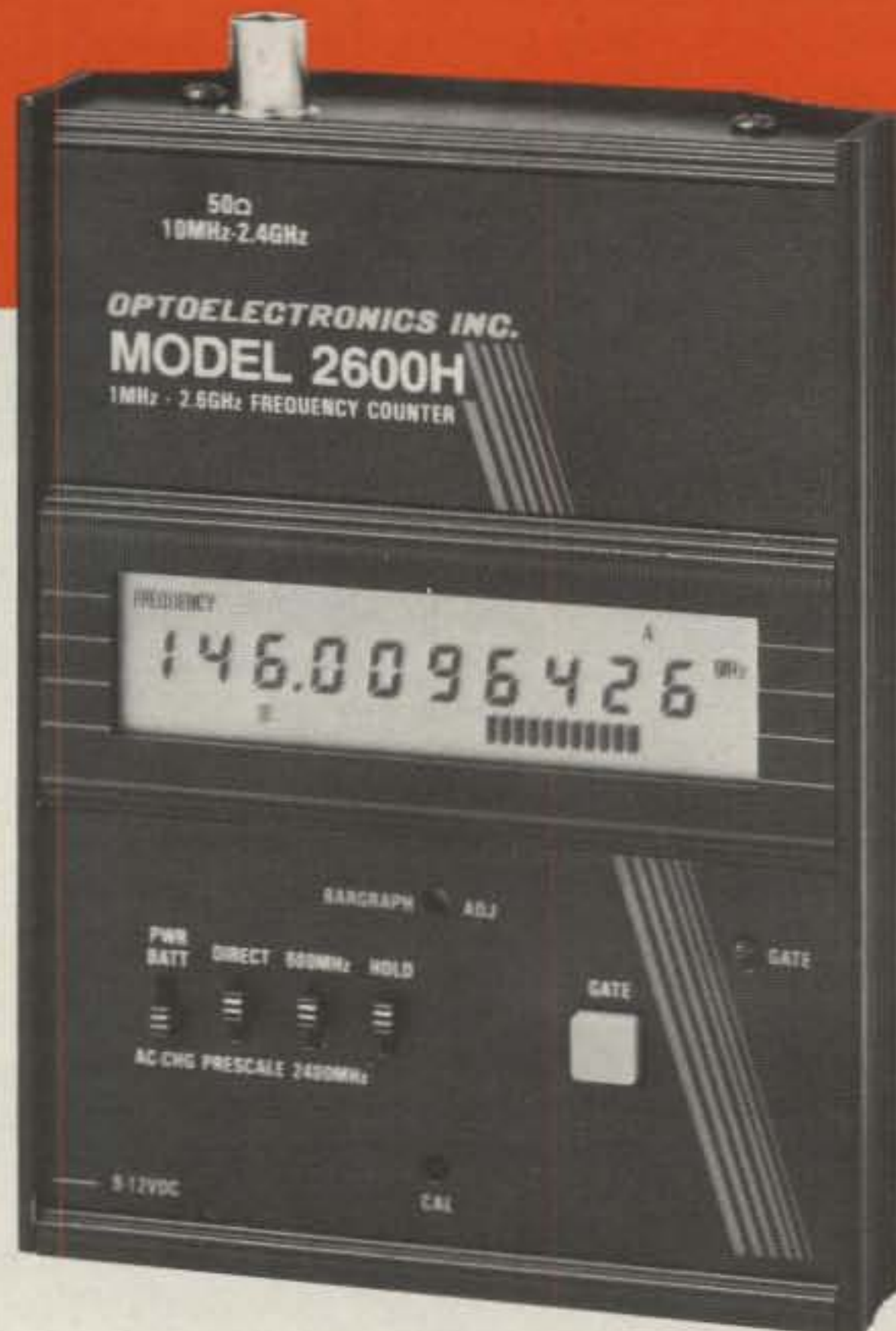
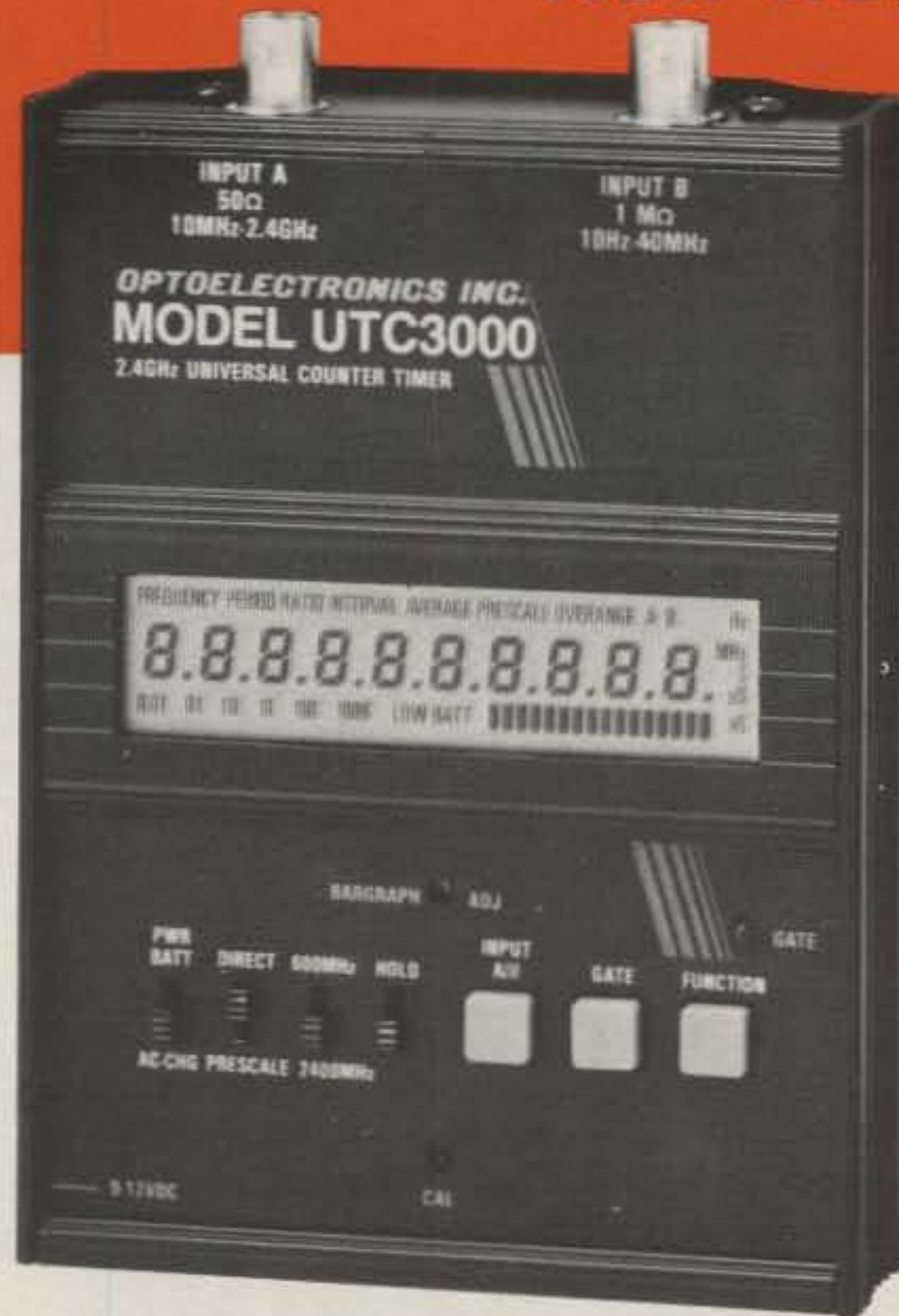
I drew up the tube enclosure making

sure that there was sufficient room for all four tubes along with the plate choke and plate blocker. The final design turned out to be a simple box measuring 10 1/2" x 10 1/4" x 8". Since this would be the most critical part of the whole project, I wanted to see if it would be possible to build the enclosure before continuing. At this point I saved the drawing to disk, turned off the computer, and went to the hardware store and purchased an 8 foot length of 3/4" x 3/4" aluminum angle. As soon as I got home I grabbed a copy of my print and headed for the work bench with hacksaw in hand. I measured off the various lengths and cut all the pieces to the sizes called out in the drawing.

I used number six (6 x 32) hardware to bolt the frame together. First I bolted together the portion that would be the bottom of the assembly. Then I bolted together the top portion. Next I cut four pieces that would be inserted in each corner between the top and bottom, and pretty soon, *voilà* a box frame. Actually, it didn't look too bad. I was encouraged thinking this may really work after all. The next day I measured all four sides of the frame, being careful to allow for overlapping sides that joined on each end of the box, and purchased four aluminum plates cut to size. I also used 6 x 32

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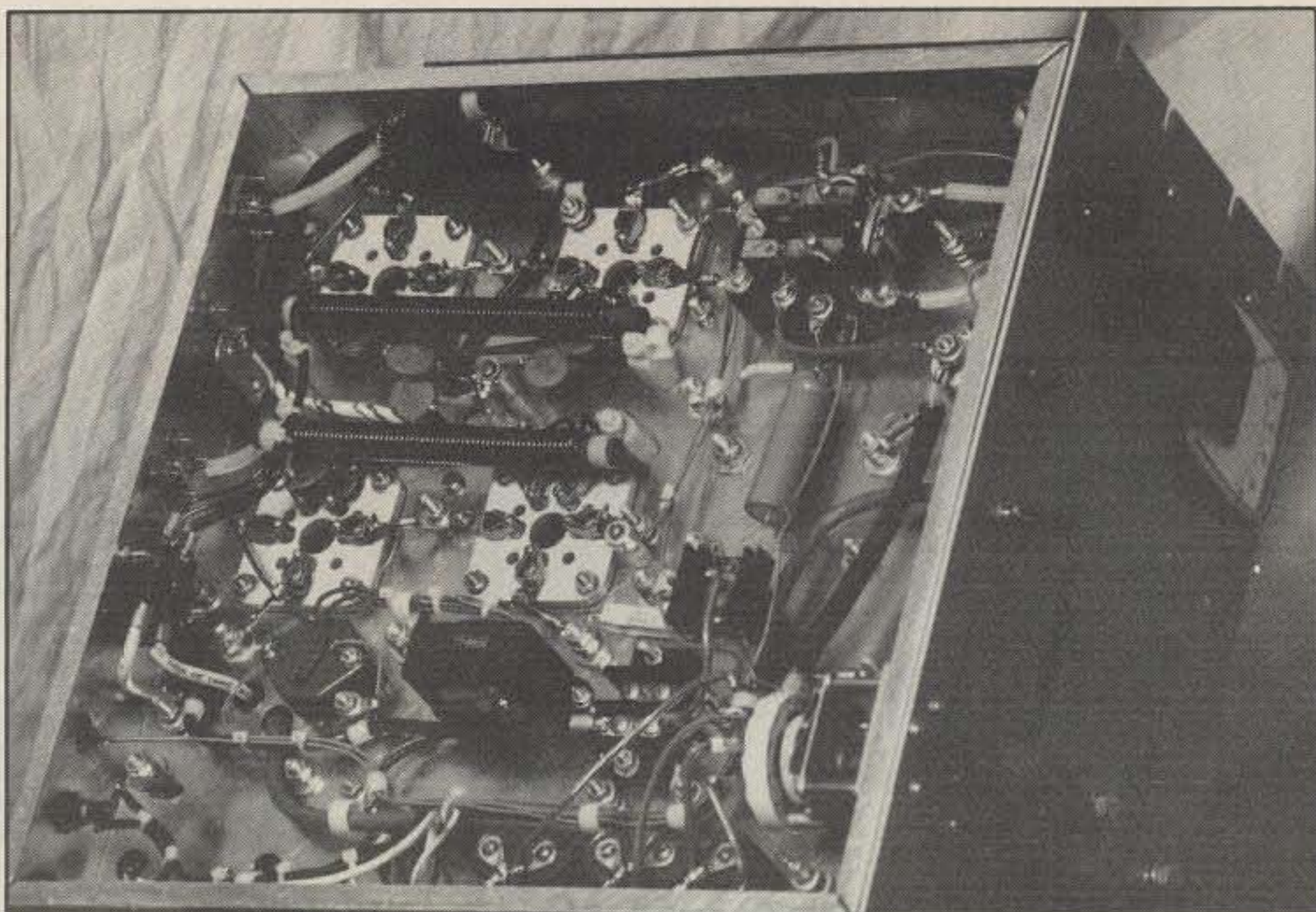
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hardware to bolt the sides onto the frame, and when finished I was rather impressed with myself. I had built an aluminum box! Isn't that great? Don't laugh too hard until you've finished yours!

Now for the critical measurement. Would all four muffin fans fit on the top cover? The plan was to cool the tube compartment with four muffin or whisper fans. Laying all four fans side by side on the top cover plate proved that computers don't lie. They fit perfectly—not any room to spare, but they did fit.

Satisfied with the results of my design, I was inspired to continue with the final design. Back to the computer. Now that I was committed to the physical space occupied by the tube compartment, it was necessary to check each part's physical dimensions to make sure that my layout was accurate. I carefully measured each part I had on hand. I must have checked the dimensions for each part several times, because I was close to committing to dismantle my existing RF decks to rob them of their parts.

There was one serious problem with the layout. I did not have sufficient chassis space to use a typical air-core-type coil. Conversations with two fellow topbanders—Don, AE7H, and Ken, K7ZFX, both experienced in using toroids in high-power applications—convinced me to try a toroid for the tank circuit. They were both very helpful in providing me with in-



Underneath view of the RF deck showing the neat and readily accessible wiring, plus the two large filament chokes.

formation on their personal experiences and information on the availability of the toroid cores. Before continuing any further, it was necessary to get a toroid core and design a method of mounting in order to finalize the parts layout. In a couple of

days the core arrived, and I was able to design a simple method of mounting the coil assembly in the space available (see fig. 7).

Convinced that I had correctly measured all remaining components and that

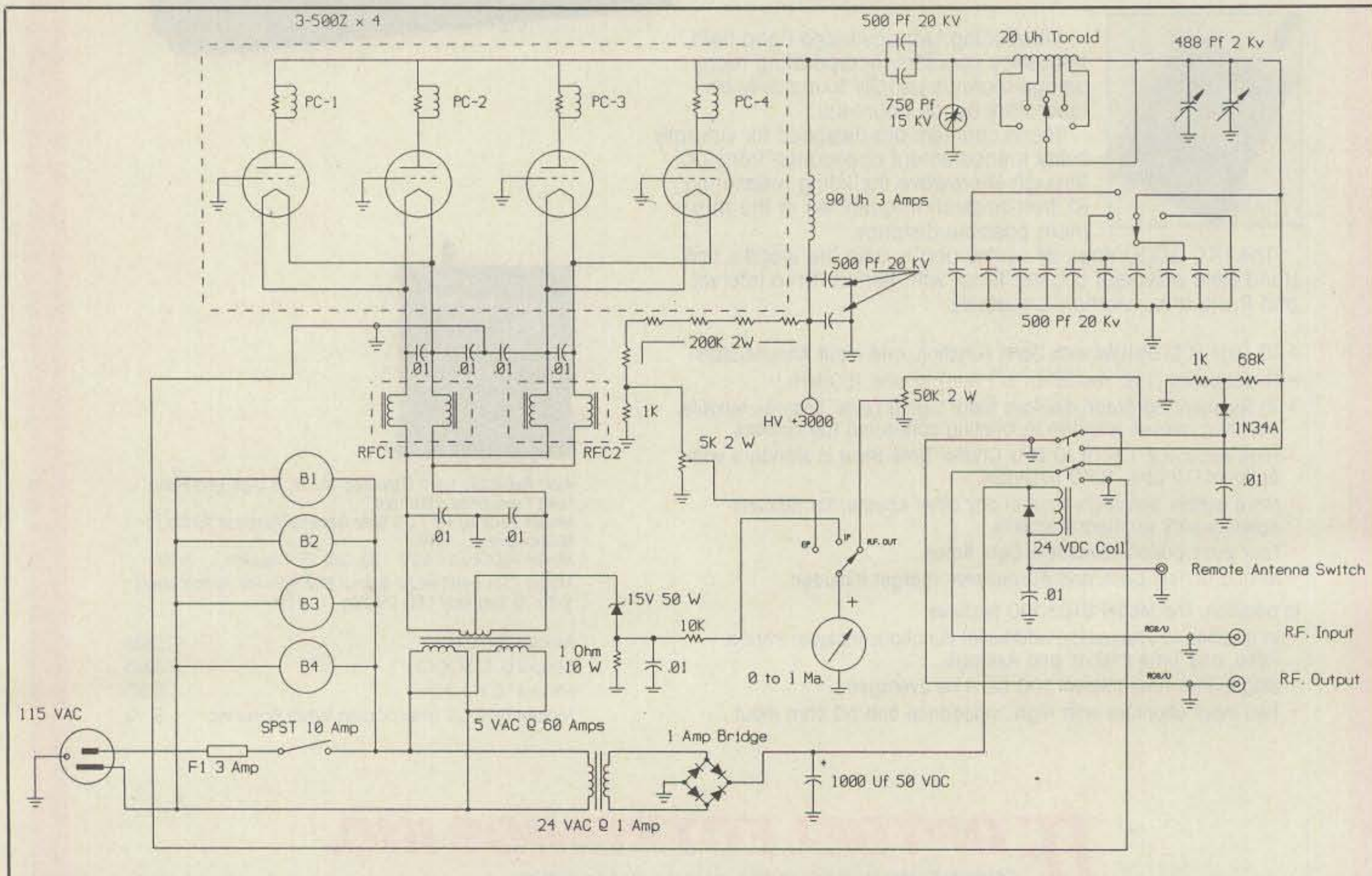


Fig. 6- Schematic diagram for the dedicated 160 meter KW amplifier.

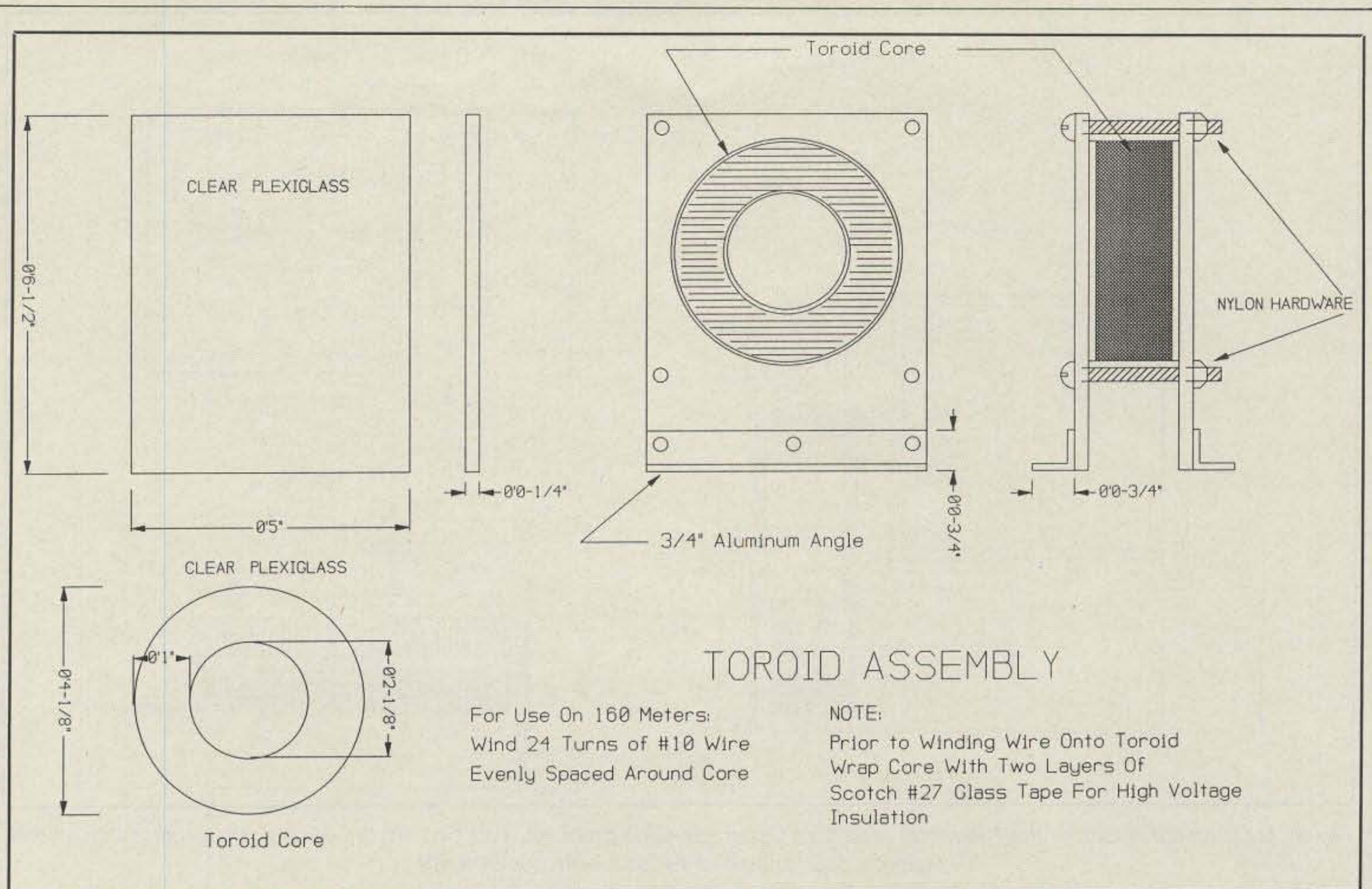


Fig. 7- Details of the toroid assembly.

the physical layout would indeed work, I finalized the mechanical design and printed myself a couple of drawings from which to work (see fig. 8).

Reluctantly I began removing parts—first the vacuum variable, then the output tuning capacitors. Little by little both of the existing RF decks which had served me faithfully for so many years were now nothing more than a pile of junk metal on the floor. I was now fully committed to finishing the project if I had any hope of operating on 160 meters this season.

I began the work of mounting all the parts according to my layout drawing. I measured the placement of the tube sockets and set the tube enclosure in place to verify that everything looked as it did on the drawing. Next I punched four holes 2 3/4 inches in diameter for the tube sockets. I positioned the tube compartment in place and drilled all mounting holes. After securing the tube enclosure to the chassis I began mounting the remaining parts. By the end of the first day's work I had all the top chassis parts mounted and the new amplifier was beginning to look very promising.

The following day was spent mounting the remaining parts underneath the chassis. By the time all the parts were mounted, I was surprised how little room remained. When I initially looked at the 17" x 17" chassis it looked rather large.

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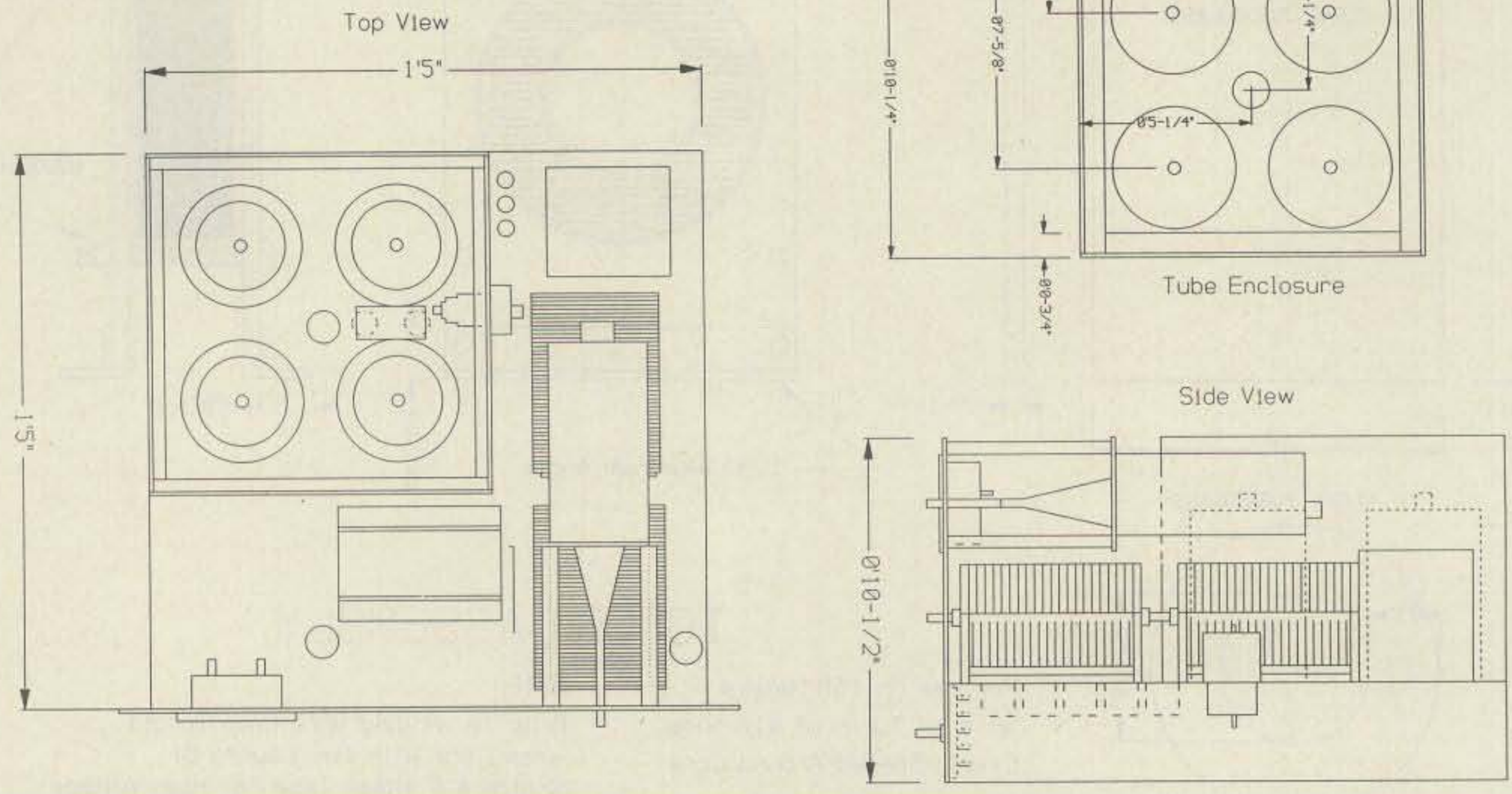


Fig. 8- Mechanical layout for the 160 meter amplifier. Using the CAD program, you can lay out almost any project before it is built and rearrange it to suit available components.

However, now it was just barely adequate for the job.

The mechanical layout proved to be quite easy to wire. It took a considerable amount of time to wire, because working with number six wire and 1/4 inch copper tubing is a bit difficult, especially in con-

defined areas. I used three short pieces of number six wire from the output of the filament transformer to the filament choke inputs. The RF wiring was accomplished by fabricating custom pieces made from 1/4 inch copper tubing. The entire wiring process took approximately three days

to complete.

With wiring now completed, it was time for the original smoke test. I placed the RF deck into the space provided in the rack and made all necessary connections. The filaments were turned on and the meter placed into the plate current position. I switched on the power supply and noted that static plate current rested at approximately 220 milliamps as indicated on the front-panel meter.

I applied some drive from the TS830S in the "tune" position and began twisting the turning knob on the plate tuning capacitor. As I watched, the Bird wattmeter began to climb. Alternately I adjusted the plate tuning and output tuning capacitors for maximum output on the wattmeter. After all tuning was accomplished, the wattmeter indicated slightly over 700 watts of output power. I let things sit for a few minutes and observed the tubes, which showed no color at all in any of the plate elements. I reached over and put the 830 into the CW mode and applied full power to the amp. The wattmeter pegged off scale, so I turned off the power supply. There was no point in continuing, since I had no way of accurately measuring the output power of the amp. Until such time as I can purchase a higher power slug for the wattmeter I will simply tune up at a 1 KW output level.

As for the loop receiving antenna, I think I'll put my tools away for a few days and continue smoke-testing my new amp.

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UG21DS N plug for RG8,213,214 Silver	3.35
UG83B N jack to PL259 adapter, teflon	6.50
UG146A SO239 to N plug adapter, teflon	6.50
UG255 SO239 to BNC plug adapter, Amphenol	3.55
SO239AM UHF chassis mt receptacle, Amphenol	.89
UG175S/UG176S reducer (silver) specify	.45
UG88C BNC plug RG58,223,142	1.45

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GS38 3/8" tinned copper braid	.35/ft
GS12 1/2" tinned copper braid	.50/ft
HW06 6ga insulated stranded wire	.35/ft
AW14 14ga stranded Antenna wire CCS	.14/ft

* Prices do not include shipping. Visa/Mastercard \$30 min., COD add \$3 (min. ship. charge \$3)
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MorseMan Plus - THE premier Morse Code trainer for the IBM-PC and compatibles - now incorporates mouse support, improved Farnsworth method, improved code teacher, expanded information base and MUCH MORE. Gordon West, WB6NOA - the guru of amateur radio training - calls **MorseMan Plus**, "...one of the best Morse Code trainers available."

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Unlike other trainers, **MorseMan Plus** was designed by a CW expert (NE4L) who knows what it takes to get to that high level of proficiency. Other trainers don't even come close! (Hundreds of satisfied users can't be wrong!)

You can get **MorseMan Plus** for \$24.95 (plus \$2.00 s/h) by calling 1-800-525-7235 (9-5 CST, M-F) and using your Visa or MasterCard or send check/MO (no cash please) to the address below. (specify 3.5" or 5.25" disk format)



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170,171 ProComm - One of the best communications programs available.

190-192 PC-File:dB - a great dBase 3 compatible database system. Fully relational and has LAN support.

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211 As Easy As - Lotus 1-2-3 spreadsheet clone. Does 97% of what Lotus does (and then some!)

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275, 276 DanCAD-3D (2 disks) - Very sophisticated 3D frame and drawing program. Good general CAD.

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290 FlowDraw - Full-featured program for drawing schematics, flowcharts, HIPO diagrams, ect.

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1144 MFJ Terminal Program - dedicated to the MFJ line of TNC's Rivals commercial versions.

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1148 PicPro/WeFAX - WeFAX and packet pictures via your Kantronics TNC (EGA req'd for WeFAX)

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

From the Notebook—Part III

Last time we chatted, we again opened the Antennas & Accessories notebook for some topical antenna and software ideas. This time our focus will be on books and catalogs for the hamshack, along with some brief notes on new software you're sure to like. First, let's put on our reading glasses.

From the Bookshelf Catalogs and Books

40 Years of HF Mobileering. Subtitled "A HF Mobile Antenna Compendium," this indexed, 112-page scrapbook by Don Johnson, W6AAQ, is a fascinating volume that gathers in one place this long-time, die-hard HF mobileer's tidbits, tips, notes, and assorted nostalgia. The scrapbook is dedicated to one of the early pioneers of amateur radio, John L. Reinartz, K6BJ.

Don's book is indeed a one-of-a-kind tome, one that the Quarter Century Wireless Association (QCWA) has aptly described as nothing less than a dazzling detour back through four decades of time. Don is at heart a 75 meter mobileer, one who started his adventure on July 15, 1948, the date on which American amateurs were first allowed to operate mobile on 80, 40, and 20 meters.

Don is an original member of the late-1940s/early-1950s California Bay Area 3995 Mobileers; his original idea was to distribute the book to members of the original group. However, by word of mouth, initial copies of the book received a much wider distribution, and he now shares the history of his early experiences with that group with you. Don recalls much of the early antennas and equipment that constituted the state-of-the-art in the early HF mobile days, and he covers many of the problems that were encountered then, many of which are still encountered in our high-tech era.

There is a special focus on mobile antennas, including ones you can homebrew, and on the special requirements levied on them for successful 75 meter operation. Don describes several commercial types and critiques them quite thoroughly. Other topics include diverse subjects such as automatic antenna tuners (he's a strong advocate), drilling holes, fusing, power cables, grounding, coax, mountings, and more. Also included are reprints of mobile articles he has written himself as well as several articles by other HF mobile buffs.

Don's book is loaded with a number of helpful hints and tips that should appeal to new amateurs as well as seasoned HF mobile operators. There's a substantial dose of nostalgia tossed in, including oldies but goodies such as

the old Webster BandSpanner mobile antenna, Master Mobile mounts, and even Wayne Green, W2NSD's review of the Gonset G-66 mobile receiver. (Yes, Wayne was CQ's editor at the time that article was published in July 1956!)

Though not a textbook, the book should be of help to anyone in assembling an efficient and effective HF mobile station. It's priced at \$10 including shipping and handling, and is available from Don Johnson, W6AAQ, 809 Capay St., Box 595, Esparto, CA 95627.

Aeronautical Communications Handbook. The HF edition of this handbook is by Robert E. Evans, a veteran DXer, utility monitor, and aviation enthusiast. The spiral-bound book is an exhaustive and scholarly examination of the rather specialized field of shortwave aircraft monitoring.

The book is organized by topic with individual frequency lists. Some of the contents include details on monitoring the progress of transoceanic flights; Strategic Air Command (SAC) HF message traffic; airborne CW and RTTY communications; aeronautical weather stations and shortwave FAX stations; NASA communications; major world air route areas; and more. The book is priced at \$19.95 plus \$1.00 shipping from Universal Radio, 1280 Aida Drive, Reynoldsburg, OH 43068. Fig. 1 shows this interesting volume's cover.

More from Universal Radio. The same firm recently released its 24-page Scanner Catalog, priced at \$1.00 postpaid, which describes Universal's full line of scanners, scanner antennas, accessories, and books of interest to the scanner and monitor enthusiast. The catalog is the third in their repertoire, joining the earlier-released 48-page amateur and 52-page SWL catalogs, also priced at \$1.00 each postpaid.

Incidentally, for the benefit of SWLs just starting out in the hobby or nibbling at the joys of amateur radio, Universal Radio also offers a free, seven-part series of four-page "how-to" leaflets which explore various aspects of these hobbies. According to Don Jensen, "DX Listening" columnist in *Popular Electronics*, available titles include "Antenna Installation Advisory," "How to Install RF Connectors," and "Interested in Amateur Radio?" plus four other titles. Each booklet is free, but 25 cents in stamps or coin per title requested is appreciated. Write to Universal at the above address for any copies that you may desire.

Understanding Telecommunications. Ronald R. Thomas, W8QYR, has come up with a new 243-page book that is intended to be a comprehensive overview and reference source in the field. The book includes information on diverse topics such as telephone and radio systems, television, computer-to-computer communications, and even careers in the field. A number of charts and diagrams are used to supplement the text. The book is \$17.95 and is published by TAB Books, Inc.,

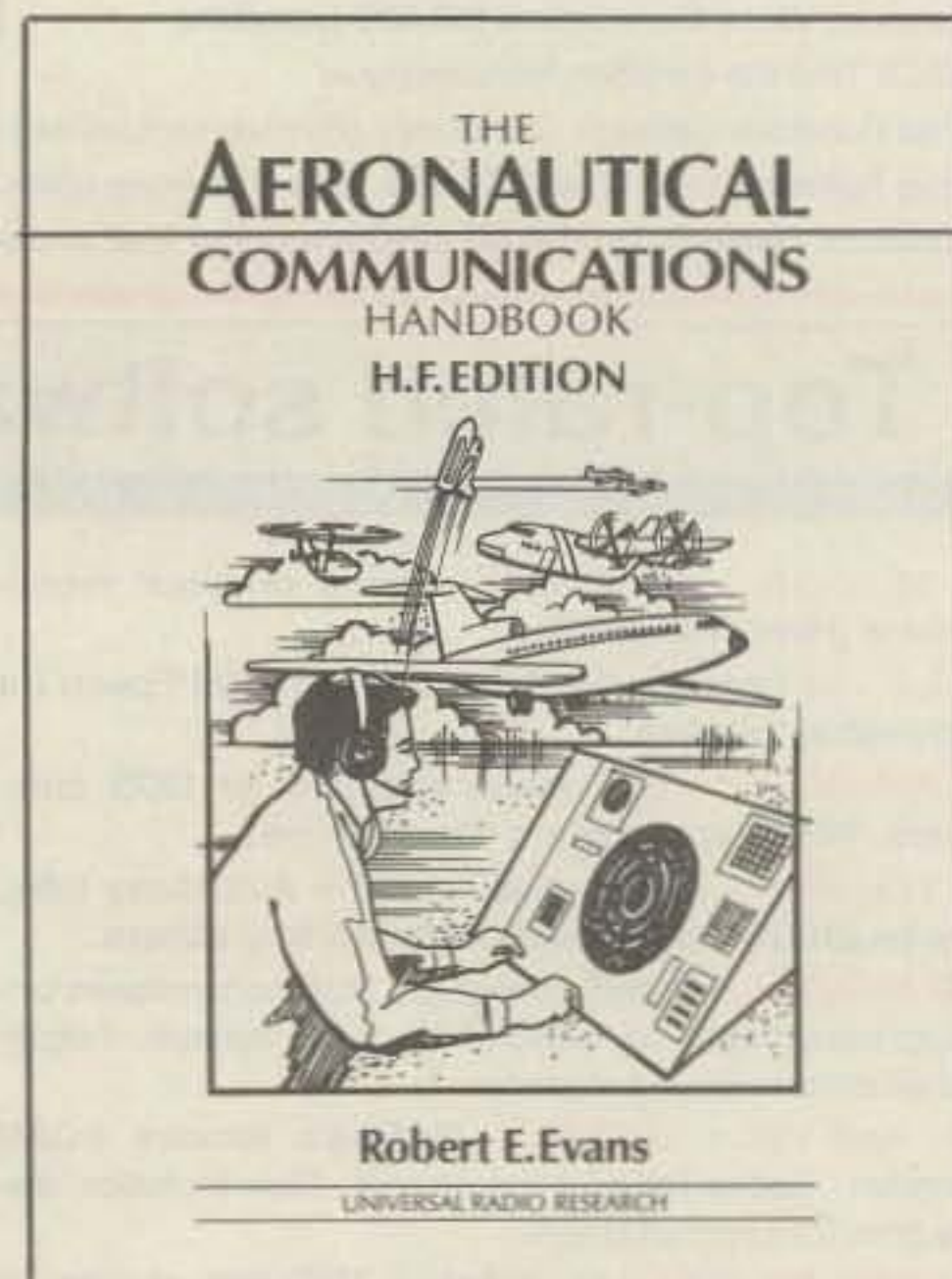


Fig. 1—The HF Edition of The Aeronautical Communications Handbook by Robert E. Evans is a scholarly examination of the entire field of shortwave aeronautical listening. The handbook is distributed by Universal Radio.

Blue Ridge Summit, PA, 17294-0850. It is distributed through TAB book dealers.

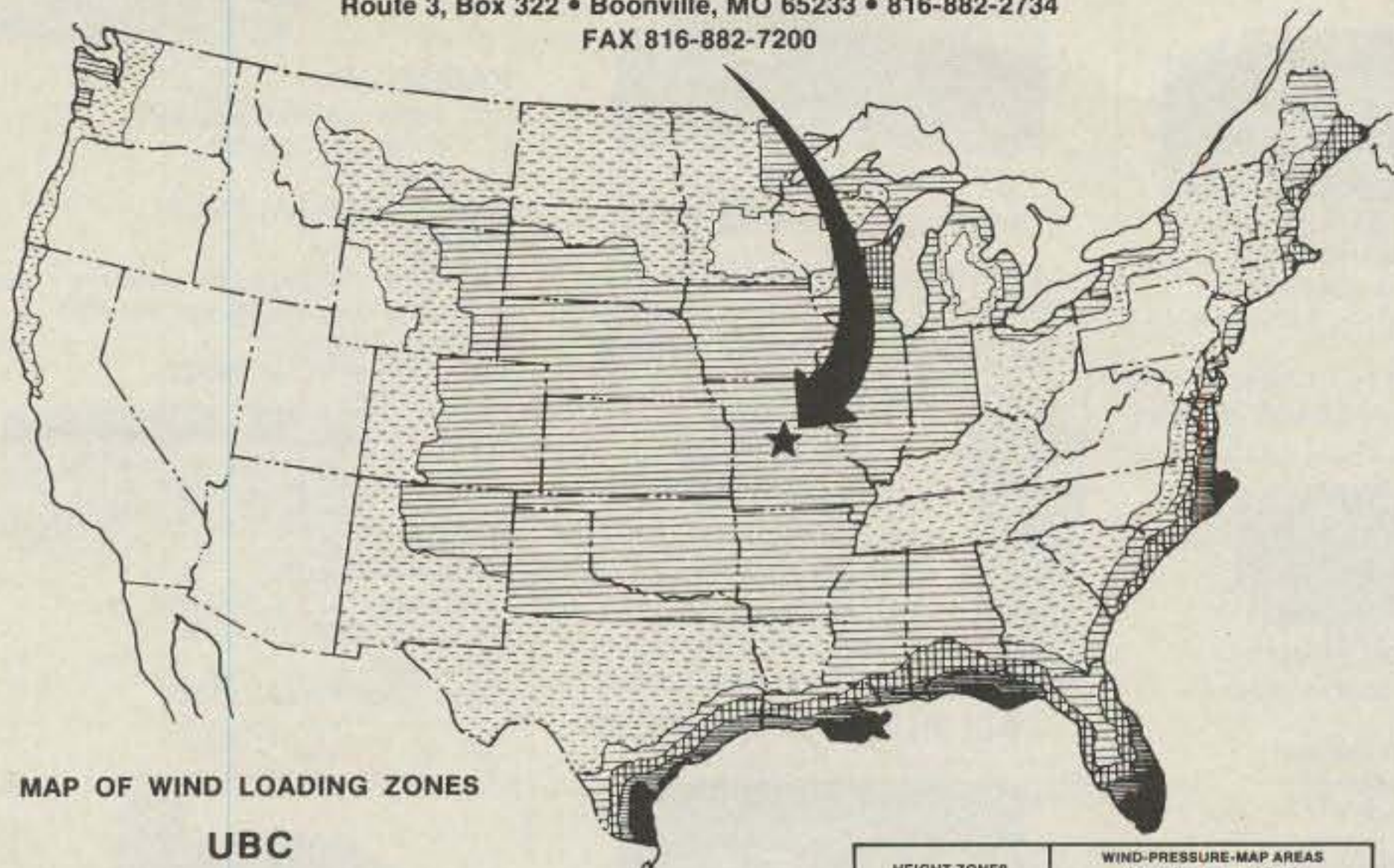
Glen Martin Catalog. If a tower is in your future this upcoming antenna season, you might want to check out the new Glen Martin Engineering catalog. The catalog describes the line of heavy-duty Martin triangular (13 and 18 inch) towers and the Martin HAZER, a simple "elevator system" for towers, an accessory that raises and lowers antennas with the turning of a winch. The catalog also includes a useful (and possibly sobering!) map of the continental U.S. which shows wind loading zones across the country. We've reproduced the handy chart found on the back cover of the Martin catalog as fig. 2.

Incidentally, while we're thinking about towers, it's useful to discuss their HAZER. The HAZER was designed as a convenient alternative to tower climbing. In addition to standard towers, it is also designed to work with telescoping towers, which can only be lowered to a height of about 22 feet and then must be climbed, and with foldovers, which fold over only as far as the radius of the antenna allows. The HAZER is designed to bring the antenna down to ground level, keeping it in an upright position, allowing for changes, repairs, and protection from high winds and storms.

The device is assembled around the tower at ground level. If it is installed at the time the tower is erected, no climbing is required. However, on existing towers a top plate and pulley

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MAP OF WIND LOADING ZONES

UBC



HEIGHT ZONES (in feet)	WIND-PRESSURE-MAP AREAS (pounds per square feet)						
	20	25	30	35	40	45	50
Less than 30	15	20	25	30	35	40	45
30 to 49	20	25	30	35	40	45	50
50 to 99	25	30	40	45	50	55	60
100 to 499	30	40	45	55	60	70	75
500 to 1199	35	45	55	60	70	80	90
1200 and over	40	50	60	70	80	90	100

Fig. 2- U.S. wind-loading chart. What's the potential risk to your tower from wind damage? The back cover of the Glen Martin Engineering catalog, highlighted this month, tells the story.

assembly must be installed at the tower top, a one-time operation.

Once installed, the HAZER travels smoothly past tower braces and bolts. A spring-loaded safety latch prevents accidental lowering by catching on the tower crossbraces. When lowering the HAZER, a control cable disengages the safety latch as the winch is turned. When fully elevated, the safety latch transfers the load from the HAZER directly to the tower, allowing 360-degree rotation of the antenna. Several models are available to allow use with a variety of parallel leg towers; these are pre-drilled for several popular rotors.

For a free catalog, contact Glen Martin Engineering, Inc., Route 3, Box 322, Boonville, MO 65233.

Readers may wish to take note of Steve Wilson, K0JW's comprehensive review of the HAZER elevator system which appeared on page 20 of the April 1989 issue of *CQ*.

AntennasWest Information Packet. The product line of this Utah firm has grown rapidly since we touched base with them in the July 1988 and April 1989 columns. They've now assembled a large stack of spec sheets on the various HF antennas they offer that's free for the asking. The theme for AntennasWest, as espoused by proprietor Jim Stevens, KK7C, is that with some care in choosing an antenna, you can work DX consistently without a tower and without running high power.

Some of the products described in the packet include the HalfSquare, a single-band antenna which makes use of two quarter-wave radiators and a half-wave phasing line; a simple to install 40-10 meter "Slinky" indoor antenna for apartment, motel, attic, and portable use; a device for making antenna launching easy, the QRV-QuickLaunch antenna installation kit; fast-up emergency antenna packs in 80-10 meter and 40-10 meter versions; full-, half- and quarter-size G5RV antennas; a closed-loop antenna, the OmniLoop™, de-

signed for 160-10 meter coverage; and several other antennas and accessories, plus some Macintosh amateur software.

For a copy of their information packet, contact AntennasWest, Box 50062, Provo, UT 84605.

Dave Ingram, K4TWJ, conducted a hands-on review of several of the antennas offered by Antennas West. The review appears in the April 1989 issue, page 36. Look for his review, "Some Signal-Radiating Treats from Antennas West."

New Radio Works Catalog. Jim Thompson, W4THU, sent us a copy of his latest catalog, which is dedicated to the wire antenna enthusiast and is a sourcebook of wire antenna systems, components, accessories, and other goodies. Some new features of the 64-page catalog are a 13-page balun section including a two-page balun specification and application matrix, 16 foot monoband MicroDipoles for all but the WARC bands, and the ground-independent "InTreeVert" antenna systems for 14 through 440 MHz. There are also some new high-grade coaxial cables listed, including the super low-loss International 9086 that is claimed to be equivalent to Belden 9913 coax. The new catalog also lists Teflon® insulated PL-259 coaxial connectors that are available plated in nickel, silver, and gold.

Interestingly, in looking back five years to his startup in April 1985, Jim notes that his first catalog was repro-machine printed on two sides of a single sheet of paper! The biggest changes are in the products rather than in the prices; most of the prices are about the same now as they were in 1985. RG-8X and RG-213 are slightly cheaper now (\$1.00 less per hundred feet), while ladderline is now \$4.00 less per hundred feet. No. 14 hard-drawn copper wire is still to be had today for 7 cents per foot.

For a copy of the catalog, contact The Radio Works, Box 6159, Portsmouth, VA 23703.

Great Radio Reads Catalog. Gerry L. Dex-

ter, prolific shortwave communications writer and columnist for *CQ*'s sister publication *Popular Communications* now has available an eight-page flyer detailing the books he's written and those which he distributes. The catalog shows a variety of books on amateur radio, scanner topics, and SWling, with an emphasis on the latter.

In addition to several tutorial and how-to-do-it books, the new catalog also lists radio frequency spectrum charts and a number of specialized frequency directories that cover utility stations, aircraft frequencies, government channels, AM and FM stations, and other specialized services. There are even some interesting titles having to do with unauthorized U.S. and Canadian "pirate broadcasters," the strange "numbers stations" that broadcast transmissions of nothing but number groups, and clandestine stations whose goal is to subvert or overthrow other governments.

For a catalog, contact Gerry at Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

Pocket Ref. A thick, 480-page pocket reference of tables, maps, formulas, constants, and conversions is offered by Sequoia Publishing. The 3.2" x 5.4" x 0.6" book by Thomas J. Glover contains a great deal of reference data on computers and printers, physical constants, electrical codes and tables, hardware, math, mining and milling, rope and cable, tools, steel and metals, materials weights, welding, and many other topics. The pocket reference also presents a sizable dose of useful general-purpose information that's targeted at the traveler and includes area codes, key 800 numbers, climatic data, time zones, monetary conversion rates, etc. Of special interest is coverage of the radio phonetics, Morse and "ten" radio codes, the frequency spectrum, and a wind strength scale.

Pocket Ref is available for \$9.95 plus \$2.00 domestic shipping and handling from Sequoia Publishing, P.O. Box 620820, Littleton, CO 80162.

Pasternack Enterprises Catalog. Their free coax catalog has grown since we last highlighted Pasternack's wares in the June 1986 column. It's nearly 40 pages in length and lists an extremely wide variety of coaxial products. Offered are coaxial cable; cutting, crimping, and scraping tools; amplifiers; power dividers; connectors, adapters, and terminators; twinax adapters and connectors; and a variety of assemblies.

The new catalog is available from Pasternack Enterprises, P.O. Box 16759, Irvine, CA 92713.

Larsen Catalog and Price List. Larsen Electronics has released its 63-page Amateur Radio Antennas Catalog, which includes the firm's full range of mobile, portable, and base-station antennas, coax and connectors, and accessories. A number of specialized antennas for repeater, handie-talkie, and mobile use are included, as are a variety of antenna mounts. The catalog also has a short section which provides a handy reference for comparisons between different types of coaxial cable and coax connectors. Also spelled out is Larsen's very liberal "no nonsense" full six-month warranty on its antenna products.

The catalog and associated price list are available from Larsen Electronics, Inc., P.O. Box 1799, Vancouver, WA 98668.

Mission Communications Information Packet. According to Charles F. Frost, president of this Houston firm, they are now stock-

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RS12A	9	12	79
RS20A	16	20	99
RS20M	16	20	119
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RS35M	25	35	179
RS50A	37	50	229
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3-211	220	2-110W	\$299.00
3-312	220	30-120W	\$264.00

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DR-110T 45W, 2M Mobile
DR-510T Dual Band, 45W Mobile

AMPS

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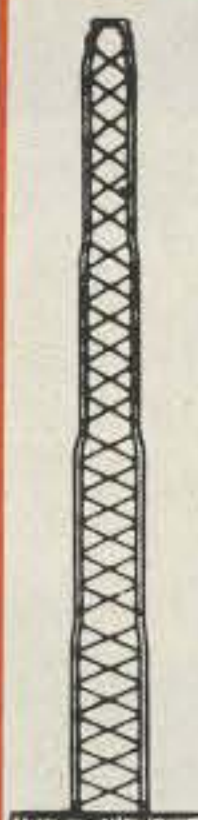
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- Check these features:
- All steel construction
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 - Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
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HG52SS	52 ft	9 sq ft	\$CALL
HG54HD	54 ft	16 sq ft	\$CALL
HG70HD	70 ft	16 sq ft	\$CALL

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- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	\$449
HBX48	48 ft	10 sq ft	303	\$589
HBX56	56 ft	10 sq ft	385	\$699
HDBX40	40 ft	18 sq ft	281	\$569
HDBX48	48 ft	18 sq ft	363	\$689

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN Guyed Tower Packages



- World Famous Rohn Quality and Dependability
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- Complete packages include: guy hardware, turnbuckles, guy assemblies, concrete base, rotor plate and top section per manufacturers specs. Packages shown below are rated for 70 mph wind zone. 90 mph wind zone packages slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	\$849	\$1229	\$1549
60'	939	1389	1939
70'	999	1719	2159
80'	1199	1869	2369
90'	1289	2039	2579
100'	1369	2199	2989
110'	1449	2459	3209
120'	1669	2619	3429



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Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
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MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

*Note-towers rated at 50 mph to EIA specifications

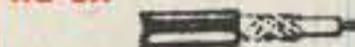
RG-213U



\$.39/ft \$379/1000 ft.
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

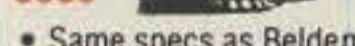
RG-8X



\$.22/ft \$209/1000 ft.

- RG8X—95% Bare Copper Shield •Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086



\$.45/ft \$439/1000 ft.

- Same specs as Belden 9913
- Lower loss than RG8U
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Lowest Loss
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1/2" Alum. w/poly Jacket	\$.79/ft.
1/4" LDF4-50 Andrew Helix®	\$1.99/ft.
3/8" LDF5-50 Andrew Helix®	\$4.99/ft.

select connectors below.
Helix® is a Registered Trademark of the Andrew Corp.

Cable Type	Coaxial Cable Loss Characteristics (DB/100 ft)				
	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	8	1.2	3.5	5.8
9086	50	4	64	1.7	3.1
1/2" Alum	50	3	5	1.2	2.2
1/4" Helix	50	2	4	9	1.6
3/8" Helix	50	1	2	5	9

HELIX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
1/4" Helix®	\$29	\$29	\$29	\$29
3/8" Helix®	\$55	\$55	\$55	\$55

COAX CONNECTORS

Amphenol Silver PL259	\$1.50
UG21B N Male	\$3.50
9086/9913 N Male Connector	\$4.95

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Stranded Copper 14ga.	\$10/ft.
1/4 mile 18ga copper-clad steel wire	\$30
Dog bone end insulator	\$.79 ea.

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1:1 Balun	\$15	Center Insulator	\$8
Dipole Kits	D80 \$31.95/D40 \$28.95		
Short Dipole Kits	SD80 \$35.95/SD40 \$33.95		
All-band Dipole w/ladder line	\$29.95		
G5RV all band antenna	\$49.95		

ALPHA DELTA

DX-A 160-80-40 Sloper \$49

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A3 3-el Tribander	
A4S 4-el Tribander Beam w/S.S. Hdwr.	
A743 & A744, 30/40 mtr KIT for the A3 & A4.	
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AV5 80-10 mtr Vertical	
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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	
ARX2B 2 mtr Vertical	

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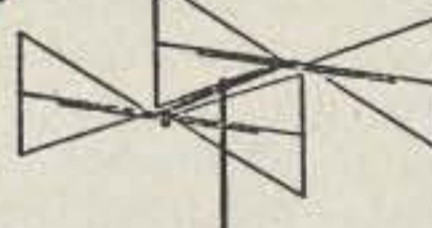
RMK II Roof Mtg. Kit	\$59.95
STR II Stub-Tuned Radials	\$39.95
TBR160 160m Coil Kit	\$59.95
30m Add-on Kit	\$39.95
17/12m Add-on Kit	\$39.95

HF6V

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FREE UPS on ACCESSORIES when purchased with antenna

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



- Unique Design Reduces Size
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- No Lossy Traps
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- Element Length 12.5 Feet

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KT34A 4-el Broad Band Triband Beam	\$419
KT34XA 6-el Broad Band Triband Beam	\$619

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Alliance U110 (3 sq. ft. rating)	\$49
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

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Standard 8 cord cables \$.25/ft.
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heavy Duty 8 Cond cable \$.45/ft
(vinyl jacket 2-#16 & 6-#18 ga)



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10 FT. STACKED SECTIONS			
20G	\$54.50	45G	\$153.50
25G	\$65.50	55G	\$197.50

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Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	
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.

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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
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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
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HPTG6700 Guy Cable (6700 lb rating)	\$.72/ft
9901LD Cable End (for 2100/4000 cable)	\$9.95
9902LD Cable End (for 6700 cable)	\$11.95
Socketfast Potting Compound (does 6-8 ends)	\$16.95

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Length	Heavy Duty Steel Masts 2 in OD - Galvanized Finish			
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12 in Wall	\$29	\$49	\$69	\$89
18 in Wall	\$49	\$89	\$129	\$149
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ing a wide variety of antennas and accessories. These include their own 80, 40, and 10 meter "Double Bazooka" antennas, a standard G5RV antenna, and a broad selection of popular HF and VHF/UHF base- and mobile-station antennas from a range of manufacturers. Featured are the Texas Bug Catcher mobile antenna and its accessories, as well as the 2 Meter Squared Mobile SSB antenna.

Information and a catalog are available from Mission Consulting, Inc./Mission Communications, 11903 Alief-Clodine, Suite 500, Houston, TX 77082.

Unadilla/Reyco/Inline Antenna Accessories. This Andover, Massachusetts firm has for several years carried the line of HF antennas, W2VS HF antenna traps, W2AU and W2DU baluns, interference filters, W1NBB inline coaxial relays, switches and couplers, and a variety of accessories and other goodies formerly offered by the Microwave Filter Company.

For an eight-page illustrated catalog, along with some history on the firm's products supporting its "a dime on the antenna is worth a dollar on the radio" philosophy, contact Unadilla Antennas Etc., P.O. Box 215BV, Andover, MA 01910-0814.

Information Unlimited Catalog. This mail-order outfit's "Complete Catalog of Amazing and Fascinating Devices" certainly has a number of unusual items described in its 24 pages. Although not particularly oriented toward amateur radio, much less antennas, the catalog nevertheless is a treasure trove of information for electronics hobbyists and experimenters—and that includes many of us.

Some of the products covered in the catalog include visible light lasers, solid state and helium neon lasers, Tesla coils and accessories (remember them?), plasma display devices and lightning globes, pulsed magnetic coil guns and launchers, infrared viewers, FM wireless and security devices, electronic defense weapons (stun guns), solar cells, ultrasonic and high sound pressure acoustical devices, and more esoterica.

The catalog lists several device plans and specialized parts, along with a number of experimenters' books. These include seven different titles on electrical pioneer Nikola Tesla, including separate books on his life, inventions, and patents.

For a copy of this fascinating catalog, write to Information Unlimited, Box 716, Amherst, NH 03031.

Bird RF Power Measurement Catalog. Bird Electronic Corp. has issued a slick, new 60-page catalog which describes its comprehensive product line of power-measuring equipment and other RF instruments and accessories. Included in the catalog are descriptions of its several different types of RF wattmeters, coaxial low-pass filters, calorimeters, load resistors, attenuators, coaxial selector switches, directional couplers, and a host of related products.

Although aimed largely at the commercial, business, and upscale amateur markets, the catalog nevertheless is an excellent hamshack reference and contains a wealth of tech data and tutorial material which explains the theory of operation of many of its products. The catalog is free from the Bird Electronic Corp., 30303 Aurora Road, Cleveland, OH 44139.

1990 EEB Shortwave Catalog. The Electronic Equipment Bank has issued its 1990 catalog, which is of special interest to the serious

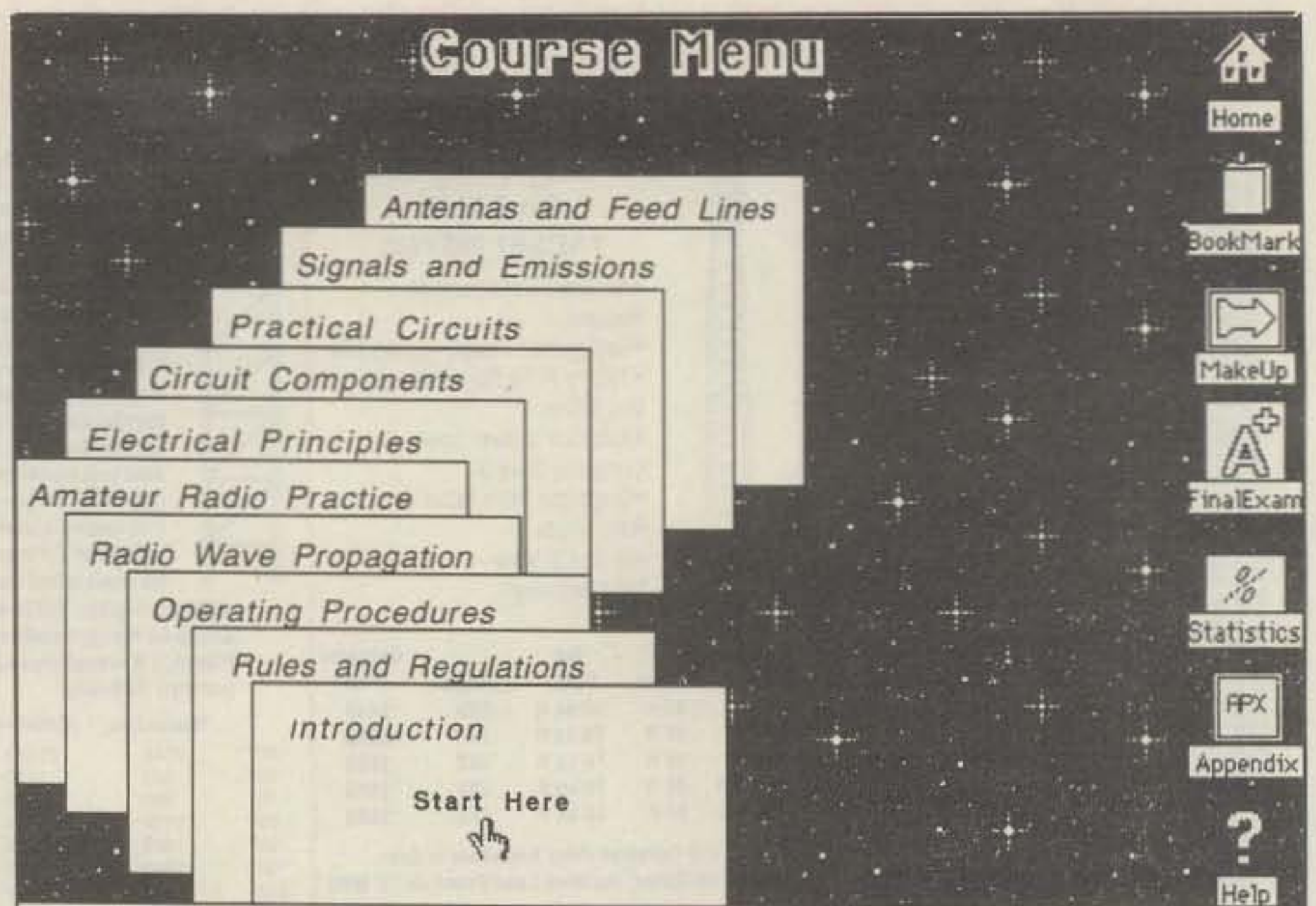


Fig. 3- Course menu, Ham Radio 101. Ham Radio 101 is a Macintosh software program that helps beginners prepare for the Novice FCC theory exam. It is a full-fledged computer-based training (CBT) course that takes good advantage of the Macintosh's superior graphics capabilities. (Illustration courtesy ZCo Corporation)

SWL. Included in the catalog are a wide variety of desktop HF and VHF/UHF receivers, scanners, satellite receiving equipment and antennas, portable receivers, RTTY and FAX adapters, customized SWL receiving equipment, computer interface systems, books, and accessories. EEB also stocks several lines of amateur equipment, including ICOM, Yaesu, and Kenwood.

A highlight of the EEB catalog is their Computer/Radio Interface System (CRIS), a menu-driven IBM-compatible control system that operates with a wide variety of computer-capable radios. The hardware and software system takes care of tasks such as scanning for and logging stations, plotting signal-strength spectra as a function of frequency, and other high-tech chores. Many of the receivers EEB stocks are CRIS-compatible.

Included in the catalog are several pages of antennas, including simple SWL singlewires, slopers, various amplified or "active" antennas, a potpourri of loop receiving antennas for VLF through HF, preamplifiers, and VHF/UHF scanner antennas.

A novel antenna offered is a set of four handheld directional loops for RF sensing, direction finding, and noise source locating that together cover 10 kHz through 40 MHz. A second is an unusual, 23-element VHF/UHF log periodic antenna that covers 25-1300 MHz and boasts an 11-13 dB forward gain with a 15 dB front-to-back (F/B) ratio. The \$240 antenna can be vertically mounted if desired.

For a catalog, contact EEB at 516 Mill St. NE, Vienna, VA 22180.

DYNACOMP Software Catalog. The column wouldn't be complete if I didn't include at least one catalog of computer stuff. So here it is—the fully indexed, 228-page DYNACOMP catalog, which lists a host of commercial and public-domain software for practically any PC that's likely to be found in operation today. In-

cluded is software for the IBM PC and compatibles, Apple, Atari, Commodore, and most CP/M systems—including some 8 inch CP/M disk formats and support for the Kaypro, Osborne, Morrow, Zenith Z-100, Commodore 128 (in CP/M mode), and other CP/M machines. In addition to its software support, DYNACOMP also offers CP/M and other disk format translation services.

Their catalog is priced at \$2.00 and is available from DYNACOMP, Inc., DYNACOMP Office Building, 178 Phillips Road, Webster, NY 14580.

Software Topix

MN/YO Update. In several columns past (September 1988 and again in June and August 1989) we discussed the two sophisticated antenna analysis programs for the IBM PC offered by Brian Beezley, K6STI. These programs, MN and YO, have now been updated to at least Version 2.

The MN program, based on the MININEC program from the U.S. Naval Ocean Systems Center, analyzes antennas that are made of wire or tubing. The program computes antenna forward gain, F/B ratio, beamwidth, side-lobes, angle of radiation, current, impedance, SWR, near-field intensity, and far-field radiation. It also plots antenna radiation patterns in rectangular or polar form on CGA, EGA, or Hercules graphics screens; hardcopies may be made. The new version has many enhancements, including modeling of complex systems having up to 150 wires, and is said to be 15 to 22 percent faster as well. The new version is priced at \$75 postpaid and is available on 5.25 inch or 3.5 inch disks.

The companion YO program automatically optimizes Yagi-Uda antenna designs for maximum forward gain, best pattern, and minimum

SWR. During optimization, radiation patterns at band center and edges are plotted on CGA, EGA, or Hercules screens, and hardcopies can be made. Antennas up to 50 elements can be modeled, and the program includes models for gamma, T, hairpin, and beta matching networks. The updated version includes a new gain-F/B-SWR tradeoff mechanism which yields improved designs, and the program now allows optimization across a whole frequency band as well as at a single frequency. The new version is priced at \$90 postpaid.

For more details, contact Brian Beezley, K6STI, 507 1/2 Taylor St., Vista, CA 92084.

Ham Radio 101™. John Olapurath, KE1Z, challenged us for a remark we made in a previous column. We had indicated that we would feature more Macintosh amateur radio software in our column, if only there were more of it around to feature. John's trying to rectify that situation with his introduction of Ham Radio 101, which he describes as a full-fledged computer-based training (CBT) program that prepares the student for the theory portion of the FCC Novice exam.

According to John, the program is self-contained and typically takes 8 hours to complete. It includes some of the latest in CBT technology such as a high level of interactivity, remedial feedback, testing, graphics, and game-like approaches to make the course interesting. John even has a trademarked slogan that sums up the philosophy that drives the program he created: "Before you know it, you know it."™

In Ham Radio 101 coverage of the subject matter is sharply focused to prepare the student for the FCC exam, with graphics being used throughout. The student is tested regularly, with an incorrect answer triggering automatic routing to remedial work. By the end of the course, the student should be thoroughly familiar with every question in the FCC question pool, its correct answer, and the basics behind each question.

An important feature is the "final exam," which helps the student evaluate himself. This feature presents him with the correct number of questions at random from the FCC pool, and provides him with statistics on his performance at the end of the session. Since the questions are chosen at random, the student can take the exam as many times as he wishes. He can also repeat the course after taking the final exam by traversing through only those topics with which he needs more help.

The program requires a Macintosh with at least 1 MB of RAM, a hard disk, and the HyperCard software. Priced at \$29.95 plus shipping, the program is available from ZCo Corporation, P.O. Box 3720, Nashua NH 03061-3720. Fig. 3 shows the Ham Radio 101 Course Menu.

DXLOG Update. In a recent column we highlighted the DXLOG DXCC award tracking and recordkeeping program for the IBM PC. To recall, DXLOG is specifically designed to minimize the paperwork hassle involved in DXCC submissions. The program includes the ability to generate a ready-reference work/confirmed checklist by band and mode, inform you when you are eligible for DXCC awards and endorsements, and generate DXCC award applications. There's also a handy "quick check" feature which displays QSOs with a particular country quickly, bypassing the menus. The program also prints logs, a "QSLs needed" list, and QSL labels.

DXLOG has been improved considerably while our review was "in the hopper," and now is available in Version 1.31 or higher. The new version includes many significant enhancements: It is now several times faster, and the menus have been redesigned for ease of use.

DXLOG, designed for the IBM PC with at least 512K of RAM, is priced at \$39.95 postpaid from PAYL Software, P.O. Box 926, Levittown, PA 19058-0926. When ordering, you need to furnish your callsign, as it is imprinted in the program.

According to Drew Smith, K3PA, PAYL Software also offers for \$5.00 the DXLOG Demonstrator, a fully functioning demo of DXLOG which includes the program manual; the demo price is creditable toward purchase of the full program. Drew also offers custom data conversion services for the transfer of other log data to DXLOG format.

GOfer™ Update. In the January 1989 column we took a close look at GOfer, an unusual text retrieval utility used for rapid text search, finding, and insertion. A pop-up, RAM-resident program that can also be run as a stand-alone, GOfer searches through multiple disk files at very high rates, without the need to refer to index files or keywording schemes. A few refinements and new bells and whistles have been included in V2.0 for the IBM PC, and the updated program is also available for the Macintosh.

GOfer lets you begin a search with a simple word or phrase, or perform complex searches, including Boolean AND/OR/NOT logic and "how close do I want this" parameters. Once GOfer has located the text you are after, you then have the option to insert the text "find" into the document on which you are currently working, even from files created by different programs. You can direct the "found text" to your printer, or write the "finds" to another disk file for future use. The program also lets you search for misplaced files across your entire hard disk or a portion of it.

I also find myself using the program's nifty file compression feature, which lets me free up lots of space on my hard disk. This feature allows me to take "old files" (mostly ASCII and wordprocessing files) that I don't need now but might need in the future, and compress them up to 50 percent. When GOfer creates a compressed file on my hard disk, I still retain complete access to the file, as GOfer doesn't need to decompress it in order to search, browse

through, or even export text from it. And I can decompress the file if I care to so that it's just like it was before compression.

As I noted in the earlier review, you may also find GOfer to be a useful adjunct to amateur logging programs, where your logger has created reams of log files on your hard disk, and you are trying to locate a particular QSO or contest contact. While the logging program can usually retrieve this information, with most loggers you first have to know in which file the contact resides, and then load that file into the logging program to search for the contact. Since GOfer can read standard ASCII and dBase files, often used by amateur logging programs, it may provide a shortcut to finding the information you are after.

The new version works about like the original version, but it is designed to interface with an increased number of commercial software products, mostly new editions of popular wordprocessors, databases, and spreadsheets. The new version also has an easy-to-use installation routine and more customization options. One of the new options is a memory-saving feature that allows you to "swap out" the entire resident portion of GOfer to expanded memory or disk. Operated in this mode, GOfer requires but 8.3K of RAM—a precious commodity in a 512K system like my old PC XT clone.

In my view, GOfer is one of the better-designed and more practical RAM-resident utilities. Priced at \$79.95, it works with the IBM PC/XT/AT, PS/2, and compatible computers using PC/MS-DOS 2.0 or higher. The new Macintosh version is similarly priced, and is intended to work with a number of popular Mac productivity programs. All GOfer users can upgrade for a \$25 fee.

For more details, contact Microlytics, Inc., One Tobey Village Office Park, Pittsford, NY 14534.

Wrapping It Up

That's all for this time, gang. Next month more Antennas & Accessories topics of current interest. See you then.

Overheard: The trouble with justice these days is that it isn't usually admissible in a court of law.

73, Karl, W8FX

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Working Range: 1.8 to 29.7 MHz
Impedance: 50 ohms
Power Rating: 15kw continuous, 5kw peak
Attenuation: ≥ 80db @ 54 MHz

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NEWS/VIEWS OF ON-THE-AIR COMPETITION

Winning the CQ World-Wide DX Contest—Has it Changed?

Anyone who has read the results of any recent contest can't help but marvel at the tremendous scores being generated. I put myself in that category as each contest year seemingly ends with scores far exceeding those of the past. This month I would like to compare the effort required in today's competitive climate to that of 26 years ago.

What follows is an analysis of two logs: P40GD from the 1989 CQ WW CW and 5A1TW from the 1963 CQ WW CW, both resulting in winning Single Operator/All Band scores for the world. Please note that I have chosen the high-claimed log of P40GD because it represents the most recent data point. John Crovelli, W2GD, has graciously offered his log for this analysis, knowing that it still remains a claimed score subject to appropriate checking by the CQ WW Contest Committee.

In order to set the stage for this analysis there are several details that need attention. First, I am comparing contest entries in dissimilar parts of the sunspot cycle. You should also observe the fact that the stations I have chosen to analyze are in radically different parts of the world. Furthermore, there is a dramatic difference in their relative quality of equipment and antennas. Nevertheless, both logs were winning entries in their categories and are worthy of further study.

5A1TW

The station 5A1TW was owned and operated by Gene Walsh, N2AA. Located a long way from his current QTH in Edison, New Jersey, Gene recalls the incredible excitement he encountered during his radio operating years in Africa. Nothing compares to his experiences as 5A1TW in the 1963 CQ WW Contest. As I poured over Gene's logs, I couldn't help but repeat over and over, "My, have times changed."

For Gene, the contest started on a disastrous note. Just hours before the beginning of the contest, he learned of the death of President Kennedy and nearly cancelled the operation altogether. In fact, Gene did not operate during the first hour of the contest out of respect and sadness for what had just happened.

Winning a contest in 1963 still required

2 Baldwin Street, Windham, NH 03087

Calendar of Events

Mar.	20-21	AC-DC CLARA CW Contest
Mar.	24-25	CQ WW WPX SSB Contest
Mar.	27-28	AC-DC CLARA SSB Contest
Apr.	1	Poisson d'Avril Contest
Apr.	7-8	SP DX Contest
Apr.	8	Yuri Gagarin Cup Contest
Apr.	11-13	YLRL DX-YL to NA-YL CW
Apr.	18-20	YLRL DX-YL to NA-YL SSB
Apr.	21-22	MARAC County Hunters SSB
Apr.	21-22	Connecticut QSO Party
Apr.	21-22	ARI International DX Contest
Apr.	28-29	Swiss Helvetia Contest
Apr.	28-29	Hispanic DX Contest
May	19-21	Michigan QSO Party
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

the same skills of today. You had to copy the other guy's callsign/exchange and put him in your log. However, there were several significant differences. In those days operators sent "real" signal reports. Over 50% of the 5A1TW log contained reports other than 599.

Today's contesters regularly pass needed multipliers from one band to another. I could not find a single instance of this in Gene's log. The current strategy of regularly changing bands was not nearly as common. In 1963 you tended to stay on a single band for a long time and then move on to another. Speaking of time, Gene's world-winning log resulted from only 31.6 hours of operating.

Imagine operating from Libya in today's CQ World-Wide. Of course, there would be that 48 hour pileup calling you. The rates would routinely exceed 200 QSOs/hour. However, things were very different 26 years ago. Gene's best hourly rate was 62, and there were 12 hours with rates under 15 QSOs/hour. That reminds me of the time I operated mono-160 in the Montana RTTY QSO Party. However, Gene did what it took to win in 1963. And he did it without the advantage of a Caribbean Island and high Yagis. Yes, times have changed.

P40GD

The winning efforts of John Crovelli, W2GD, are becoming almost common-

CQ WW DX Contest General Computer Info

The following general information pertains to the CQ World-Wide DX Contest and has been determined by the CQ World-Wide Contest Committee.

Any station submitting a written request and a M/S DOS formatted 5¼ inch floppy disk with their log data to the CQ WW Contest Committee (via CQ magazine, K3EST, or N6AR) may receive:

- Their own list of unique callsigns identified from the committee's database.
- The average unique rate for their specific entry category.

DJ1DB	K4PQL	SM7MS
DJ2AA	K4TEA	SP2JS
DJ2YA	K8VIX	SP9PT
DJ5GG	LZ1KSP	UT5BP
DJ7IK	OH1AA	VE2YU
DL1JF	OH2AA	W1BIH
DL7CF	OH2FS	W1WAI
G3FXB	OH5TS	W2GKZ
G3LPS	OH9NV	W2VJN
G3OHP	OK1MG	W3EYF
G3SBI	OK2BCI	W8YGR
G4CP	OK2DB	W9GIL
HB9JG	OK2QX	W9VNE
HB9MO	OK3IR	K1LPL/W3LPL
HB9ZY	ON4KR	W4YHD/W4RX
K0BHM	OZ1LO	K1NOL/K1NA
K2MGR	PA0LOU	W3WJD/N3RS
K4LTA	SM6BWQ	K4GSU/N4AR

Table I- Calls appearing in 5A1TW and P40GD logs.

F7CE	VQ2W
IT1TAI	VQ4IV
KR6ML	VR2DK
MP4BEE	VS1JY
MP4TAS	VS9HAA
VQ1GDW	ZE4JS
VQ2BC	ZD6OL

Table II- Do you recognize these calls from 1963?

5A1TW

TRIPOLI, LIBYA



طرابلس ليبيا
مع اطيب التحيات

N2AA's 1963 5A1TW QSL.

FRANKFORD RADIO CLUB ARUBA SO. AMERICA ZONE 9

P40GD

CQWW DX CONTEST (CW) - W2GD, Opr.

CONFIRMING QSO WITH	DATE	UTC	MHz	RST	MODE
DAY	MONTH	YEAR			2-WAY
		87		599	CW

TS-930S
ALPHA 78 - 1KW
CUSHCRAFT A4 # 50'
CUSHCRAFT 402CD # 62'
80M DELTA LOOP # 50'
160M DIPOLE # 50'

QSOs verified by
Howard - N2MM

JOHN M. CROVELLI
200 Woolf Road
Milford, NJ
08848 USA

A WEMPY QSL

W2GD's 1989 P40GD QSL.

place as he tears up the bands from his hideaway in Aruba. His claimed results from 1989 are no exception. Needless to say, operating in 1989 is revolutionary when compared to the days of 5A1TW. There were more P40GD QSOs in the first 7 hours of the contest than in the entire weekend for Gene. Remarkably, John had only 11 hours with QSO rates lower than Gene's peak rate of 62.

Use of computers has to play a part in this analysis as well. While Gene had circumstantial reasons for empty spots in his log, P40GD lost QSOs because his hard disk became full during a big run on 40 meters. In 1989 "BIN files" (K1EA-ese for the contest log file created by his CT computer logging program) became the common denominator as opposed to the 1963 version of spiral-bound notebooks and number-two pencils. Winning in 1989

meant carrying the TS930 under one arm and your IBM PC under the other!

Unlike Gene's 31.6 hours of operation, John operated a total of 37.9 hours. John's total of only 38 hours surprised me to some extent. However, it was how he used those 38 hours that differed dramatically from Gene. In the early days of contesting there was a substantially smaller supply of multipliers. The art of scanning up and down the bands for new ones and passing them to other bands was non-existent in the 1960s. For example, P40GD had 8 hours with over 15 new multipliers in that hour. 5A1TW, on the other hand, had only 2 such hours (and only 4 hours with 10 or more new multipliers). Finally, I have one other observation about operating schedules. 5A1TW had only 2 hours without any QSOs. This is contrasted with a surprising 6 hours from P40GD. The

Rate Analysis Top Ten Hours

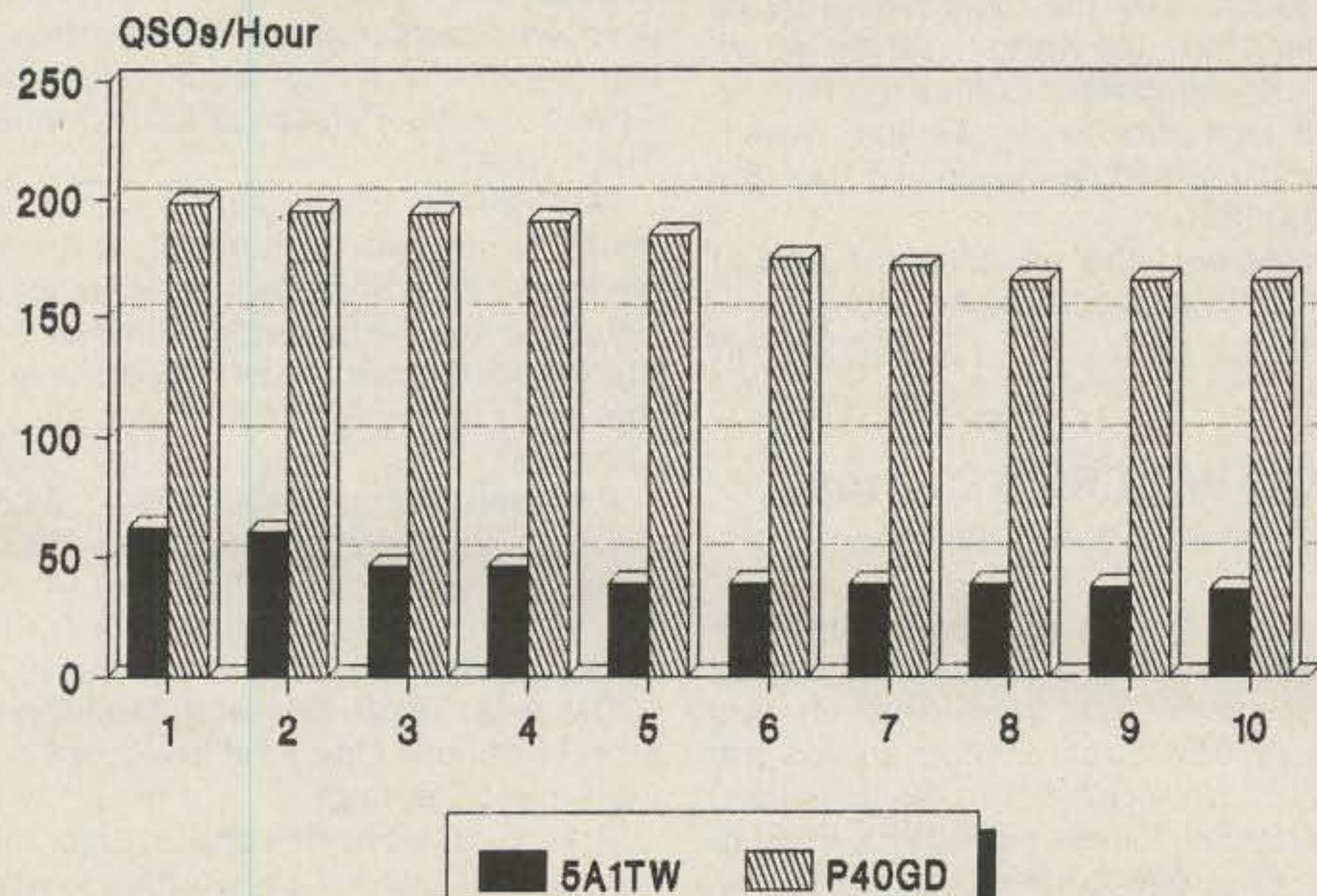


Fig. 1-Rate analysis, top ten hours, 5A1TW (1963 CQ WW DX CW Contest) versus P40GD (1989 CQ WW DX CW Contest).

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TB5EM 10, 15, 20 Mtr.
TB6EM 10, 15, 20 Mtr.

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20M536 5 elem. 20 Mtr.
20M646 6 elem. 20 Mtr.

15M532 5 elem. 15 Mtr.
15M845 8 elem. 15 Mtr.

10M523 5 elem. 10 Mtr.
10M636 6 elem. 10 Mtr.

2MVS814, 2 Mtr. phased

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	5A1TW			P40GD		
	QSOs	Zones	Countries	QSOs	Zones	Countries
160 Meters	—	—	—	121	11	24
80 Meters	47	6	18	349	18	54
40 Meters	352	15	38	864	25	72
20 Meters	346	28	64	890	28	86
15 Meters	443	23	51	1017	31	89
10 Meters	7	3	4	1509	33	92
Totals	1195	75	175	4750	146	417
Final Score		871,750			7,945,619	

Table III- Relative breakdowns for 5A1TW/P40GD.

winning operating style of the 1960s required you to be on the bands all the time, working short bursts of stations and then retiring to the task of tuning your dial to another frequency. Contesting in the 1980s is much more fast paced. For the most part, you simply have to take a break out of physical exhaustion rather than being a victim of slow rates.

When all is said and done, winning contests becomes a relative affair. I can't say that my personal passion for contests would be satisfied if I had to operate under the conditions of the 1960s. However, I'm not so sure that the circumstances of the 1970s are that appealing either. One thing is for sure. The individual efforts of Gene, 5A1TW, and John, P40GD, are something to admire. Each of them accomplished something that few will ever do in their own time—*win a contest!*

Next Month

There has been considerable debate around the topic of sanitizing contest logs after a contest. My contest survey of last year touched on the topic (yes, there's another one in the works!). Where do we draw the line when it comes to cleaning up our logs prior to submission? Watch for some pointed discussion on that one next month.

Remember, the deadline for August column submissions is June 1st.

73, John, K1AR

CQ WPX SSB Contest

0000Z Mar. 24 to 2400Z Mar. 25

This is the 34th running of the WPX contest. Please see the complete rules and the current trophy list in the February issue of *CQ*. Summary/log sheets are available from *CQ* magazine or N8BJQ for an SASE. Please write WPX FORMS on the envelope to speed up processing. All logs go to *CQ* Magazine, 76 N. Broadway, Hicksville, NY 11801. Mailing deadline is May 10th for SSB logs and July 10th for CW logs.

Poisson d'Avril Contest

0000-1948Z Sun., Apr. 1

This is the 42nd running of this old classic. It is sponsored by the French LIRPA-LOOF Foundation (Legion International des Radio Professionnels et Amateurs—Lacrimier d'Oignons en Oeil Fondation). The purpose of the contest is to promote the humorous use of amateur radio throughout the world. The basic idea is to work as many other stations in the world as possible, on any band or mode. A participant may work any other station as many times as possible on each band/mode.

Eligibility: All present regularly issued licensees, friends, or otherwise licensed stations.

Exchange: RS(T), serial number (beginning with any number you choose), QTH (yours or someone else's), and birthday (month/day).

Scoring: Count 1 point for each station worked or heard; 105 points for any station whose birthday is the same day as the contest; 256 bonus points for making at least one QSO without the use of commercial, generator, battery, solar, or similar power sources. Other arbitrary bonus points you choose to credit will be reviewed by the Poisson d'Avril Contest Committee.

Multipliers: Every station worked or heard counts as a multiplier, but only once per QSO. Stations in the District of Columbia and the Eastern Northwest Territories do not count as multipliers unless they are Federal Employees living in log cabins.

Frequencies: CW—1825, 3525, 7025, 14025, 21025, 28085; SSB—1850, 3799, 3830, 7204, 14159-14165, 14178, 14220, 21404, 28888. SSTV, RTTY, FM, packet, telepathy—usual frequencies.

Classes: Single-Operator, Multi-Operator, Telephone Operator, and Just-Fooling-Around Operator.

Awards: Certificates and an elaborate personal fortune will be awarded to whoever the Committee feels deserves them. Actual scores and merits of creativity will be considered. Logs submitted on computer disks will be accepted provided

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they adhere to standard CP/M EBCDIC 8-inch format. Logs must be postmarked no later than April 2, 1990. As usual, logs go to: P d'A Contest Committee, 144 Kendall Pond Road, Windham, NH 03087 with an SASE and other substantial compensation for final results.

Polish "SP" DX Contest

1500Z Apr. 7 to 2400Z Apr. 8

Sponsored by the Polski Zwiagek Krotkofalowcow (PZK), this one is usually held the first weekend of April, and generates a good level of activity by the SPs.

Classes: Single operator, single and all band. Multi-operator, single transmitter (all band only), and SWL.

Exchange: Signal report plus a three-digit serial number. SP stations will include a two-letter province abbreviation.

Multiplier: Polish provinces (total of 49).

Scoring: 3 points per QSO times the number of Polish provinces worked (maximum 49).

Bands: 160-10 meters (no WARC bands).

Awards: Certificates to winning stations in each class in each country.

Mailing deadline for logs is 30 days after the end of contest. Mail to Polski Zwiagek Krotkofalowcow, Contest Committee, P.O. Box 320, 00-950 Warsaw, Poland.

Yuri Gagarin Cup Contest

0000-2400Z Sun., Apr. 8

This contest, sponsored by the Radio Sport USSR, runs every three years and is filled with activity worldwide. Although the competition is limited to CW and Satellite operation, very high QSO/hour rates are possible.

Classes: Single Operator (All Band/Single Band), Multi-Single, SWL. Multi-operator stations must adhere to the standard 10-minute rule.

Exchange: RST and ITU Zone.

Scoring: Count 1 point for QSOs within your own continent and 3 points for others. Multipliers are ITU Zones per band with final score calculated as total QSO points times multiplier.

Frequencies: 160-10 meters (WARC bands excluded).

Contest results are to be postmarked no later than June 1, 1990. Send your results to: GC Contest Committee, Box 88, Moscow, USSR.

DX-YL to NA-YL Contest

CW: April 11-13 SSB: April 18-20
1400Z Wednesday to 0200Z Friday

This is a YL activity in which DX YLs will be contacting YLs on the North American Continent. (KH6 and KL7 are DX.)

All bands may be used. However, cross-band, nets, and repeater contacts do not count. Likewise, contacts with OMs do not count. The same station may be worked on each band and mode for QSO credit. SSB and CW are separate contests and require separate log sheets. You may only operate 24 hours out of the 36 hours and off times must be clearly indicated in the log.

Exchange: Station worked, QSO no., RS(T), and US state, VE province, or DX country.

Multiplier: US state, Canadian province, or DX country. The multiplier is counted once only, not once per band.

Scoring: One point per QSO. Multiply total by sum of states, provinces, and countries worked. There is a power multiplier for stations running 150 watts or less on CW and 300 watts or less on SSB. If you qualify, multiply your final score by 1.25 for your final score.

There is a penalty of 3 additional QSOs for each duplicate QSO removed from your log for which credit was taken.

Frequencies: CW—3555, 7055, 14055, 21195, 28195. SSB—3955, 7255, 14295, 21395, 28595 (plus or minus 15 kHz, and other frequencies used by DX stations.)

Awards: Four cups will be awarded to first-place winners, DX and NA, on both SSB and CW. Two plaques will be awarded to the highest combined CW/SSB score (both DX and NA winners). Certificates will be awarded to the second- and third-place winners.

Submit separate logs for each contest, including a summary sheet showing the scoring, transmitter power, and other essential information. The usual signed declaration is also requested. Entries with more than 200 QSOs should use a separate sheet for each band and include a dupe sheet.

Entries must be postmarked no later than May 5th and should be sent to Dana Tromba, c/o Dandy's, 120 N. Washington, Wellington, KS 67152 USA.

MARAC County Hunters SSB Contest

0000Z Sat., Apr. 21 to 2400Z Sun., Apr. 22

The Mobile Amateur Radio Awards Club is again sponsoring the 19th running of this event. Mobile, portable, and fixed operation from every county in the United States is welcome. Mobiles and portables may be worked each time they change counties or bands.

Exchange: RS(T), category, U.S. county and state (province/country for others).

Scoring: 1 point for fixed stations; 15 points for mobiles; US/VE contacts with DX countries are worth 5 points. Final score is computed by the total QSO points times U.S. counties worked.

Frequencies: 3880, 7240, 14270,

21340, 28340. Fixed stations should operate above the suggested frequencies and allow mobiles to operate below.

Awards: Certificates will be awarded to winning fixed stations in each state/province/country; portables in each state; mobiles in each state. MARAC plaques to the highest scoring mobile and portable station in the U.S., North American fixed station, and DX station who scores at least 50,000 points.

Completed logs, summary sheets, and check sheets must be received by May 21, 1990 and go to: WA5DTK, 185 Cinnamon Drive, Satellite Beach, FL 32937-3118. Include an SASE for final results.

ARI International DX Contest

2000Z Sat., Apr. 21 to 2000Z Sun., Apr. 22

Although this contest has been around for a number of years, this year's event has a completely new set of rules. Most notable is the rule change that allows stations worldwide to work each other. The ARI DX Contest is managed by a group of veteran contesters (I2UIY and I2MQP) and should offer a significant amount of activity.

Classes: Single Operator SSB or CW, Single Operator Mixed, Multi-Single Mixed, and SWL Mixed.

Frequencies: 160 through 10 meters (no WARC bands) according to the IARU band plans. All stations (including single operator) must adhere to the standard 10-minute rule.

Exchange: Italians send RS(T) and province; all others send RS(T) and serial number.

Points: QSOs within your own country count only for multiplier credit. Count 1 point for QSOs within your own continent, 3 points for QSOs outside your continent, and 10 points for Italian QSOs. Stations can be worked once per band and mode (e.g., 15 CW and SSB).

Multiplier: Italian provinces (95) and DXCC countries (not I or IS0).

Awards: A plaque will be offered to the highest scoring station in each class. In addition, a certificate will be awarded to the top two to five placing stations as well as the leading scorers in each DXCC country. QSOs made during the contest are eligible for other existing Italian awards (CdM, WAIP, ITA, etc.).

Logs must be mailed 30 days from the end of the contest and addressed to ARI Contest, Via Scarlatti 31, 20124 Milano, Italy.

Connecticut QSO Party

2000-0200Z Sat., Apr. 21 to Sun., Apr. 22
1200-2000Z Sun., Apr. 22

This is the annual running of the Connecticut classic sponsored by the Candlewood Amateur Radio Association.

Each station can be worked once per band and mode, and may be worked again in different counties.

Exchange: RS(T), Serial number (starting with 001), and QTH (CT county, state/province, DXCC country).

Scoring: Count 1 point for SSB QSOs, 1.5 points for CW, 3 points for OSCAR, and 5 points for working the CARA club station, W1QY.

Multippliers: CT counties for stations outside of Connecticut. Inside Connecticut, use CT counties, states/provinces, and a single DX multiplier credit (regardless of the number of DXCC countries you work).

Frequencies: SSB—1860, 3927, 7280, 14280, 21370, 28370, 50150, 146550; CW—band edge plus 40 kHz, Novices use their band edge plus 25 kHz.

Awards: Certificates will be awarded to the high scorers in each state/CT county. In addition, certificates are available to the highest CT club and participating member. A special certificate will be awarded to any station working all Connecticut counties.

Logs must be postmarked no later than May 23, 1990. Please send your results to: Candlewood Amateur Radio Association, Box 143, Bethel, CT 06801.

Swiss Helvetia Contest

1300Z Apr. 28 to 1300Z Apr. 29

This is a good chance to build up your Canton total for the Swiss Helvetia Award which requires confirmation of all 26 Cantons.

Frequencies: 1.8–28 MHz (no WARC bands). Phone and CW.

Exchange: RS(T) plus a 3-digit serial number. Swiss stations will also include a two letter abbreviation for their Canton.

Scoring: Only contacts with Swiss stations count. Each contact with an HB station is worth 3 points. You may only work a station once per band regardless of the mode.

Multipplier: The sum of the Cantons worked on each band (26 per band).

Final Score: Total QSO points multiplied by the sum of Cantons worked.

Awards: Certificates to the top scorers in each country and each USA and VE call area.

Logging: Indicate a Canton in a separate column for each band the first time it is worked. Check your log for duplicates and include a summary sheet showing the scoring and your name and mailing address in block letters. Also include the usual signed declaration.

Mailing deadline for contest logs is 30 days after the contest. All logs to: USKA Traffic Manager, Walter Schmutz, HB9AGA, Gantrischweg 1, CH-3114 Oberwichtach, Switzerland.

Hispanic DX Contest

0000Z Sat., Apr. 28 to 0000Z Sun., Apr. 29

The contest rules I received were sent in Spanish, so you will have to excuse any error in translation. This event, sponsored by the Radio Club Cordoba of Argentina, is intended to promote contesting throughout the world and Hispanica.

Classes: Single Operator, Multi-Single Iberoamerica, Single Operator Argentina.

Frequencies: 80–10 meters (no WARC bands) on any allowable frequency.

Multipplier: Iberoamerican countries (once per band)—CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HR, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C, and DXCC dependencies.

Scoring: 1 point for Iberoamerican to non-Iberoamerican QSOs, 3 points between Iberoamerican stations, 5 points for QSOs with any Argentine station. Final score is computed by multiplying total QSO points by multiplier.

Exchange: Signal report and serial QSO number (59001).

Awards: There will be certificates and award metals offered to high scorers, including an interesting SWL category. Logs are due no later than July 31, 1990 and must be sent to: Radio Club Cordoba, P.O. Box 65, Cordoba, Argentina 5000. Include (3) IRCs for a copy of the final results.

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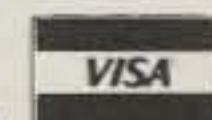
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International Morse Code Training Tapes

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the existing ones excess to my needs. There are 15 one-hour long tapes in the present set of code training tapes. Thousands of people have used them to go from no knowledge of the international Morse code to a receiving proficiency of about 13 words per minute, which is the General and Advanced test requirement. Each code run is followed by a voice read off of what was sent. Instructors are welcome to make copies of my tapes for use by their students. A complete set of these tapes sells for \$25 ppd. Please send requests to Bill Welsh (W6DDB), 45527 Third Street East, Lancaster, CA 93535-1802.

Initial DXCC

Chod Harris, VP2ML, published an excellent article in a recent issue of *The DX Magazine*. His article lists the 100 most needed countries based on the results of a survey conducted with more than 2000 of the world's most active DX operators (see Table I). Chod intends to publish an abbreviated version of his article in a 1990 DX column. His article made me think that new amateurs would like to

know the 100 easiest countries to contact to earn an ARRL DXCC (DX 100 countries) Award (the letter C is the symbol for 100 in Roman numerals). The first list shows 53 countries which can be heard almost every day of the week. The second list shows 47 countries which may not be heard every day, but which are likely to be heard every week. The country name and the most common call sign prefix are listed throughout.

If you contact an amateur in one of the countries not listed in this article, you may have contacted one of the 200-plus countries that are more difficult to work. If you hear a station that has a prefix not shown in this article, such station should be worked in preference to a station with a prefix that is known to belong to a more easily worked country.

The March and April 1980 issues of *CQ* contain my article about high-frequency radio-wave propagation predictions. Copies of the article can be purchased for \$2.50 each from *CQ*, 76 North Broadway, Hicksville, NY 11801. A 9-page reprint of that article is available at no charge to anyone who requests it and supplies a self-addressed stamped envelope with double first-class postage (45¢)



Clarence Smith, KA8PJN, is a farmer in Spring Lake, Michigan. He has this 1940s-era Hallicrafters amateur radio station set up in his barn. It includes an HT-19 transmitter, SX-42 receiver, SP-44 panadapter, and a PM-23 loudspeaker.

Nancy Staub, KBØFJR, of Hoskins, Nebraska shares this station with her husband (Robert, WBØYWO). They are the parents of three children. Their station includes a Kenwood TS-430S transceiver, an 80 meter dipole, and a Mosley TA-33 Junior tri-band Yagi-Uda. Nancy prefers code operation, and she expects to upgrade very soon.



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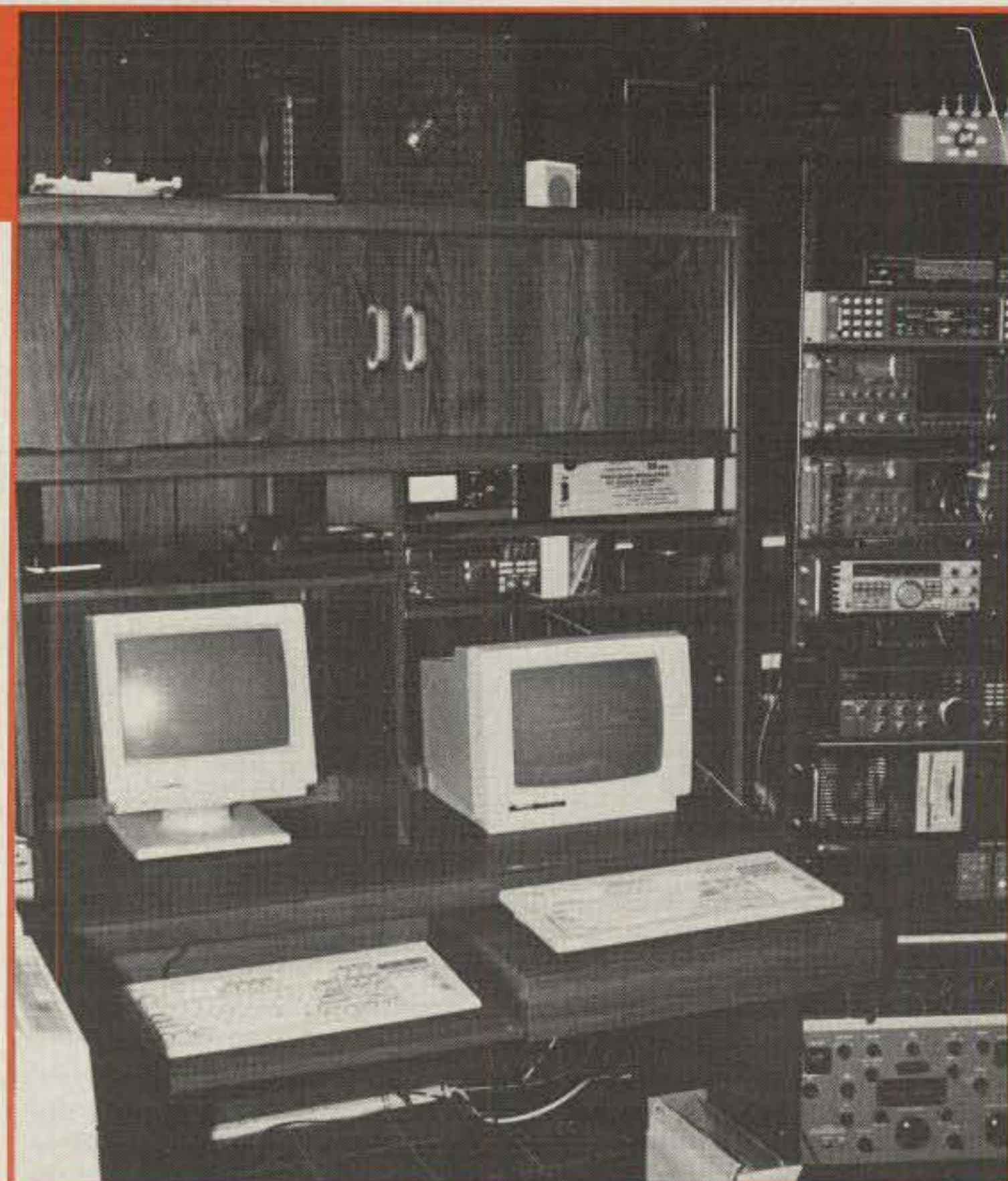
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CURRENT MENU MAIN MENU	VERSION 9.1
MEM 394 K STACK 1 K		LOCAL : 16:54:00
DATE: 10-24-1989	SELECT FUNCTION	MODE= USB
		U.T.C.: 20:54:00
1. READ MEMORY CHANNELS	7. MEMORY CHANNEL	DIAL
2. INPUT DESIRED FREQUENCY	8. WRITE MEMORY TO VFO	VFO A
3. 500 KHZ. UP	9. UTILITY MENU	
4. 500 KHZ DOWN	ALT-P. CHANGE MENU PAGE	
5. ACTIVATE/DEACTIVATE CLARIFIER	ALT-Z. DISPLAY OR PRINT LOG	
6. SWEEP BETWEEN 2 LIMITS	ALT-Q. END	
A. AVIATION (VHF) COMMUNICATION	D. F.M. BROADCASTING	
B. TELEVISION BROADCASTING	E. AMATEUR FREQUENCIES (VHF)	
C. COASTAL MARINE FREQUENCIES	F. MISCELLANEOUS FREQUENCIES (VHF)	
PORT= COM2	BAUD= 9600	CURRENT PARAMETERS
UPPER - BAND	LIMIT - LOWER	FREQUENCY
		MODE
		FILTER
		SQ. ACTIV.
		ADDR
30.000 MHZ	0.100 MHZ	17.44300 MHZ
		USB
		WIDE
		38

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attached; please use my California address. If you are just getting serious about working DX, you should read this simple explanation of radio-wave propagation factors.

National Electronic Trading Post

If you are interested in buying, trading, or selling amateur radio equipment or accessories, a free advertisement in the "National Electronic Trading Post" (including the Postal Hamfest) could be of interest to you. This 7" x 11" flyer is published twice each month. In addition to ham gear, it includes ads on computers and their accessories. Ads are separated alphabetically into 23 classifications. A sample copy of this publication is available to anyone who requests one and send a 25¢ stamp to Postal Hamfest, R.D. 1, Box 1201, Ruffsedale, PA 15679-9707. Privately owned items can be advertised at no charge (35 word limit), and it is okay to submit such an ad with your request for a sample copy. The price of a 4-issue trial subscription is \$2 to U.S.A. addresses, whereas it is \$3 to Canadian and Mexican addresses. A 24-issue (one year) subscription costs \$10 (U.S.A.), \$12 (Canada and Mexico), or \$26 (DX). Larry Lauffer,

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CT	Portugal	KH6	Hawaii	UA	European Russia
CX	Uruguay	KL7	Alaska	UA0	Asiatic Russia
DJ	West Germany	KP2	Amer. Virgin Is.	UB	Ukraine
EA	Spain	KP4	Puerto Rico	VE	Canada
EI	Ireland	LA	Norway	VK	Australia
F	France	LU	Argentina	XE	Mexico
G	England	OE	Austria	Y2-9	East Germany
GI	Northern Ireland	OH	Finland	YB	Indonesia
GM	Scotland	OK	Czechoslovakia	YU	Yugoslavia
GW	Wales	ON	Belgium	YV	Venezuela
HA	Hungary	OZ	Denmark	ZL	New Zealand
HB	Switzerland	PA	Netherlands	ZP	Paraguay
HI	Dominican Rep.	PJ2	Netherlands Ant.	ZS	South Africa
HK	Colombia	PY	Brazil	4X	Israel
I	Italy	SM	Sweden	6Y	Jamaica
IS	Sardinia	SP	Poland	8P	Barbados
JA	Japan	SV	Greece		

Slightly Harder Countries to Work

A2	Botswana	HR	Honduras	VP2V	Brit. Virgin Islands
BY	China	JY	Jordan	VP8	Falkland Islands
C6	Bahama Islands	KC4	Antarctica	VP9	Bermuda
CE0A	Easter Island	KH2	Guam	VS6	Hong Kong
CO	Cuba	LX	Luxembourg	VU	India
CP	Bolivia	LZ	Bulgaria	YN	Nicaragua
CT2	Azores	OA	Peru	YO	Romania
DU	Philippines	T7	San Marino	ZD8	Ascension Island
EA6	Balearic Islands	TG	Guatemala	ZF	Cayman Islands
EA8	Canary Islands	TK	Corsica	ZK1	So. Cook Islands
FO	French Polynesia	UL7	Kazakhstan	ZS3	Namibia
GJ	Jersey Island	UP2	Lithuania	5N	Nigeria
GU	Guernsey Island	UQ2	Latvia	8R	Guyana
HC	Ecuador	V3	Belize	9H	Malta
HL	Korea	VK9	Norfolk Island	9Y	Trinidad
HP	Panama	VP2M	Montserrat Island		

Table 1- VP2ML's list of the 100 most needed countries based on the results of a survey conducted with more than 2000 of the world's most active DXers.

WA3YIR, is the Editor and Publisher of the National Electronic Trading Post. The 24-hour-per-day telephone number is 412-696-5500; this number can be used to record advertisement orders.

Magazine Articles Source

Rich Rosen, K2RR, has made it easy to locate every CQ, Ham Radio, QST, and 73 Magazine article that has been published since 1909. The name of his 1200-page compilation is *From Beverages Thru OSCAR—A Bibliography 1909-1988*. 1776 (nice number!) of these magazines have been issued, containing 231,173 pages. Everything is covered in 92 chapters, including 52,880 references. This information is available in a 15/24X microfiche set at an amateur net of \$49.95. The address is Didah Publishing, P.O.B. 7368, Nashua, NH 03060-7368. The present issue is the third revision of this reference compilation.

Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year CQ subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest CQ issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB

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CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

"A Gate to DOS"

By now many readers know that I have an addiction for any new "gadget" that will make packet radio more fun. Could it be that it is really beginning to show?

Not long ago I received a letter from one of my 1200 baud, 10 meter friends, Wayne Beck, K5HYB. Wayne opens up with "Buck, since you are interested in new ideas and ways to make packet interesting . . ." That was the grabber: "ways to make packet interesting." You bet I'm interested!

Wayne's QTH is Pine Bluff, Arkansas, and he operates a system called the "DOSGATE." DOSGATE is for the most part a culmination of several systems rolled into one, but more about that later. Wayne has the DOSGATE on line in Pine Bluff for use by packeteers in that area. If you live near Pine Bluff and you would like to check out his system, then you may find this article to be of help in doing so. For the rest of us who would like to try a system like the one that Wayne is using, get on 28.195 LSB at 1200 baud. Wayne included a path I could use to get to the DOSGATE of the author, NM1D. This will give us a first-hand look at the DOSGATE.

If you recall, last month I told you about the path from AZSE (28.195 MHz LSB) in Arizona to BERK5 in Granville, Massachusetts. This same group of nodes that gets you into Herb Belin, WA1TPP's node complex will lead a bit further into a DOSGATE like the one we're going to learn about in this month's column.

After you've made all the connects to BERK5 from AZSE in southeast Arizona, then connect to "SNH." BERK5 knows the way from 28.195 MHz to the southern New Hampshire SNH:K1TR-1 145.07 MHz node. From there, connect to NM1D-2, and you have arrived.

Rick Bono, NM1D, is the author of the DOSGATE. He has the latest system on the air there for your use and pleasure. As a matter of interest, you may find a more recent version than the one I'll describe later. I don't recommend that you use this kind of route for daily use of the DOSGATE. However, it will allow you to take a quick "look and see." At the end of this article you will find how you can obtain a copy of this very useful software.

506 Pheasant Ridge Drive, Warner Robins, GA 31088

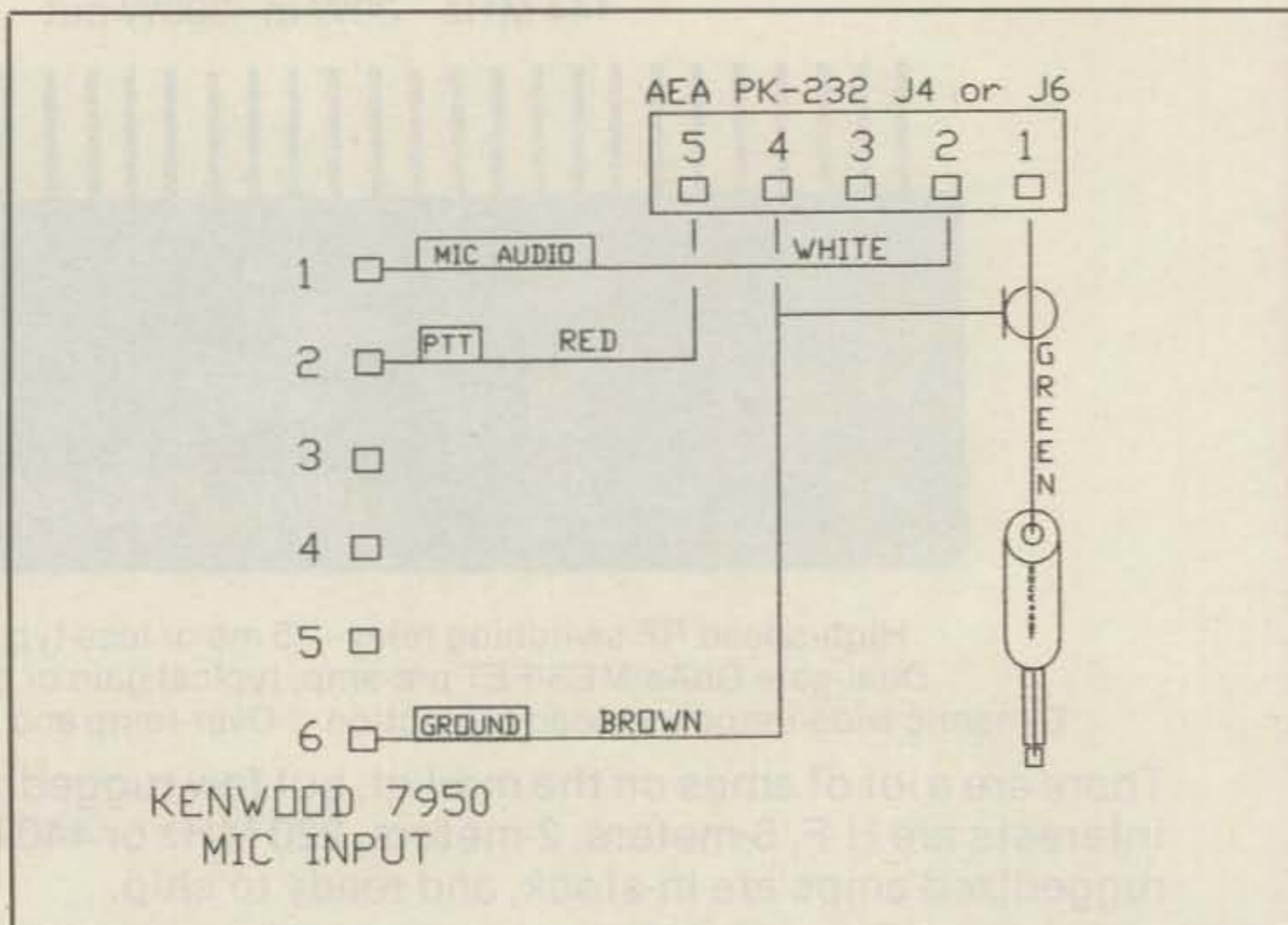


Fig. 1- AEA PK-232 MBX Multi-Mode Data Controller to Kenwood 7950. Note: AEA PK-232 port can be either J4 or J6; switching is controlled by front-panel RADIO 1/RADIO 2 switch.

DOSGATE opens a door for many different uses and applications of packet communications. For instance, on the DOSGATE system that I am running today, the user can connect and look up the name, address, and other information that would be contained in the amateur radio *Callbooks*. The user can also run any program that is on the disk drive(s) that I have dedicated to the DOSGATE.

It's not TCP/IP, but it does allow the user to access and run a PC even if he/she is using another kind of computer, or one *not* compatible with the PC or clone. The user can be running a Commodore™, Coco™, Atari™, or any other kind of computer and still feel as if he/she is using a PC/AT. There is much more to this system than I have room to write about, so I will give you a glimpse at a few of the uses of the DOSGATE.

User Friendly as MS/DOS

DOSGATE is a system which allows an industry-standard MS-DOS™ computer to be controlled via an RS-232 serial port.

The port is considered to be a remote user. The traditional console of the machine is still in complete control and can supervise and disable/enable the remote user at will. There is a simple "chat" mode that may be entered from the console to allow "chatting" with the remote user to give assistance or instructions. In addition to the chat mode, there is a simple terminal emulator to allow control of a TNC or modem that is connected to the serial port. The remote user may be connected directly with an RS-232 terminal via a TNC for remote operation via radio!

The local console can still be used for any software that normally runs on a PC. There are some limitations, however. The remote user is capable of running any software that does only MS-DOS system calls. Any software that by-passes MS-DOS and interfaces with the BIOS or directly with the hardware for I/O will *not* be usable by the remote user.

So far I've had the system running here at the K4ABT QTH on the AEA PK-232, MFJ-1274, and Kantronics KPC-4. It should run on the GLBs and PAC-COMM as well. The DOSGATE is installed, or I

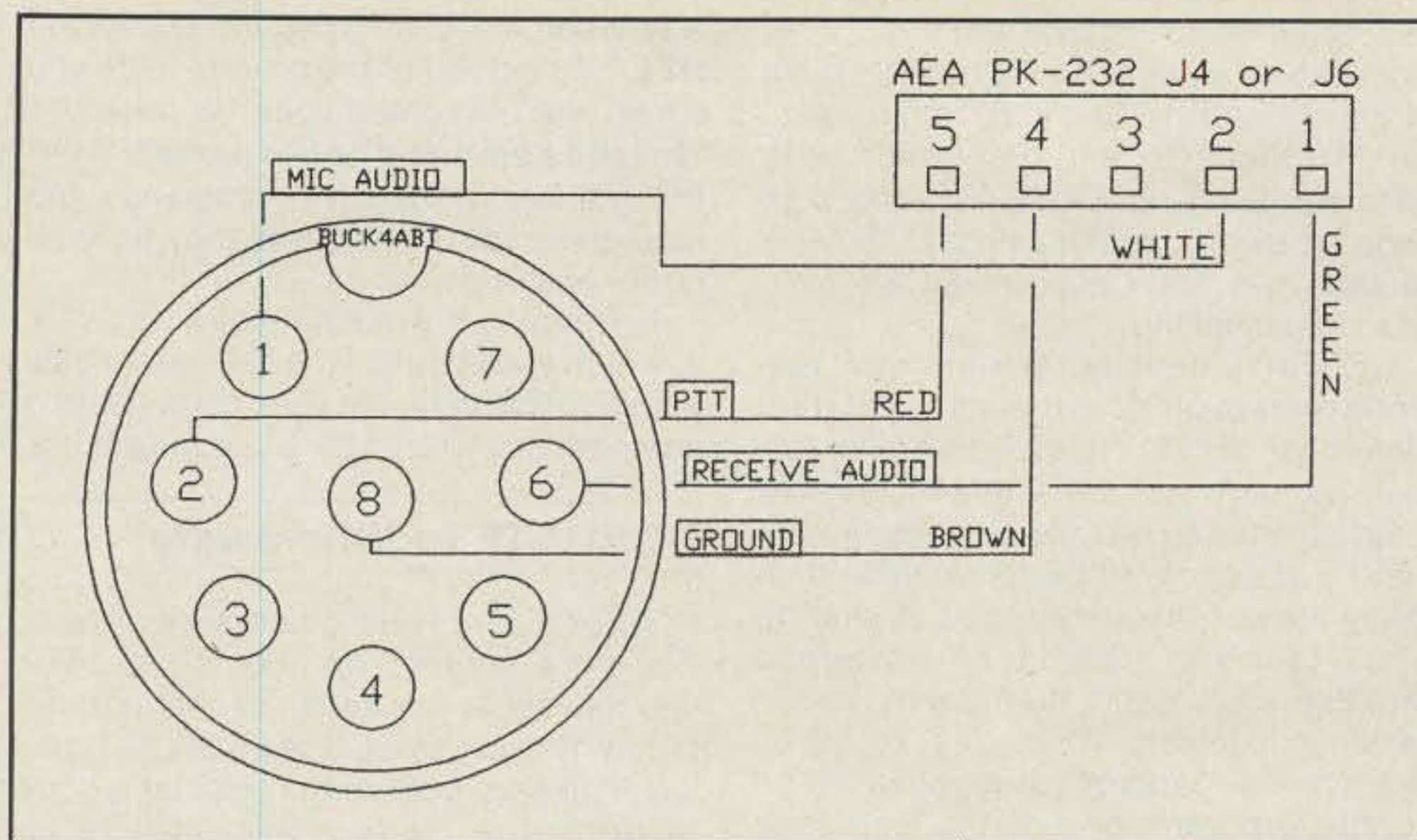


Fig. 2- AEA PK-232 Multi-Mode Data Controller to Kenwood TM-231 transceiver. Note: Receive audio is available from pin 6 of the transceiver MIC connector.

should say "implemented," as an MS-DOS installable device driver. At the same time a simple terminal emulator is installed which allows the SYSOP to communicate with the serial port.

To use the terminal emulator, execute DOSGATE at the DOS prompt. DOSGATE has four runtime commands:

ALT-D will toggle the remote user on and offline. A message is sent to the console and the remote user to inform them about the change.

ALT-T will toggle the "terminal" function on/off. A message is output to confirm the change in mode. This terminal is only to be used for simple configuration commands to or from the TNC or modem.

ALT-C will toggle the "chat" function on/off. A message is output to both the console and the remote user to inform about the change. Use this mode to "talk" to a remote user that is connected to the system.

ALT-X exits the terminal emulator and returns to MS-DOS.

DOSGATE should be installed as any other MS-DOS device driver. It also provides for various options.

CONFIG.SYS should contain the line:

DEVICE = DOSGATE.EXE

There are other device options that may be added to the DEVICE = line, causing different setup modes to be activated at startup of DOSGATE. For example,

DEVICE = DOSGATE.EXE /R /E—Start remote user enabled, and absorb (disable) ECHO to the remote user, or

DEVICE = DOSGATE.EXE /P—Start DOSGATE for packet radio operation.

DOSGATE should be the only device driver installed for the CON: device. This means *do not* install an ANSI.SYS device driver at the same time—i.e.,

DOSGATE /b96—This would start the

terminal emulator using 9600 baud over COM1.

Environment variables are used to assist MS-DOS programs executing in the DOSGATE environment.

The "DOSMAIL" system

Nestled within the DOSGATE environment is another useful feature which enables mail distribution. The commands are much like the commands used to send and receive mail with the regular BBS message systems.

One of the first actions to occur when you connect to the DOSGATE is recognition of your callsign. If you have mail in the mail system of the DOSGATE or in the DOSMAIL BOX you will receive a message that reads "**You have mail waiting.**" The user is then asked if he/she wants to read the mail, and after the mail has been read, the user is prompted to delete the message by selecting a **Yes** or **No**.

Included are all setup files that allow execution of some fast and distinctive lookup tables. From the user's point of view, the commands are "**S**end, "**R**ead, "**L**ist, "**K**ill, and "**T**alk. The files and command structure of the DOSMAIL features are as follows.

SEND.exe—"Sends" mail to the designated party. If receiver of mail is not specified, the sender is prompted. The sender ID is from the environment USER. If USER is not available from the environment, then the sender is prompted for his ID. The user can then specify a subject, and then enter his message. Send terminates with a CTRL-Z or /EX. The mail is stored in the MSG subdirectory in the file xx.MSG, where xx is the number of the message in HEX—i.e., **SEND K4ABT**, to send a message to K4ABT.

READ.exe—"Reads" mail sent to the current user. The current user is defined by the environment USER. If USER is not found or specified on the command line, then the user is asked to supply the required ID. If there is mail waiting for the user, it is presented to the user, one message at a time.

At the end of each message the user is given the chance to delete the message. Optionally, "READ /c" will check the MSG directory for a mail file to the current USER, or if USER is not found, the current user is prompted for an ID. For example,

READ—To read mail addressed to the environment USER.

READ /c—To check for mail addressed to the environment USER.

READ K4ABT—To read mail for K4ABT.

READ 21—To read message number 21.

LIST.exe—"Lists" all (*.msg) files stored in the environment MSG directory (INDEX.MSG). This is to allow the user to see what pending mail files exist. For example,

LIST—To list all mail TO, FROM the current user, or to ALL.

LIST K4ABT—To list all mail for K4ABT.

LIST ALL—To list mail addressed to ALL.

LIST /FK4ABT—To list all mail (F)rom K4ABT.

LIST /TK4ABT—To list all mail (T)o K4ABT.

LIST /SDOSGATE—To list all mail that has the word "DOSGATE" in the subject field.

TALK.exe—Allows the remote user to attempt to contact the SYSOP for keyboard-to-keyboard communication. The SYSOP is informed of the ID of the remote user. Either can abort the "talk" session by sending a CTRL-Z.

DOSGATE Compatibility

The general rules for programs that can be run under DOSGATE are fairly simple. Not keeping to the rules may simply cause confused users.

1. Any program that affects the serial port that DOSGATE is using for the remote user will probably cause the computer to hang! DOSGATE is using the serial port with interrupts ON, and will probably not tolerate other programs touching the serial port hardware.

2. Any program that does not use the I/O through DOS calls will probably bypass the remote user. This means that the remote user will probably be able to start such a program, and all may appear normal on the local console, but the computer may appear dead as far as the remote user is concerned.

3. Any program that issues ANSI escape sequences may work for the re-

mote user (if his/her terminal supports the proper escape sequences), but (with the current version of DOSGATE) will not work correctly on the local console (another reason to register with the author).

4. Programs that output massive amounts of data may run slowly. Remember that any data that is output to the remote user is limited in speed by the serial port (1200 baud is about 120 characters per second; this means that it will probably take more than 16 seconds to output one screen worth of data).

5. If the remote user sends too much data to DOSGATE and the current program cannot keep up with the user, some data may be lost. There is output hardware handshaking (CTS).

Some Special Notes on TNC Setup

There are various TNC parameters that are very important for successful use of DOSGATE. DOSGATE is not very smart as far as the TNC is concerned. This is not an accident or an afterthought! Since DOSGATE performs no TNC commands, it should be compatible with virtually all TNCs.

The TNC should have the RS-232 Data Carrier Detect (DCD) go true when a user connects and go false when a user disconnects. This also means the your RS-

232 cable must include the DCD line. Most cables designed for a modem have all the necessary lines (also important is the CTS and DSR line). Set up for hardware handshaking. DOSGATE only supports hardware handshaking. DOSGATE version may soon support DOS's software handshaking.

DOSGATE does not perform any machine protection. This means that if a remote user decides to erase a file or format your hard disk, he or she *will* be able to do so unless you take steps to ensure that he is unable to perform these dastardly deeds! If you can trust *all* remote users, then you need not be concerned with this. If you can't, then you may want to do the following.

1. Create "hidden" directories which contain programs or data that you don't want the casual user to stumble across.

2. Set the **Read Only** attribute on any files that you don't want to be easily erased.

3. Do *not* keep a copy of your format (or any similarly dangerous software) *anywhere* on your machine.

4. Obtain CED (or other similar DOS extension) to allow the removal or renaming of internal DOS commands so that the remote user cannot delete files, set the path, or look at environment variables. I use CED and map the commands that I don't want the user to perform. I set them to a nonexistent command, and this

way when the user types the command **DEL *.***, instead of the prompt "Are you sure?" he is greeted with the message "**Invalid command or file name**"! After trying a few destructive commands, the user gives up, thinking that they have all been removed!

5. Keep on the machine only software to which you are allowing the user to gain access. This way, if a user does destroy something, it will not be an important file.

DOSGATE is "Shareware"

DOSGATE is not public-domain software. For more information about DOSGATE you may write the author at the address below. Be sure to include an SASE. If you would like to receive and register a copy at the same mailing, then include an SASE disk mailer, a formatted 360K 5.25 inch disk, and \$20.00 to Rich Bono, NM1D, 7 Redfield Circle, Derry, New Hampshire 03038.

The author would like to hear from anyone with comments or suggestions concerning DOSGATE or other projects.

Until next month, HavFun Packeting.
de BucK4ABT

(MS-DOS is a trademark of Microsoft Corporation; COCO is a trademark of Tandy Corporation; Atari is a trademark of Atari; Commodore is a trademark of Commodore Computers.)



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NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for April is:

Cecil Vincent, W0UM USA-CA All Counties #222 Mixed, 4-18-79

"Being a railroad telegrapher since 1949, my friends urged me for years to become a radio amateur. I was a member of a CB club in Moorhead, Minnesota at the time. Mr. Dosland (a past president of the ARRL) took a group of us and started amateur classes.

"I passed my Conditional class license examination, receiving the call WA0ZOL, and finally got on the air in 1969. I earned my Extra class in 1972, and got my present call during the year that Extras could request a call of their choice.

"My first award, like all new ops, was the WAS, then eventually 5BWAS; to finish that I began to monitor the County Hunter nets.

"My last seven or eight counties were given to me by WB0TVL, who took a trip through Nebraska, Wyoming, and Montana to finish up for USA-CA All Counties #222.

"One of the highlights during my search for them all was being Net Control most nights during the week in the mid-70s when mobilers ran the whole state of Minnesota on 75 meters.

"I was inactive for a few years, then retired in 1981, and am now trying to finish them the second time (All SSB) and enjoying it almost as much as the first time.—73 de Cecil, W0UM."



Cecil Vincent, W0UM, USA-CA All Counties #222, 4-18-79.

Allen R. Carpenter, K1QPV, did it all in one step and claimed USA-CA All Counties #646, USA-CA 3000 #675, USA-CA 2500 #750, USA-CA 2000 #817, USA-CA 1500 #904, USA-CA 1000 #1097, and USA-CA 500 #2381, Mixed, dated 12-11-89.

Emil Havel, KD9ZF, also did it all in one giant leap and received USA-CA All Counties #647, USA-CA 3000 #676, USA-CA 2500 #751, USA-CA 2000 #819, USA-CA 1500 #905, USA-CA 1000 #1098, and USA-CA 500 #2383, All 20 Meter SSB Mobiles, dated 12-14-89.

Harold J. "Hud" Huddleston, KF4BU, filled out his count and qualified for USA-CA All Counties #648, USA-CA 3000 #677, USA-CA 2500 #752, USA-CA 2000 #820, USA-CA 1500 #906, and USA-CA 1000 #1099, Mixed, dated 12-19-89.

Dr. Theodore Palmer, WA6MUK, took the final step in his quest and received

USA-CA Honor Roll

3000		1500	
AK2H	672	VE3OEE	902
VE3OEE	673	W5RJH	903
W5RJH	674	K1QPV	904
K1QPV	675	KD9ZF	905
KD9ZF	676	KF4BU	906
KF4BU	677		
2500		1000	
VE3OEE	747	VE3OEE	1094
W0AWP	748	WB9HPR	1095
W5RJH	749	W5RJH	1096
K1QPV	750	K1QPV	1097
KD9ZF	751	KD9ZF	1098
KF4BU	752	KF4BU	1099
2000		500	
W0AWP	789	VE3OEE	2380
VE3OEE	815	K1QPV	2381
W5RJH	816	PA3ABW	2382
K1QPV	817	KD9ZF	2383
K9UA	818	K9UGX	2384
KD9ZF	819	N7LWX	2385
KF4BU	820		

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, NY 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.

USA-CA All Counties #649, Mixed, dated 12-26-89.

Alvin B. Unruh, W0AWP, filed his good application for USA-CA 2500 #748, All CW, dated 12-9-89. Alvin qualified for USA-CA 2000 #789, All CW, on 4-27-89.

Richard W. Mencil, K9UA, updated his good record and received USA-CA 2000 #818, Mixed, dated 12-11-89.

Charles Wm. Lenhart, WB9HPR, added a gold seal to his certificate by claiming USA-CA 1000 #1095, Mixed, dated 12-6-89.

USA-CA 500 certificates went to:

Keith Laughlin, VE3OEE, USA-CA 500 #2380, Mixed, 12-6-89.

Allen R. Carpenter, K1QPV, USA-CA 500 #2381, Mixed, 12-11-89.

A. H. Hammink, PA3ABW, USA-CA 500 #2382, All 10M SSB, 12-12-89.

Emil Havel, KD9ZF, USA-CA 500 #2383, All 20M SSB Mobiles, 12-14-89.

James T. Scherer, K9UGX, USA-CA 500 #2384, Mixed, 12-18-89.

Charles "Bart" Bartlett, N7LWX, USA-CA 500 #2385, All 20M SSB Mobiles, 12-29-89.

Awards Issued

Warren H. Ash, AK2H, completed his quest and qualified for USA-CA All Counties #643, and USA-CA 3000 #672, All CW, dated 12-4-89.

Keith Laughlin, VE3OEE, garnered a complete set of contacts and confirmations and claimed USA-CA All Counties #644, USA-CA 3000 #673, USA-CA 2500 #747, USA-CA 2000 #815, USA-CA 1500 #902, USA-CA 1000 #1094, and USA-CA 500 #2380, Mixed, dated 12-6-89.

Alvin P. Sligh, W5RJH, completed his paperwork and received USA-CA All Counties #645, USA-CA 3000 #674, USA-CA 2500 #749, USA-CA 2000 #816, USA-CA 1500 #903, and USA-CA 1000 #1096, Mixed, dated 12-9-89.

333 South Lincoln Avenue, Mundelein, IL 60060

USA-CA Special Honor Roll

Warren H. Ash, AK2H
USA-CA All Counties #643, All CW, 12-4-89

Keith Laughlin, VE3OEE
USA-CA All Counties #644, Mixed, 12-6-89

Alvin P. Sligh, W5RJH
USA-CA All Counties #645, Mixed, 12-9-89

Allen R. Carpenter, K1QPV
USA-CA All Counties #646, Mixed, 12-11-89

Emil Havel, KD9ZF
USA-CA All Counties #647,
All 20M SSB Mobiles, 12-14-89

Harold J. "Hud" Huddleston, KF4BU
USA-CA All Counties #648, Mixed, 12-19-89

Dr. Theodore E. Palmer, WA6MUK
USA-CA All Counties #649, Mixed, 12-26-89

Awards Available

Utah Beach Award. The Utah Beach Award was originated at the end of 1989, after several operations at Utah Beach, Normandy in commemoration of D-day.

General rules: One QSO with one of the special calls FV6JUN, TK6JUN, TV6JUN, TO6JUN, TQ6JUN, HX6JUN, or callsigns for future operations. QSL must be submitted. There are three classes: Utah Beach Veterans; Omaha, Sword, Gold, Juno veterans; Normal class.



Utah Beach Award commemorating D-day landings, Normandy, France.

Fee: \$2.00 U.S. for Utah Beach veterans and/or members of ADUBRA (Association of D-day Utah Beach Radio Amateurs), and for all veterans of landings on other d-day beaches. (These fees for veterans are only to cover postage fees.)

All veterans please give the name of your division, corps, etc., to provide a list of radio amateur veterans of the landings. A little sack of sand from Utah Beach will be sent with the award.

Award manager: F5AM, Andre Morio, 631 route de Carentan, F-50000 Saint Lo, France.

"Chinghis Khan" Award. This award, dedicated to the 750th anniversary of the well-known ancient masterpiece "The Secret History of Mongols," is issued by the JT DX Club and Mongolian Culture Fund.

The award is available to licensed amateurs and SWLs. There are no limits on time, modes, or bands. The fee for the award is \$5.00 U.S. or equivalent (no IRCs). Do not send QSL cards. A list showing full details of the contact (SWL) should be certified by club officials or two amateurs.

Applicants must submit proof of confirmations of contacts (SWL) with 12 stations whose suffix letters spell Chinghis Khan (e.g., JA7KCA for the letter C; WB3DFH for the letter H; YU1IEY for the letter I, etc.). The 12 stations should be in 12 different countries (DXCC) and one should be a Mongolian station.

Applications must be sent to Award Manager, JT1CD, P.O. Box 639, Ulaan-

baatar-13, Mongolia, Asia. Please use registered mail.

Memory of Russian Pioneers Award (MORP). The Memory of Russian Pioneers Award (MORP) was established by The U9J-Club. This club was founded in Surgut, one of the oldest towns (1591) of the North Parth West Siberian region of the USSR (WAZ Zone 17, Region 162).

Applicants need 12 QSOs (or SWL reports) on 1.8–29 MHz on or after 1 January 1988.

A. One QSO with a radio amateur (according to the list of the award R-100-0) from each of the districts:

1. Region 098 (UA0Q ...)
2. Region 105 (UA0B ...) or 106 (UA0H ...)
3. Region 107 (UA0L ...)
4. Region 110 (UA0C ...)
5. Region 113 (UA10 ...) or 114 (UA1P ...)
6. Region 128 (UA0Z ...) or 129 (UA0X ...)
7. Region 138 (UA01 ...) or 139 (UA0K ...)
8. Region 143 (UA1Z ...)
9. Region 163 (UA9K ...)

B. One QSO with a radio amateur from the North Pole, or from the North Arctic, or from the islands of northern and far eastern seas. The following prefixes count: EK, EY, EZ, R, RA, RU, RV, RW, RZ, U, US, UV, UW, UZ, 4K, 4L, etc.

C. One QSO with a radio amateur who is working in Antarctica, drifting in Arctic Regions, or is a radio amateur of Alaska.

D. One QSO with a U9J-C DXpedition (August and December 1989—EK9JG).

There are three classes: Class 1, CW only; Class 2, SSB only; Class 3, Mixed.

Send a verified log and 10 IRCs to cover the cost of the award to P.O. Box 1, Surgut-14, 626400 USSR. Do not send QSL cards. Please print clearly your call, name, and full mailing address.

Other USSR Awards. Thanks go to Edward Kritsky, NT2X, who provided the following press release relative to a number of Russian awards.

"Good Neighbours" Award is offered by Magadan DX Group of the USSR. An attractive multi-color certificate is available to anyone satisfying the following requirements.

Total of 10 QSOs with UA0I/UZ0I, oblast 138, and/or UA0K/UZ0K stations, oblast 139. Another 10 QSOs must be made with the state of Alaska (KL7). Alaskan stations need only 10 contacts with oblasts 138–139. Any bands and modes. Valid are contacts made after January 1, 1986. Please send GCR (no QSLs required) and award fee of 5 IRCs to USSR, 685000, Magadan, P.O. Box 190.

Plaque "Ukraine" is being offered by the Federation of Radiosport of the Ukraine (USSR) and the "Crystal" Radioclub. Work all 27 Ukrainian oblasts (UB) on any two bands for a total of 54 QSOs. All modes. Valid are contacts made after January 1, 1988. Fee: 60 IRCs or \$30 US. Award Manager: Victor Tkachenko, RB7GG. International applicants send GCR with fee (no QSLs needed) to



Good Neighbour Award offered by the Magadan DX Group of the USSR.

Ed Kritsky, NT2X, P.O. Box 300715, Brooklyn, NY 11230 USA.

Kiev Kashtan Award. The award is available to amateurs and SWLs for QSOs with stations in Kiev (obl. 186) between November 25 and December 5, 1988.

EU—6 QSOs (including 2 or more QSOs with RT0 prefix).

DX—3 QSOs (including 1 or more QSOs with RT0 prefix).

All bands and modes are valid.

A silk pennant is available free to everyone who participates. Send GCR (no QSL needed) and 10 IRCs to 252056, Kiev-56, Box 391.

Crimea DX Group Plaque. The C-DX-G Plaque is available to all amateurs and SWLs for confirmed contacts with CDXG members and DXpeditions. All bands/modes are valid.

All contacts made after January 1, 1987 count for the award. Send GCR only and \$10 US or 40 IRCs to award manager UB4JDM, 334270, Alushta, Box 111, USSR.

EU 10 QSOs, NA/SA 7 QSOs, AF/OC 5 QSOs. Contacts should be made with the following stations: UB1RR, UA4UBC, UB4JDM, UB5JRR, UB4JX, RB4IRO, UB5EAZ, UO5OAS, UB5JF, RB5LVV, RB4JWS, UB4JWL, UB4JWS/UF1V, RB4JWS/UF1Q, RB4JWS/UF1O, RB5LVV/RB1J, RB5LVV/RB8J, UB5JF/UF, UC00/UB1RR, UB8J/UB1RR, UC40/UB1RR, UB5JRR/RT1J, UB4JDM/UT1J, UB4JX/UT8J, UB5JRR/RB8J, RB1J/UZ3WWZ, EW8TJ, UB6J/UZ9OYN, UB4JFV, UP0BB, UB6J/UB4IYU, UB7J/RB5IJ, RB5IJ, EV7DN, RG/UB4JDM, UG3G/UZ3WXX, RG3G/UZ3WXX, and all contacts with —/UB4RXR and others.

Federation of Radiosports of the USSR SWL Committee (290000, Lvov, P.O. Box 19, Chliyanz George [UY5XE, UB5-068-3]). These awards are for QSL cards received from the SWL (shortwave listeners) C-100-0 (Heard in 100 oblasts of the USSR).

The award is available to all radio amateurs who received QSLs from the SWL of the Soviet Union. USSR—from 100 oblasts; EU, AS, AF, NA, SA—50 oblasts;

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OC—25 oblasts. Stickers are given for each additional 50 oblasts (OC—25 oblasts).

SWL cards are valid from January 1, 1957, any mode/band.

International applicants: award fee is 14 IRCs, stickers—3 IRCs.

C-50-C (heard in 50 countries and territories of the world). This award is available to all radio amateurs who received QSLs from SWLs worldwide. One must receive QSLs from all 15 republics of the USSR.

Every 10 additional countries get you a sticker. SWL cards are valid from June 1, 1956, any mode/band.

International applicants: award fee is 14 IRCs, stickers—3 IRCs.

The applications for the above awards must be made in alphabetical order, of countries and territories, and in the increasing order of Soviet oblast numbers. Indicate a call, country/territory name, and oblast number (if applicable). Send your verified application to Box 88, Moscow, USSR.

U-DX-C Award. The award is sponsored by the Soviet DX Club (UDXC) and the Central Radio Club of the USSR. It is available to amateurs worldwide as well as SWLs.

Requirements: Have contacts/SWL with UDXC members—EU and AS (outside of the USSR) 15 QSOs; AF, NA, SA 10 QSOs; Australia, OC 5 QSOs.

Valid are all QSOs made after January 1, 1988 any mode/band. QSO with the same station counts only once. There are no band/mode endorsements. You can substitute missing QSOs with QSLs from SWLs, members of UDXC. When you contact additional UDXC members (as required for your geographical area, see above), you can get a sticker.

Application should be based on the QSL cards received, in the alphabetical order of prefixes and suffixes. Do not send QSL cards with your application. Mail award application to Box 88, Moscow, USSR. The award is free for amateurs of countries that have fee-free diploma exchange with the Central Radio Club. Otherwise, the fee is 14 IRCs.

UDXC accepts foreign membership applications. One must have "R-150-S" and "UDXC" diplomas. Annual dues is 40 IRCs. Send your membership application to UT5HP, Anatoly Kucherenko, USSR, 348903, Schastie Voroshilovogradskoi oblasti, Mira 2-34.

Armavir—150 years. This multi-color award is issued by the amateurs of Armavir-city to commemorate 150 years of their home town.

Any QSO with Armavir (UA6A/RA6A) after January 1, 1989 is valid. EU needs 10 QSOs; DX stations 5 QSOs. Work the same station on different bands only.

Submit your application with 10 IRCs to USSR, 352900, Armavir, Box 16.

If you would like only a commemora-

tive pin, you need to work one Armavir station, regardless of your QTH. Send your application to the address above with 7 IRCs.

Inter Radio Club, Leningrad, USSR Awards. All of the following awards are available from the Inter Radio Club.

60th Parallel Award (60 degrees north). This award is available to all radio amateurs throughout the world for two-way contacts with 16 out of 17 oblasts of the USSR which are located across the 60th parallel. Oblasts are (Oblast px, oblast number): UA1A-169, UA1C-136, UA1Q-120, UA4N-131, UA9X-090, UA9G-141, UA9F-140, UA9C-154, UA9J-162, UA9H-158, UA0A-103, UA0S-124, UA0Q-098, UA0C-110, UA0I-138, UA0X-129.

A special "super sticker" is issued to those amateurs who submit confirmations of two-way contacts with:

a. Nine additional territories—i.e., KL7, VE, OX, GM-Shetlands, LA, SM, OH0, OH plus five members of the DX Club 60th Parallel, for EU hams; or

b. The same nine territories plus three members of DX Club 60th Parallel, for all others.

There are no restrictions as to the mode, band, report, and date of the contacts.

GCR must be verified by two amateurs. The fee is 10 IRCs. Do not send cards.

Applications for the "super sticker" should contain the number of the award already received, plus 5 IRCs. Applications should be submitted to Award Manager, Inter Radio Center, P.O. Box 73, Leningrad, 196070, USSR.

The award is available to shortwave listeners under the same rules.

Pulkovsky Meridian Award. This award is available to all radio amateurs throughout the world for two-way contacts with 14 oblasts of the USSR located along the Pulkovsky Meridian (30 degrees east). Oblasts are (oblast px, oblast number): UA1Z-143, UA1N-088, UA1C-136, UA1T-144, UA1W-149, UC2W-006, UC2S-010, UC2O-007, UB5U-065, UB5C-080, UB5V-066, UB5F-070, UO5-039.

A special "super sticker" is issued to those amateurs who contact 14 additional territories on the same meridian:

a. JW-Svalbard, LA, OH, TA, SU, ST, 9Q, 5X, 9X, 9U, 5H, 9J, Z2, ZS, plus contacts with five members of the Pulkovsky Meridian Club, for EU hams; or

b. The same 14 territories plus three members of the club, for all others.

There are no restrictions as to mode, band, report, or date of the contacts.

GCR must be verified by two amateurs. The fee is 10 IRCs. Do not send cards.

Applications for the "super sticker" should contain the number of the award already received, plus 5 IRCs. Applications should be submitted to Award Manager, Inter Radio Center, P.O. Box 73, Leningrad, 196070, USSR.

The award is available to shortwave lis-

Please send all reader inquiries directly.

teners under the same rules.

60 x 30 Award (60 degrees north 30 degrees east). This award is available to all radio amateurs throughout the world who have already received two prior awards (60th Parallel and Pulkovsky Meridian). An extra "super sticker" is also available. Applications for the "super sticker" should contain the numbers of the "super stickers" already received, plus 5 IRCs. Applications should be submitted to Award Manager, Inter Radio Center, P.O. Box 73, Leningrad, 196070, USSR.

The award is available to shortwave listeners under the same rules.

N-S Award. This award is available to all radio amateurs and SWLs worldwide who submit proof of two-way contacts/SWL with one Soviet drifting station from Arctica (RAEM, UPOL, 4K0) and one Soviet base station from Antarctica (UA1KAE, 4K1, ...). For the "super sticker" required are contacts with three different drifting Arctic stations and three different base Antarctic stations (separate locations) plus five contacts with the members of N-S Club (for EU) and three contacts with N-S Club members (for all others).

One contact with the honorary member of the N-S Club counts for three regular contacts with the club members.

There are no restrictions as to mode, band, report, or date of the contacts.

GCR must be verified by two amateurs. The fee is 10 IRCs. Do not send cards. Applications for the "super sticker" should contain the number of the award already received plus 5 IRCs. Applications should be submitted to Award Manager, Inter Radio Center, P.O. Box 73, Leningrad, 196070, USSR.

Leningrad SWL-DX-C Award (New Wave). This award is available to all shortwave listeners worldwide who submit reports of activity by different stations from the city of Leningrad (oblast 169). EU SWLs need 30 stations; all others 15 stations. There are no restrictions as to mode, band, report, or dates of the contacts.

GCR must be verified by two amateurs. The fee is 10 IRCs. Do not send cards. GCR must have full details on activity (date, time, signal reports exchanged, and the call of the other correspondent).

The "super sticker" is issued for reports of 60 stations for EU SWLs and 30 for all others. Applications for the "super sticker" should contain the number of the award already received plus 5 IRCs.

Applications should be submitted to Award Manager, Inter Radio Center, P.O. Box 73, Leningrad, 196070, USSR.

Optimist Award. This award is issued to all amateurs and SWLs worldwide who submit proof of contacts with the amateurs who are blind and are members of the Optimist Club. EU amateurs need five QSOs; all others three stations.

The "super sticker" is issued for additional contacts with blind amateurs from three different continents and three separate Soviet republics.

There are no restrictions as to mode, band, report, or date of the contacts. GCR must be verified by two amateurs. The fee is 10 IRCs. Do not send cards.

Applications for the "super sticker" should contain the number of the award already received plus 5 IRCs. Applications should be submitted to Award Manager, Inter Radio Center, P.O. Box 73, Leningrad, 196070, USSR.

For County Hunters

Lenny Mendel, K5OVC, has generously

offered to give a county outline map of the state of Arkansas to any amateur desiring it. Just send him a self-addressed business-size envelope with 25 cents U.S. postage affixed; DX stations send 2 IRCs. Lenny's address is 409 Rolling Acres Drive, Percy, AR 71964 U.S.A.

At the Dayton Hamvention on Sunday, April 27 from 3 to 5 PM Dr. Roland Toth, WB8NWK, will chair the County Hunter Forum. Check your program for the room number. County Hunters and friends will meet for dinner at the Red Lobster on Salem Avenue beginning at 5:30 PM. Contact Ron at 3406 Longleaf, Dayton, OH 45430 for reservations for the dinner.

Until next month...

73, Dorothy, WB9RCY

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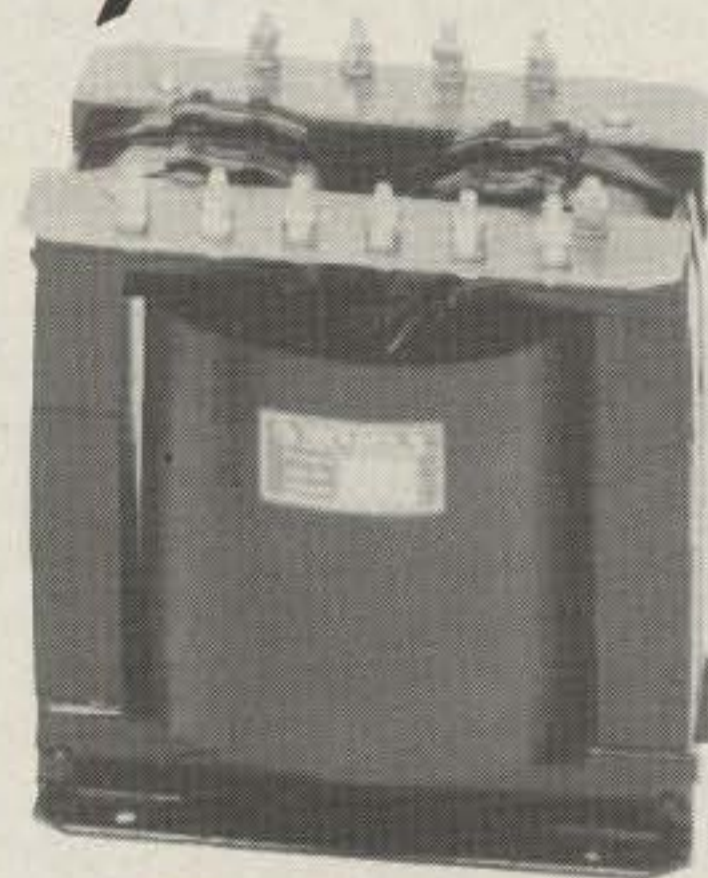
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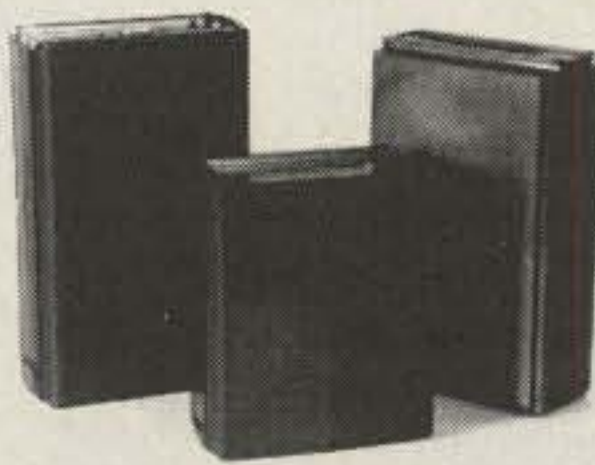
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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Amateur Radio Zooms Into The Space Age

Amateur radio's space program rocketed to new heights on the evening of January 21 when Ariane flight V35 launched six satellites built by radio amateurs of four nations. The last amateur satellite, OSCAR 13, was launched on June 15, 1988. Now half a dozen of them have been orbited in a single space shot! Lift-off came at 0135 UTC from the European Space Agency's spaceport located off the northern coast of South America. The launch was originally scheduled for November 10th.

Four of the satellites are called Microsats due to their small, low-cost, highly efficient spacecraft design. Lift-off was delayed several times due to various problems ranging from bad weather to a faulty tape recorder on board the primary payload, the SPOT-2 earth imaging satellite. The Microsat satellites are built in a modular tray design. Each of the five trays, one stacked on top of the other, measures approximately 9" x 8½" x 1½" and contain electronics for one subsystem of the spacecraft (see fig. 1).

Accompanying the \$100,000,000 SPOT-2 satellite, the hamsats inaugurate a new era in data and image communications. UoSAT OSCARs-14 and 15, PACSAT OSCAR-16, DOVE OSCAR-17, WEBERSAT OSCAR-18, and LUSAT OSCAR-19 now orbit the Earth every 101 minutes 9 seconds from an altitude of 500 miles. OSCAR is an acronym for **O**rbiting **S**atellite **C**arrying **A**mateur **R**adio. OSCAR numbers are assigned in sequential order to amateur satellites once they are placed in orbit.

The UoSATs continue the University of Surrey (England) line. The latter four are Microsats based on the tiny but powerful new spacecraft design developed by AMSAT and constructed at Weber State College in Ogden, Utah.

Hams around the world monitored the launch from Kourou, French Guiana, via the AMSAT Launch Information Network Service (ALINS) on 35 repeaters, on HF bands, and via relays through satellites OSCAR-10 and OSCAR-13 over Asia and Africa. Listeners heard "All lights are green!" and the thrilling sound of Ariane mission controllers' applause as they

celebrated each milestone in the historic flight. Initial signals, particularly from the LUSAT CW beacon on 437.125 MHz, were reported as quite strong.

Amazingly, the Microsat program was only an idea just two years ago. To create the satellites required intense hardware and software development by dedicated hams and close cooperation between AMSAT-North America, the ARRL, Tucson Amateur Packet Radio Corp., and the AMSAT organizations in other countries.

Capabilities of the Microsats

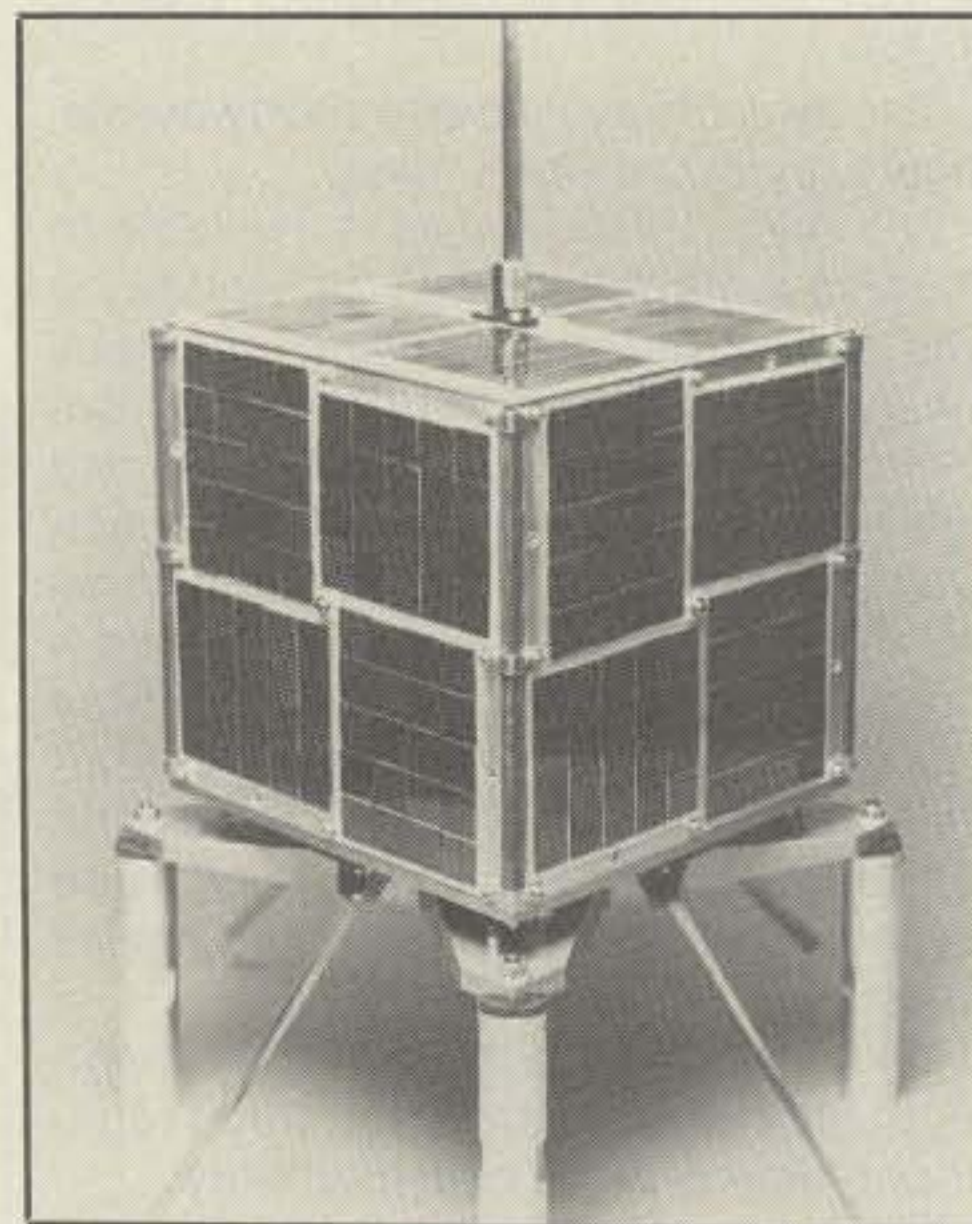
AMSAT-NA sponsored PACSAT, a digital store-and-forward satellite. It will serve as both a network link and an orbiting packet bulletin board. LUSAT sponsored by AMSAT-Argentina is basically a clone of PACSAT.

The PACSATs will become flying bulletin-board systems. A simple computer, TNC, and appropriate modems and radios can upload a message to the Microsats. Messages placed on the satellite by others can be downloaded. A TNC, terminal node controller, assembles and decodes digital packets of information.

The idea is to devote some of the channels to direct access for the user. The balance of the resources will be devoted to supporting the packet radio networks. If you're in a large metropolitan area, you're already linked to your local BBS and network. But for amateurs in rural areas who haven't really gotten into packet radio because there is no network with which to interact, the PACSATs offer tremendous opportunity to bridge the gap.

The primary mission of PACSAT is to receive and store amateur packet radio messages for later transmission back to Earth. Any properly licensed radio amateur in the world will have open access to use the satellite. PACSAT, while only a 9 inch cube and weighing less than 25 pounds, carries one of the most sophisticated amateur radio payloads ever placed in orbit. The May and June 1989 issues of *QST* carried a two-part article that describes the spacecraft and their frequencies and mission.

There might be real benefit to using a PACSAT in times of natural disaster. Because these spacecraft are in low-Earth orbit, in a matter of a few hours every amateur in the world has access to them.



A Microsat satellite.

Portable packet radio satellite ground stations with omni antennas can fit in a briefcase. Disaster relief teams could quickly use them to handle emergency traffic out of a distress area.

DOVE—Digital Orbiting Voice Encoder

Like the namesake bird, the flight of DOVE will support goodwill through communication. DOVE, sponsored by BRAMSAT, AMSAT-Brazil, will be used for amateur radio and educational applications. Conceived by BRAMSAT founder and president, Dr. Junior de Castro, PY2BJO, of Sao Paulo, the primary DOVE payload will provide an easily received signal consisting of a digitally synthesized voice.

The idea is to get the youngest of school children interested in amateur radio at an early age by listening to DOVE talk to them from space during a five or ten minute window as it passes within range. A wide scope of activities is planned for young people to participate in using the DOVE spacecraft. It is even planned to spacecast recorded messages from school children worldwide.

DOVE will speak in many languages, but all messages and classroom information will be repeated in English on each

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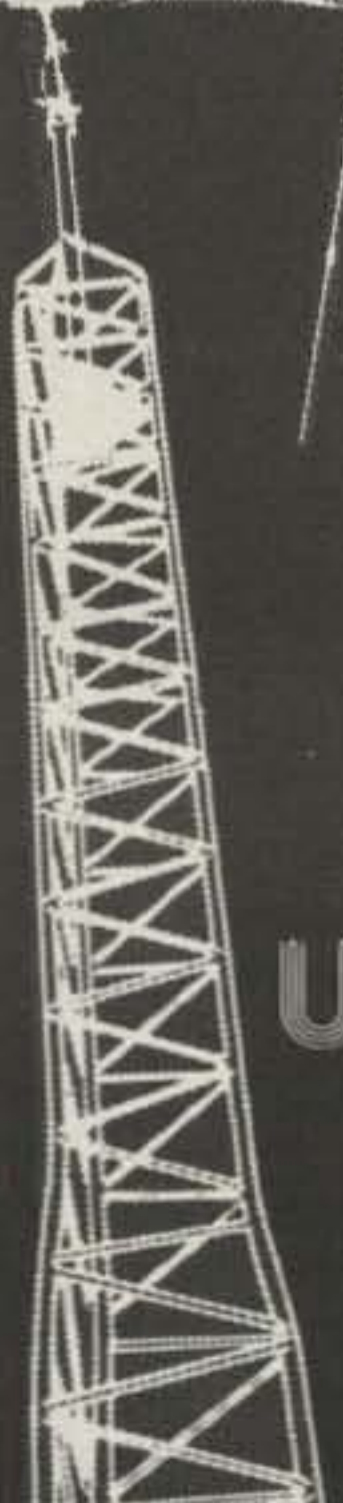


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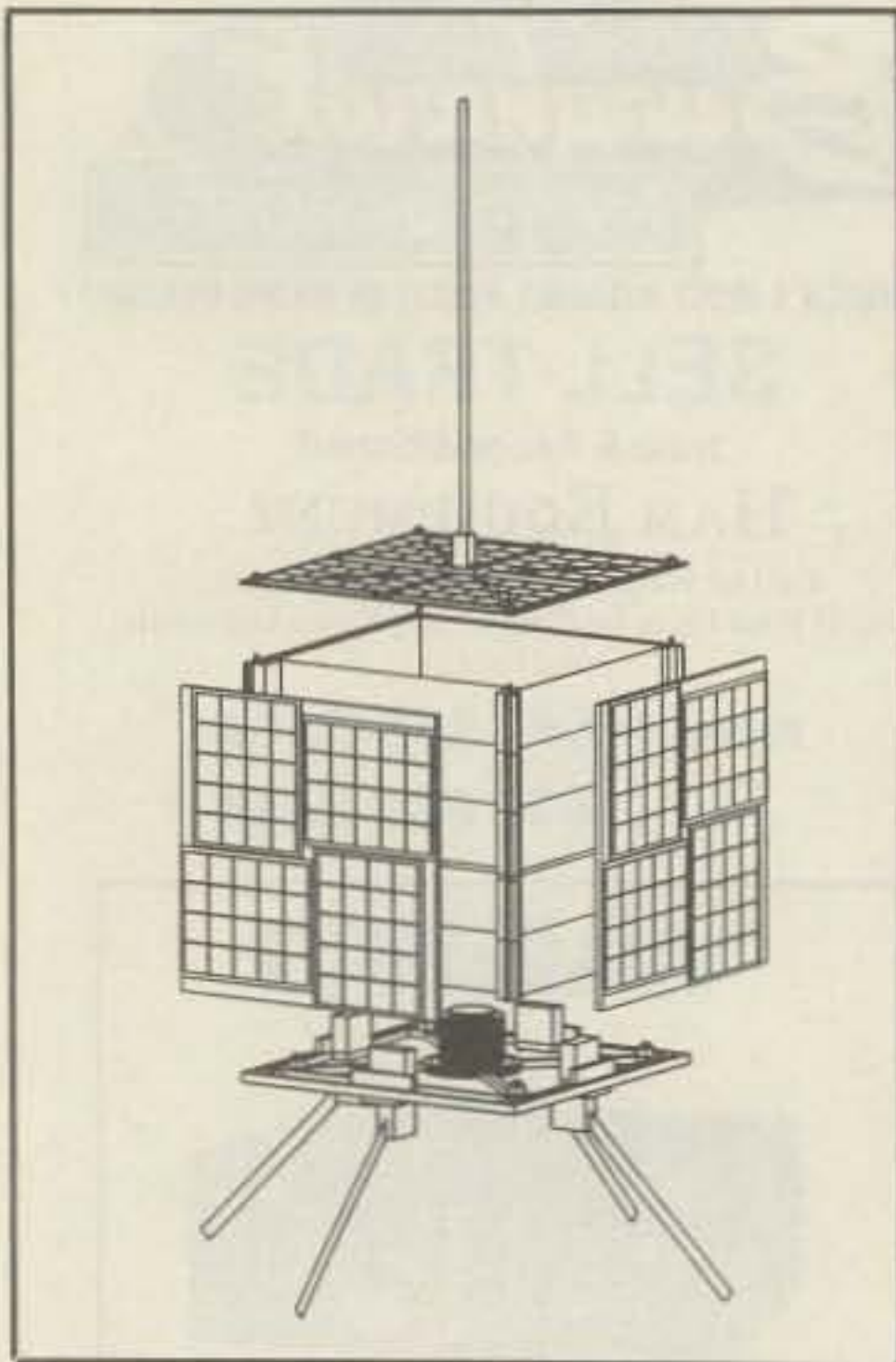


Fig. 1—The Microsat concept. Note the exterior solar panels and five trays or internal modules which contain the satellite's circuitry and make it structurally sound. Four of these amateur satellites were simultaneously orbited on January 21, 1990.

pass. It is anticipated that the talking space programs will start about March 15th after a test period.

Initially, the digitized voice will be uploaded from the United States by Bob McGwier, N4HY, who built most of the on-board voice encoding experiment. Later on, voice messages will be uplinked from other locations around the world, and especially from remote nations, which will not interfere with large masses of people listening to the programming.

Teachers interested in classroom participation should write to AMSAT Education Director, Richard C. Ensign, N8IWJ, 421 N. Military, Dearborn, MI 48124 (tel. 313-274-1718).

DOVE's telemetry comes down as standard packets. You hook your unmodified TNC-2 to your 2 meter FM radio and antenna and see the packet transmissions on your screen. A receive-only satellite, amateurs may not transmit to or through DOVE.

While all four Microsat satellites have their receivers tuned to the 2 meter amateur radio band, LUSAT, PACSAT, and WEBERSAT transmit in the 70 centimeter amateur band. The DOVE satellite, on the other hand, transmits in the 2 meter amateur band. This frequency arrangement was chosen because receivers capable of receiving signals on the 2 meter VHF-FM band are more readily available throughout the world than comparable

70 centimeter (440 MHz) receiving equipment.

The other Microsat satellites transmit a signal modulated through digital phase-shift keying which must be demodulated by a modem and computer. The voice-synthesized signal from DOVE can be understood as spoken speech. Since DOVE is in low Earth orbit (LEO), its powerful 4 watt transmitter can be heard on the simplest of 2 meter FM receivers.

Its digital synthesized speech can be received on pocket scanners and handheld transceivers tuned to 145.825 MHz. DOVE passes overhead about the same time each day, since it is in a sun-synchronous orbit.

There are other DOVE applications such as transmission of bulletins and sunspot, propagation, and orbital data. You basically have an amateur radio bulletin station orbiting in space that is not dependent upon propagation or affected by QRM. Anyone in the world can hear it. Meaningful information could be distributed throughout the world almost in real time.

College with Its Own Ham Satellite

NUSAT-1, the first college-built satellite to be sent into space aboard the space shuttle, made history for its creators—students and faculty at Weber State College, Ogden, Utah. NUSAT stood for **N**orthern **U**tah **S**ATELLITE program. NUSAT-1 was launched as a "get-away special" cannister from Challenger on April 29, 1985.

The NUSAT program is acknowledged as having motivated a great interest in the development of low-cost satellite applications. The mission of NUSAT-1 was to test the feasibility of evaluating FAA air-traffic-control radar beacon antenna patterns with low-orbit satellites.

Now four years later the WSC Center for AeroSpace Technology (CAST) again broke new ground by building the four Microsats. The project was funded through the Utah Center for Excellence in conjunction with AMSAT-NA. The electronics for three of the Microsats was completed by AMSAT people. The fourth Microsat not only was constructed by students on the campus, but most of its electronics was built by them as well under the watchful eye of a host of volunteer aerospace-industry technical advisors and faculty.

WEBERSAT will receive, store, and transmit radio messages from amateur radio operators and from the WSC ground station located on the Ogden school's campus, and will conduct experiments on the Earth's atmosphere and magnetic fields.

In addition, a video camera will take pictures of Earth from space. An on-

board computer will relay these pictures to the ground station. The satellite also has the capability of receiving photos from Earth. Its camera will offer computer hobbyists, educators, and amateurs the chance to capture the data, compile it, and take a PC with EGA or VGA graphics and produce pictures of Earth. It's a very exciting stimulus to put in a classroom. This is the first color camera to be installed on an amateur-constructed satellite. Amateur radio operators are also excited about the ability to transmit photos, via the satellite, to and from almost any spot in the world.

The college spent about \$200,000 in raw materials for this 20-pound bread-box-size satellite. If the cost of the volunteer labor was added in, it would cost approximately \$1.5 million. WEBERSAT will be around for a long time. Its life is estimated at 50 years!

AMSAT Argentina Sponsors LUSAT

In many ways LUSAT is a clone of PACSAT with store-and-forward capability. There are some fundamental differences, however. LUSAT has a CW beacon, for example. "AMSAT Argentina wanted the Morse code beacon on the satellite so that anyone who could receive the signals from the satellite could also receive the telemetry without the need of more equipment than a proper radio," said Carlos Huertas, LU4ENQ, President of AMSAT Argentina. "Our CW beacon will afford Argentina an opportunity to attract the largest audience possible for our LUSAT."

The CW beacon transmits "LUSAT, Hi, Hi . . ." and then a series of characters which can be easily decoded to show the status of many of the sub-systems aboard the satellite. AMSAT Argentina sent Jose Machao, LU7JCN, of La Plata, to AMSAT North America's Boulder, Colorado, Microsat laboratory for 11 months to help with the Microsat project. Jose, a student at the University of La Plata, not only worked on LUSAT, but assisted with many other volunteers in building and testing the other three Microsat satellites.

Arturo Carou, LU1AHC, Vice President of AMSAT Argentina, said, "AMSAT Argentina and all the citizens of our country are very proud to have the opportunity to build and launch this satellite. We invite all radio amateurs, whatever their affiliation, to use and enjoy LUSAT."

The Future of Microsats

These spacecraft are incredibly small structures. They are so small that the North American Air Defense Command (NORAD) had trouble locating them on radar. The spacecraft are 9" x 9" cubes—a little bigger than a one-gallon

milk jug. Consider that there is the equivalent of an IBM AT on board each one with eight megabytes of RAM, transceivers, batteries, charge circuitry, and experiment modules.

The future of Microsat is bright indeed. AMSAT Italy has already begun building their own Microsat. With its small mass and size and the fact that the Microsat has been qualified for flight upon any launch vehicle, we should see many more satellites in years to come.

The Microsat concept was "brainstormed" by AMSAT officials in a hotel room in Detroit and in a matter of a couple of hours. They wanted a very small spacecraft that would use digital store-and-forward techniques. They took that thought, and 26 months later placed four satellites into low-Earth orbit. This is a tremendous comment on the innovative and resourceful spirit of the individuals who make up this organization. It should serve as a source of pride for radio amateurs everywhere.

The Microsats were married to their electronic subsystems in a rented office off a back street in Boulder, Colorado—all with volunteer labor. A "cleanroom" was constructed in that office.

AMSAT did what governments and major corporations do, but on a budget that is almost laughable. Their cost was less than \$300,000. The launch was not free,

Spacecraft	OSCAR No.	Freq./MHz	Mode
UoSAT D	UO-14	435.070	1200 BPS AFSK (FM)
UoSAT E	UO-15	435.120	1200 BPS AFSK (FM)
PACSAT	AO-16	437.025	1200 BPS PSK AX.25
DOVE	AO-17	145.825	1200 BPS AFSK AX.25 (FM)
WEBERSAT	AO-18	437.075	1200 BPS PSK AX.25
LUSAT	AO-19	437.150	1200 BPS PSK AX.25
LUSAT-CW	LUSAT	437.125	12 WPM CW telemetry

Table 1—Microsat and UoSAT monitoring frequencies. Packet transmissions from DOVE may be monitored with an unmodified TNC-2 or clone, using an FM receiver. Voice transmissions from DOVE require only a scanner/radio that receives 145.825 MHz FM. The other Microsats (PACSAT, WEBERSAT, and LUSAT) require an SSB receiver and TNC with a 1200 BPS PSK demodulator (FO-12 compatible, NOT the 400 BPS PSK demodulator used with AO-10 and AO-13). A PSK modem kit is available from TAPR (P.O. Box 12925, Tucson, AZ 85732, telephone 602-323-1710) and an assembled unit is available from PAC-COMM (3652 West Cypress St., Tampa, FL 33607, telephone 800-223-3511 or 813-874-2980).

however. AMSAT paid for the Microsat orbiting. The idea that free launches continue to be available is a misconception. Launch costs are sold by mass and volume. That was the challenge that led AMSAT to explore how small they can go. AMSAT simply couldn't afford the multi-million-dollar launches of major corporations and governments.

The four sponsors were financial sponsors. The Tucson Amateur Packet Radio Corp. (TAPR) provided a sizeable grant to AMSAT. The ARRL also helped with ex-

penses and made available their lab in Newington. AMSAT also had a number of fund-raising drives among their 6,000 membership. The Microsat program has now drained AMSAT's resources to a critical level, and they need financial support.

The Microsat concept has been exclusively licensed to an aerospace firm for commercial applications, and it is possible that down the road AMSAT could receive income from this arrangement. The aerospace firm, Interferometrics, Inc., of

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Rot.Tq.	14	37	50	57	143	215	287
Brk.Tq.	108	215	502	717	1290	1792	2150
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PreSet	No	No	No	Opt	Yes	Yes	Yes
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Vienna, Virginia, calls the Mircosat "EyeSat" and believes there is a commercial need for low-cost satellites that can support worldwide store-and-forward communications and other scientific data collection missions. They will sell EyeSat's for \$10 or \$20 million each.

Tracking the Microsats

AMSAT generates a good portion of its operating income from the production and sale of tracking software. There are two MS-DOS PC tracking programs supported by AMSAT which can track virtually any object in space—the Space Shuttle, Microsats, OSCAR 13, a geosynchronous satellite. Once you have the Keplerian elements for a given object and put them in, the program depicts the orbit in meaningful terms for your location. AMSAT makes sure that the data needed is available through their bulletins.

Quiktrak 4.0 is menu-driven and requires a CGA or EGA graphics. *Instant-*

Track 1.0 requires EGA as a minimum and offers many options. *Quiktrak* supports 100 satellites in 100 observer cities. *InstantTrack* supports 200 satellites in 1300 cities.

AMSAT asks a contribution from members, and a larger one from nonmembers. *Quiktrak* is \$75 for nonmembers and *InstantTrack* is \$70 for nonmembers. If you join AMSAT (\$30/year, \$45/foreign) you receive almost your first year membership dues in the discount on the software. Member prices are \$55 for *Quiktrak* and \$50 for *InstantTrack*. They are available from AMSAT, P.O. Box 27, Washington, DC 20044, or you can use your VISA/MasterCard by calling 301-589-6062. AMSAT also has Apple II and Macintosh tracking software. You directly support the amateur space program by purchasing tracking software.

The main function of AMSAT is to produce amateur satellites. They also publish the *AMSAT Journal* bimonthly and maintain their own QSL bureau and software exchange.

Geosynchronous Amateur Satellites

Since the mid-80s AMSAT has been studying Phase IV, a geosynchronous amateur satellite that many feel is the next step in the logical evolution of the OSCAR satellite program. A geosynchronous satellite orbits at approximately 22,000 miles altitude and appears to hang in one position in space. Thus it is in view of much of the Earth at all times. No tracking would be needed. Just point your antenna at a spot in the sky and "weld" your antennas in place! It would provide a continuous 24-hour high-grade international "net" for audio, video, and messages on a scale never before seen in amateur radio. Terrestrial repeaters would be linked to provide HT-to-HT communications a continent apart. Phase IV is already being developed in the lab!

Amateur radio has a need for such a resource, but AMSAT realizes that it is not attainable at the financial resource level they have now. If AMSAT goes geosynchronous, they will have to compete with the big boys. Instead of spending several hundred thousand dollars for a spacecraft project, it will require a few million.

AMSAT President Doug Loughmiller, KO5I, of Paris, Texas, told us, "The culmination of the Microsat project is a significant event in the history of the amateur satellite program. AMSAT-North America is very proud to have this opportunity to build and launch a satellite for the worldwide amateur radio fraternity. We invite radio amateurs the world over to use and enjoy PACSAT.

"If the amateur community wants to continue to see more spectacular events like the Microsat launch, we've got to have help. AMSAT is a small organization. I know that everybody in the world has their hand out. While there are many worthy causes in amateur radio, I contend that we represent the future of amateur radio... and the best that it has to offer."

Licensing Handbook

Interested in becoming a ham, upgrading your license, or helping others to enter the fascinating world of amateur radio? Then the *Radio Amateur Licensing Handbook* is for you! Contains everything you ever wanted to know about FCC ham licenses, including all 1932 word-for-word questions, multiple choices, and answers appearing in every amateur class from the beginning Novice to the top-of-the-line amateur Extra class. Cost is \$9.95 plus \$2.00 shipping. Over 300 pages. Satisfaction guaranteed. Order from W5YI Publishing, P.O. Box 565101, Dallas, TX 75356.

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<p>RM-A SERIES</p> <p>MODEL RM-35M</p>		<p>19" X 5 1/4" RACK MOUNT POWER SUPPLIES</p> <table border="1"> <thead> <tr> <th>MODEL</th> <th>Continuous Duty (Amps)</th> <th>ICS* (Amps)</th> <th>Size (IN) H x W x D</th> <th>Shipping Wt. (lbs.)</th> </tr> </thead> <tbody> <tr> <td>RM12A</td> <td>9</td> <td>12</td> <td>5 1/4 x 19 x 8 1/4</td> <td>16</td> </tr> <tr> <td>RM-35A</td> <td>25</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>RM-50A</td> <td>37</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> <tr> <td colspan="5">• Separate Volt and Amp Meters</td> </tr> <tr> <td>RM-35 M</td> <td>25</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>RM-50 M</td> <td>37</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> </tbody> </table>			MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)	RM12A	9	12	5 1/4 x 19 x 8 1/4	16	RM-35A	25	35	5 1/4 x 19 x 12 1/2	38	RM-50A	37	50	5 1/4 x 19 x 12 1/2	50	• Separate Volt and Amp Meters					RM-35 M	25	35	5 1/4 x 19 x 12 1/2	38	RM-50 M	37	50	5 1/4 x 19 x 12 1/2	50													
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(from p. 6)

coni Day; sponsored by Cornish Radio Amateur Club of England; 0000-2400Z April 21; General bands. For award work 10 of the stations and send log to CRAC, P.O. Box 100, Truro, TX1 1RX, Cornwall, United Kingdom.

VR200PI/JR, Jim Russell, G3OKQ/VR6JR op from Bicentennial of Pitcairn Island; 0000Z April 1 through 2359Z April 30; 6 meter, 10 meter Novice portion and 15 and 20 meter SSB, General portion of the bands. All VR200PI/QSLs are direct only and should be sent to award manager Dr. G. O'Toole, KB6ISL, 9605 San Gabriel Ave., So. Gate, CA 90280-4725 with #10 SASE for confirmation.

• **The following hamfests, etc., are slated for April:**
Mar. 31, **Parker County ARC Hamfest**, National Guard Armory, Weatherford, TX. Contact R.M. Oliver, N5KXS, P.O. Box 108, Peaster, TX 76049 (SASE). (Exams given.)

Mar. 31 & Apr. 1, **1990 Greater Baltimore Hamboree & Computerfest**, Maryland State Fairgrounds Exhibition Complex, Timonium, MD. Contact GBH&C, P.O. Box 95, Timonium, MD 21093-0095, or call 1-800-HAM-FEST 24 hrs, in Maryland 301-HAM-FEST (use a touch-tone phone).

Apr. 7, **Lake Region ARC Hamfest**, Otter Tail County Fairgrounds-Hockey Arena, Fergus Falls, MN. Call 218-826-6274. (VE exams—Send 610 form, copy of license, or all current completion certificates, check for \$4.95 payable to ARRL/VEC, to Tom Shubitz, Box 157, Fergus Falls, MN 56537. Walk-ins first come, first served.)

Apr. 7, **Rochester Area Hamfest & Computer & Electronics Show**, John Adams Junior High School, Rochester, MN. Contact RARC, c/o N0HZN, 2824 NW 24th St., Rochester, MN 55901.

Apr. 7, **Columbus ARC Hamfest**, Bartholomew County 4-H Fairgrounds, Columbus, IN. Contact Marion Winterberg, WD9HTN, 11941 W. Sawmill Rd., Columbus, IN 47201 (812-342-4670).

Apr. 7, **Longmont ARC Swapfest**, Boulder County Fairgrounds, Longmont, CO. Contact Bob Dornan, WA2EKU, 1106 Fordham St., Longmont, CO 80501 (303-651-3613).

Apr. 7, **Appalachian AR Group Hamfest & Computer Show**, Lebanon Area Fairgrounds, south of Lebanon, PA. Contact Homer, WA3YMU, 717-345-3780. (VE exams, preregistration requested.)

Apr. 7-8, **Inland Empire & Eastern Washington Section Hamfest**, Spokane Youth Sports Bingo Hall, Spokane, WA. Contact Patrick Dockrey, NQ7M.

Apr. 8, **Madison Swapfest**, Dane County Exposition Center Forum Building, Madison, WI. Contact MARA, P.O. Box 8890, Madison, WI 53708-8890, or call 608-249-7579.

Apr. 8, **Raleigh ARS Hamfest & NCS ARRL Convention**, Jim Graham Building, NC State Fairgrounds, Raleigh, NC. Contact Rollin Ransom, NF4P, 919-269-4406. (Wheelchair accessible.)

Apr. 14, **Clarksville ATS Hamfest**, Clarksville National Guard Armory, Clarksville, TN. Contact Larry Burns, WD4DBJ, Rt. 1 Box 162A, Indian Mound, TN 37079 (615-232-6141). (VE exams.)

Apr. 14, **Hamboree '90**, National Guard Armory, Bowling Green, KY. Contact KCARC, P.O. Box 9781, Bowling Green, KY 42102-9781 (502-843-2395). (Exams.)

Apr. 14, **Oak Ridge Hamfest '90**, National Guard Armory, Clinton, TN. Contact Gene Muncy, KB4UMM, Rt. 8 Box 539, Powell, TN 37849 (615-945-5349). (VE exams—must preregister by Apr. 4. Send check for \$4.95 payable to WCARS/VEC, copy of license, and completed form 610 to Ray Adams, N4BAQ, 4325 Felty Drive, Knoxville, TN 37918; bring original license and two IDs to exam.)

Apr. 15, **MIT Electronics, Computer, Amateur Radio Tailgate Fleamarket**, Albany and Main St., Cambridge, MA. Call 617-253-3776.

Apr. 21, **Lawton-Ft. Sill ARC Hamfest**, County Fairgrounds, Lawton, OK. Contact Claude R. Matchette, 3411 NW Atlanta Ave., Lawton, OK 73505 (405-357-5870).

Apr. 21, **Arkansas Hamfest/ARRL Convention**, North Little Rock Community Center, Little Rock, AR. Contact Bob Hancock, KB5IDB, 501-771-2617 or Leon Schlosser, N5GYW, 501-835-4004 (evenings).

Apr. 22, **Moultrie ARK Hamfest**, Cadwell Road, 5 miles east of Sullivan, IL. Contact Ralph Zancha, WC9V, 502 E. State St., Lovington, IL 61937 (217-873-5287 evenings). (VE exams from 9-12, walk-ins okay.)

Apr. 22, **Wellesley ARS Hamfest**, Wellesley Senior High School, Wellesley, MA. Contact Gerry Driscoll, NV1T, 617-444-2686. (Wheelchair accessible.)

Apr. 22, **Southington ARA Fleamarket**, Southington High School Cafeteria, Southington, CT. Contact SARA 1990 Fleamarket, P.O. Box 873, Southington, CT 06489. (VE exams. For preregistration send info to "VE Exams 1990 Fleamarket," address as above.)

Apr. 26, **Hungarian-American Amateur Radio Get-Together**, at the Dayton Hamvention. Contact "Laci" Radnay, W1PL, 66 Wheeler Ave., Melrose, MA 02176 (617-665-6419, or on 28660 SSB at 1400Z weekdays, 7160 SSB 1400Z Sundays).

Apr. 27, **QCWA Banquet**, Dayton Hamvention, Neil's Heritage House. Contact Bob Dingle, KA4LAU, 657 Dell Ridge Drive, Dayton, OH 45429 (513-299-7114).

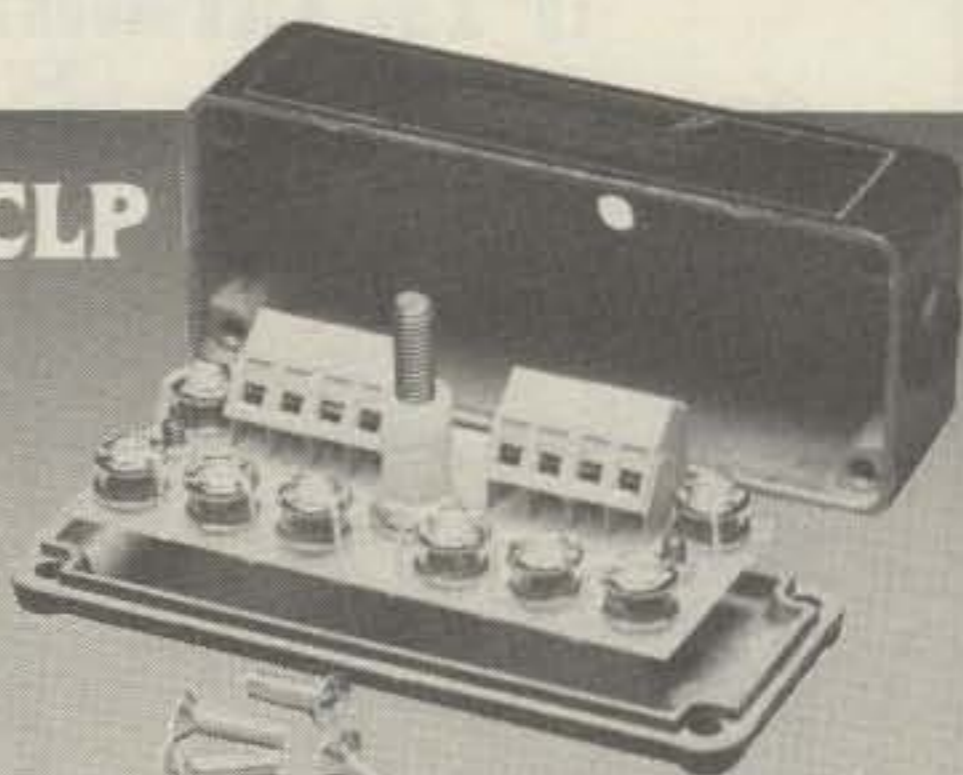
Apr. 28, **Auburn ARA Hamfest**, Fleming No. 1 Community hall, Auburn, NY. Contact James P. Nash, N2DTG, 114 Dunning Ave., Auburn, NY 13021 (315-253-0512).

Apr. 29-30, **Amateur Radio Conference**, Airport Inn, Dayton, OH. Contact Bill Brunton, KA0SEP, 5617 East Shadybrook, Wichita, KS 67208-1756 (316-682-0206).

Apr. 29, **"Dayton East" Fleamarket**, Contook, NH. Contact K1OPQ, 603-746-5090 or PKT BBS @ WA1WOK-2.

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OUR READERS SAY

(from p. 8)

Texas Congressman and his son. Hopefully he did not hear the mess, too.

After it was over several reporters asked me seriously, "How does one get their own frequency, and don't hams feel that emergency traffic is more important than chatting?" They definitely got a mixed message about ham radio.

Bob Chimel, WA3LWR
Clarks Summit, PA

Looking For QSLs

Editor CQ:

From time to time I have read articles in your fine magazine regarding receiving a QSL some time after the contact. With that in mind, I would like to pass along the following:

I was first licensed in 1955 as W7ZBW, and as a teenager worked several DX stations that I never bothered to confirm. Now my license is N7IRR and I have become active again and have been trying to confirm some of my earlier DX contacts.

In 1970 I worked GC5ANX on Guernsey Channel Islands. After 20 years I contacted WA2MEQ and was able to still receive a nice QSL card for that contact. I am also trying to find a route for KZ5MQ (1962); KZ5BC (1962); ZM1AAT/K (1970); FB8XX (1962); and A35FX (1972). Any help you or your readers might be able to provide would be appreciated.

Roger C. Huntley, N7IRR
304 221st St. SW
Bothell, WA 98021

Anyone Have The Answer?

Editor, CQ:

I have a problem which I am sure is not unique to my situation. I have a 1988 GMC 1/2 ton pickup. It is fuel injected with a 350 CI engine, anti-skid brakes, and the command control center. Installed in the vehicle are Kenwood 721 and 521 radios which are mounted behind the seat on the wall of the cab.

The problem mainly is with the 2 meter band. The on-board computers put out a pulsing type noise which completely wipes out my receiver. This noise is intermittent. Sometimes if I put my foot on the brakes it will stop until I release the brakes. Sometimes I can turn off the cruise control and the problem disappears. Just turning on the lights sometimes will stop it.

I have looked for 2 years now and can't seem to pin down what is happening and where it is coming from. It appears to be coming in from the antenna, not the power line.

My question is: Has anyone other than myself been experiencing this problem? If so, what have you done to cure it? If this is the first time you have heard of the problem, would it be possible to address it in an article or put some feelers out to the readers for some input? I wrote to General Motors, but they failed to respond to my inquiries.

In any event, I thought this might be an item of interest to the readers as well as helping me cure this problem in my vehicle.

Jack I. Winning, WA6WDB
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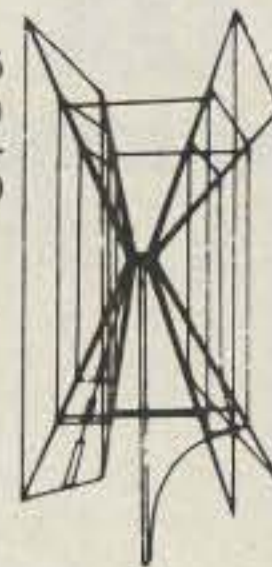
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V-425	40MHz	D.T., 1mV sens.	DC Offset, CRT Readout, Cursor Meas	\$1,070	\$849	\$221
V-660	60MHz	D.T., 2mV sens.	Delayed Sweep, CRT Readout	\$1,295	\$1,145	\$150
V-1065	100MHz	D.T., 2mV sens.	Delayed Sweep, CRT Readout, Cursor Meas	\$1,895	\$1,670	\$225
V-1100A	100MHz	Q.T., 1mV sens.	Delayed Sweep, CRT Readout, DVM, Counter	\$2,450	\$2,095	\$355
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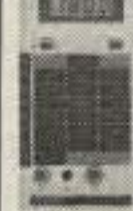
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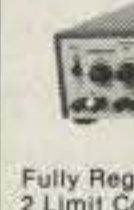
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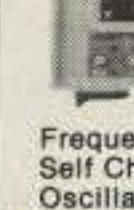
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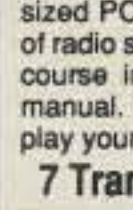
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NEWS OF COMMUNICATION AROUND THE WORLD

Bouvet

The 3Y5X Bouvet operation by Club Bouvet is over, thank goodness. The team arrived at Bouvet on schedule on Christmas day, but was unable to land on Bouvet for several days, as high winds and waves eliminated a boat landing and heavy fog grounded the helicopter. The operators finally set up their first station on December 28. What followed was one of the sorriest stories of DX.

The 3Y5X signal on 14145 kHz was strong, as the team enjoyed some of the best propagation they would get for the next two weeks. The pile-up grew quickly, and very soon matters got completely out of hand.

A major operation from an extremely rare country brings everyone out of the woodwork—experienced DXers and newcomers; operators highly proficient in split-frequency operation and DXers who don't know on which VFO they are transmitting; well-meaning, self-appointed DX "policemen"; and dozens of the most ill-spirited individuals (I won't call them DXers) this writer has heard in 20 years of radio.

One can forgive the occasional, inadvertent transmission on 14145 kHz. In the excitement of an all-time new one, some DXers aren't sufficiently careful to completely eliminate transmitting on the wrong VFO. One might think that the added incentive of avoiding a "pink ticket" from the FCC would reduce the chances of a DXer accidentally transmitting out of band, but the opposite seemed to be true. If a strong-stomached FCC engineer monitored 14145 kHz, he could have identified hundreds of violations.

Also, one can almost forgive the "policemen," even though their actions are illegal, have no value, and disrupt the DX-pedition. At least the policemen yelling "wrong VFO" or "listening up" meant well. These operators were obviously neither experienced nor clear-thinking, as they caused far more interference than they prevented, and were *deliberately* violating the terms of their license. Even though it makes me grit my teeth and want to throw my shoe, I can stand a small dose of DX policemen.

But what occurred on 14145 kHz (and to a lesser extent on 14022 kHz) was the worst mess this DXer has ever heard. The



The next time you call "CQ DX 20," don't be surprised when you work this gas station spotted by Woody Miner, K9EF/8R1K, three miles outside of St. Croix Falls, Wisconsin.

deliberate jamming, cat-calls, tape recordings, false identifications, name calling, and flat-out gross obscenities forced this DXer to turn off his radio after only a few minutes. Fortunately I was using headphones, so the secretaries in the office weren't offended by the mess. (One of the few benefits of being a DX newsletter editor is I get to have a radio in my office.)

I received dozens of complaints about the horrible mess on the 3Y5X frequency, all demanding I do something about it. But what can a DXer do? Certainly not get on the air and tell the jammers to stop. That's exactly what they want the DX community to do—notice them. Besides, that would only add to the problem. I can preach (as I did just three months ago) that DX policemen not only don't help, they add to the problem, but then I am appealing to the jammers' intelligence and good nature, two qualities the jammers clearly do *not* have.

So what does the well-meaning, thoughtful (that eliminates the DX policemen) DXer do about the situation? There are several possibilities.

First, we can give up DX all together and take up some less frustrating activity

such as collecting stamps. But this is difficult for most DXers. I gave up DX several times during the first few days of the 3Y5X operation, swearing that if this is what DX had come to, I wanted no part of it. A few hours later I was back at the rig. The DX bug bites hard.

Second, we can breathe a sigh of relief that the operation is over, and hope that the situation doesn't arise again. Such wishful thinking ranks in probability with having an Albanian station answer your "CQ DX." With Southern Sudan, South Sandwich, South Georgia, Malpelo, United Arab Emirates, maybe Bhutan, and yes, even Albania coming on the air in the next year, we can only look forward to more of the same.

Third, we can convince the FCC that this is the most pressing problem their enforcers face and enlist the resources of their sophisticated signal-tracing abilities to identify, arrest, and prosecute these violators. However, even if the amateur community *could* convince the FCC that DX jammers are the most serious problem in telecommunications, we would lose the respect of the commissioners of the FCC and the telecommunications world at large. No, asking for help from

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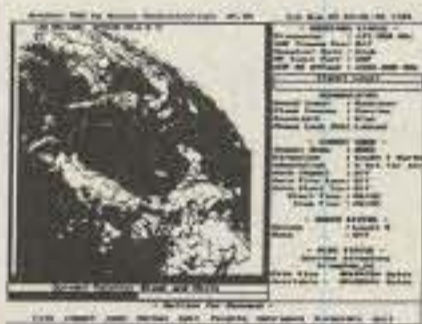
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CIRCLE 29 ON READER SERVICE CARD

The WPX Program

Mixed

1424 IN3PEE 1427 DU1PJS
1425 JY9SR 1428 VE1NA
1426 YU3EO 1429 YU7FW

SSB

2054 VK3DP 2120 EC3CPT
2117 EA3CZM 2121 EC4CPW
2118 YB0TK 2122 5Z4BP
2119 HB9CMB

CW

2611 HB9ARF 2615 YB0TK
2612 I0WOK 2616 EA5ND
2613 EA3CUU 2617 K1TG
2614 EA1EM

WPX

254 KB9CAT

Endorsements

Mixed: 450 YU3EO, N7JXS, DU1PJS, 500 YU3EO, N7JXS, 550 WK0B, YB0TK, YU3EO, N7JXS, 600 WK0B, YB0TK, YU3EO, N7JXS, 650 YB0TK, YU3EO, N7JXS, 700 YB0TK, YU3EO, ONL-2169, N7JXS, 750 YB0TK, YU3EO, DL4MCF, IK2ILH, 800 YB0TK, YU3EO, DL4MCF, IK2ILH, 850 YB0TK, YU3EO, DL4MCF, 900 YB0TK, YU3EO, DL4MCF, 950 YB0TK, YU3EO, DL4MCF, 1000 YB0TK, YU3EO, DL4MCF, F1HWP, 1050 YB0TK, YU3EO, F1HWP, 1100 NE4F, YU3EO, F1HWP, 1150 NE4F, YU3EO, F1HWP, 1200 NE4F, YU3EO, VE3NUP, F1HWP, 1250 YU3EO, VE3NUP, 1300 YU3EO, VE3NUP, KS3F, 1350 YU3EO, 1400 YU3EO, 1450 YU3EO, 1500 YU3EO, 1550 YU3EO, 1600 YU3EO, 1650 YU3EO, 1700 YU3EO, 1750 YU3EO, 1800 YU3EO, 2750 W4BQY, 2800 W4BQY, 2850 W4BQY.

SSB: 350 N6SFV, K2EEK, EA3CZM, YB0TK, NB9CMB, N7JXS, 5Z4BP, IK8EUX, 400 EA3CZM, YB0TK, DU1JZ, N7JXS, 5Z4BP, IK8EUX, 450 W9LCR, EA3CZM, YB0TK, N7JXS, 5Z4BP, 500 NE4F, EA3CZM, YB0TK, N7JXS, 5Z4BP, 550 NE4F, EA3CZM, YB0TK, 5Z4BP, 600 EA3CZM, YB0TK, 5Z4BP, 650 YB0TK, EA3CZM, 5Z4BP, 700 EA3CZM, YB0TK, 5B4BP, 750 EA3CZM, YB0TK, 5Z4BP, 800 EA3CZM, YB0TK, 850 EA3CZM, YB0TK, 900 EA3CZM, YB0TK, 950 EA3CZM, YB0TK, 1000 EA3CZM, YB0TK, F1HWP, 1050 F1HWP, 1100 F1HWP, 1150 F1HWP, 1200 F1HWP, 1950 I2JSB, 2000 I2JSB, 2100 W4BQY, 2450 I0AMU, 2500 I0AMU.

CW: 350 I0WOK, EA3CUU, YB0TK, DK8NB, AH6JF, 400 IK0ADY, EA3CUU, YB0TK, W8LRY, 500 EA3CUU, YB0TK, W4UW, W8LRY, 550 EA3CUU, YB0TK, W8LRY, 600 EA3CUU, YB0TK, 650 EA3CUU, YB0TK, EA2EYA, 700 EA3CUU, YB0TK, 750 EA3CUU, YB0TK, 800 EA3CUU, YB0TK, 850 EA3CUU, YB0TK, 900 EA3CUU, 950 NE4F, EA3CUU, 1000 NE4F, EA3CUU, OZ5UR, 1100 G4SSH, G3VQO, 1450 K4CKS, 1500 K4CKS, 1550 IT9VDQ, 2100 N2AC, 2200 W4BQY.

10 Meters: K9WA, YB0TK, AB5C
15 Meters: K9WA, YB0TK
20 Meters: K9WA, YB0TK, OZ1JNR, W8EAO
40 Meters: K9WA, YB0TK, F1HWP
80 Meters: K9WA, YB0TK, F1HWP, DK8NB
160 Meters: YB0TK

Asia: YB0, OZ1JNR, IK8EUX, DU1PJS, JI1QGX
Africa: K9WA, YB0TK, DF7QD, DL4MCF, F1HWP
No. America: YB0TK, DL4MCF, F1HWP
So. America: YB0TK
Europe: YB0TK, G4KZZ, OZ1JNR, IK8EUX, DU1PJS
Oceania: K9WA, YB0TK, DL4MCF

Award of Excellence with 160 Meter Endorsement: YB0TK

Award of Excellence Plaque Holders: VE7IG, 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, W8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF20, 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, LU3YLW4, NN4Q, KA3A, YB0TK, VE7WJ.

Award of Excellence Plaque Holders with 160 Meter Endorsement: W1BWS, NN4Q, G4BUE, LU3YLW4, 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, KF20, 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.

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.



You don't need a great location, high power, and big antennas to work DX. Chuck Joseph, N5JED, runs barefoot into a 54 inch long MFJ portable antenna inside his home. Despite the minimal station, Chuck has logged 134 DXCC countries on all continents and even has a VP2ML QSL card on his wall.

the futile attempts to chase the jammers off the 3Y5X's transmit frequency.

Working Split

The Bouvet operators made most of their contacts with wide frequency splits, listening as much as 150 kHz from their transmitting frequency. Monitoring the other end of the pile-up showed that many (most?) DXers don't know how to successfully operate split frequency.

The first requirement is to have some means of listening to your own transmitting frequency. While the new breed of transceivers features two complete receivers so that you can listen to *both* the DX station and your own transmitting frequency simultaneously, you don't need to remortgage your home nor sell your children into slavery to have this capacity. Any rig with "two VFOs" provides the ability to switch back and forth quickly between two receive frequencies. You don't even need to have a separate VFO. All you really require is an inexpensive additional receiver. Wire the receiver to mute when your rig is transmitting, and use it to monitor the DX station's transmit frequency. Then you can use the transceiver's receiver to listen to your transmitting frequency.

The second step in snagging a split-frequency contact is to determine *exactly* where the DX station is listening. Employ the most useful DX tool in your shack—your ears. Flip back and forth between the DX station's announced listening frequencies and his transmit frequency. Eventually you will hear *both* sides of a QSO. Then, and only then, do you transmit on the exact frequency of the previous VFO, waiting of course for the last QSO to finish.

If your timing is good and you are profi-

the FCC is not the answer.

The only thing we as DXers can do may be the most difficult choice of all: ignore the jammers. If these misguided individuals (I can't even bring myself to call them amateurs) have any reason for what they do, it is to attract attention to their antics. If the DX community can deny them this small satisfaction, eventually they will tire of their meaningless game and return to whatever activity they pursue between major DXpeditions, such as torturing children or drowning kittens.

For this tactic to be successful, both sides of the pile-up must cooperate. Not only must the DXer resist the nearly overwhelming urge to tell off the jammers (thereby adding to the problem), but the DXpedition operator must also do his or her part. The DXpedition operator can an-

nounce a new transmitting frequency while the jammer is transmitting, or simply slip away, and let the experienced DXers hunt him down. If this is unacceptable to the DXpedition operator, he or she can simply fake it. If the DXpeditioner even *appears* to be unaffected by the jamming, the jammer will soon give up. Or the DXpeditioner can use the trick we used to employ on 75 meter traffic nets: transmit on two frequencies at the same time.

Whatever approach the DXpeditioner wishes to use, the intent should be the same: to convince the jammer that the jamming is ineffective, without ever acknowledging that the jammer is even there.

Does the DX community have the discipline to make this work? Why not try it, at least. It can't be less successful than

The WAZ Program

15 Meter Phone

319	WB2OJL	322	YC0MCA
320	YC7DF	323	VE3DLR
321	JR3TOE		

20 Meter Phone

782	MM5Y	783	N4PYD
-----	------	-----	-------

40 Meter Phone

62	I0KPW
----	-------

10 Meter CW

73	LA9XG	74	I4EAT
----	-------	----	-------

15 Meter CW

166	W6ENZ	169	KU0S
167	I0PJQ	170	NX8J
168	JA0DAI		

20 Meter CW

352	I7ALE	354	JA0DAI
353	XE1MD		

40 Meter CW

115	WA7BPI
-----	--------

ALL BAND WAZ SSB

3473	N6QPY/7	3485	HK5LEX
3474	W6UVW	3486	SP1MHV
3475	KB5CX	3487	CT1AHU
3476	KE5JE	3488	N4MZL
3477	WD8SDL	3489	G4FEU
3478	KA4GYU	3490	UW9LA
3479	NP4CC	3491	F6EXG
3480	KB8WT	3492	K4HMX
3481	AH6HY	3493	WA5YKO
3482	W0BBT	3494	KY2O
3483	HK5JPS	3495	JA1UTN
3484	WA5YON	3496	JA3MKM

Phone/CW

6710	KL7IB	6714	N2MJ
6711	K0CVD	6715	OZ6LH
6712	WE0Q	6716	IK8DDY
6713	WW7D	6717	K8TOV/KL7

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4½ x 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.

cient at this skill and locate the DXpeditioner's listening frequency before everyone else does, you can put a new one in the log.

If you miss or are simply not loud enough to compete with the other DXers who can locate the listening frequency as fast as you can, go back to listening. Almost every DXpeditioner has a pattern of shifting frequency. Eric, SM0AGD, switches through announced discrete frequencies on SSB. Whenever enough DXers found his listening frequency to make contact impossible, Eric punched into another memory button and started listening 20 kHz away. One of the 3Y5X operators was consistently moving 1.8 kHz up the band when the pile-up became too large. The intelligent DXer could locate the current listening frequency and transmit 1.8 kHz higher. Eventually the



The organizers of the highly successful 3Y5X Bouvet operation are (from left to right) Einar, LA1EE, Erling, LA6VM, and Kaare, LA2GV. Erling was unable to get enough time off from work to travel to Bouvet, but he's in the thick of the action as head of the QSL team.

DXpeditioner would shift up and find this DXer waiting for him.

From the sounds of the 3Y5X pile-ups, relatively few DXers were using this technique. Even the ones who were transmitting on the correct VFO were usually calling "blind" somewhere in the announced listening range. Many of these DXers must have been extremely frustrated with the 3Y5X operators, many of whom listened far away from their announced listening frequencies. For example, the operator would announce "listening 14200-220," and actually be listening on 14348 kHz.

"Foul play," you cry. "Unethical DX behavior. The DXpeditioner is actually lying about where he is listening." Some of the locals were most upset about this deceptive trick. But the technique *did* allow the DXpeditioner to work DXers at a fine rate. And it rewarded the DXer who tuned around the band to find the *real* listening frequency. In other words, the 3Y5X was separating the experienced DXer from the more casual operator. The latter group was upset, but perhaps by the time the next major DXpedition comes on the air, they will have honed their DX listening skills and be among the *successful* DXers who catch the DXpeditioner 130 kHz away from his announced listening frequency.

DX News

The Saturday Evening Post Society's planned Bouvet/South Sandwich/South Georgia operation was scrubbed in late December. Mike Koss, the leader of the

DXpedition, was unable to locate a suitable ship and experienced crew for the lengthy trip. He hasn't given up, however, and may be able to reorganize the operation to activate another rare Antarctic spot.

The good news on the Antarctic front is that Tony DeParto, WA4JQS, is moving ahead with his plans to operate from both South Sandwich and South Georgia November 15 to December 15. The trip will cost more than \$100,000, and DXers who want to help make this one a reality should send their donations to AA6BB.

Another very rare country may be coming on the air about the time this issue arrives in your hands. John Fung-Loy, PA3CXC, has negotiated with Sudan officials to stage a major DXpedition in Southern Sudan ST0. South Sudan ranked 19th on *The DX Magazine's* 1989 Most Wanted Countries list, with more than half of all survey respondents indicating that they needed ST0. John is planning a two-week operation around the end of March using the callsigns 6U0DX and 6U0CW. Again, the success of this DXpedition depends on the generosity of amateur radio manufacturers, DX foundations, and individual amateurs. Send your donations to John at Strauslaan 4, 2551 NM s'Gravenhage, The Netherlands, Europe.

DX Activities and Events of the Month

April is a busy month for DXers. The month kicks off with the International DX Convention in Visalia, California, which

5 Band WAZ

As of January 1, 1990, 254 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

JA0DAI
OH3RF
G3UML
AA4V

The top 22 contenders for 5 Band WAZ are:

- | | |
|----------------|-----------------|
| 1. N4WW, 199 | 12. SP9CZ, 199 |
| 2. UQ1GXX, 199 | 13. K2UU, 199 |
| 3. W7OM, 199 | 14. YU2CBM, 199 |
| 4. W0JLC, 199 | 15. HA8XX, 198 |
| 5. K1MEM, 199 | 16. NA0Y, 198 |
| 6. N2MF, 199 | 17. K7UR, 198 |
| 7. SP9PT, 199 | 18. PY7ZZ, 198 |
| 8. NY2E, 199 | 19. K6SIK, 198 |
| 9. K9YRA, 199 | 20. I8IGS, 198 |
| 10. K5UC, 199 | 21. VE7DX, 198 |
| 11. K9TSQ, 199 | 22. W0PGI, 198 |

627 Stations have attained the 150 Zone level, as of January 1, 1990.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 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.

starts with a Friday evening cocktail party hosted by yours truly. I hope to see many of you there.

Then on April 21 the Cornish Radio Amateur Club of England sponsors International Marconi Day in celebration of Guglielmo Marconi's birthday. (Marconi is the inventor of wireless communications.) Among the special-event stations that will be active that day are GB2IMD, GB4IMD, GB0IMD, EI2IMD, K1VV/IMD, DA0IMD, IY1TTM, IY0TCI, IY4FGM, VO1IMD, VE1IMD, and ZS6RSA. You can qualify for an award by working ten of these station on April 21. Send your log data to CRAC, P.O.Box 100, Truro TX1 1RX, Cornwall, United Kingdom.

April finishes with the DX event of the year: the Dayton Hamvention, where more DXers from around the world gather in one place than at any other event. The Hamvention weekend starts early for DXers with an informal gathering in the bar at the top of the Dayton Stouffers hotel Thursday night. The main DX event on Friday is the Annual DX Dinner, also at Stouffers. Sponsored by the Southwest Ohio DX Association, this event is in its fifth year, and it gets better every year. Advance reservations are required, so send your \$23 to Scott Lehman, N9AG, P.O. Box 803, Greenville, OH 45531 with an SASE for the return of your ticket. After the banquet the DXers congregate in the many DX hospitality rooms in the same

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee \$2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

3782	YU2AA	2165	N2AC	1718	SM6DHU	1267	VE1ACK	1036	G4SDJ
3658	F9RM	2160	YT7DX	1697	HA8XX	1257	DF6EX	1036	VE3NUP
3365	K2VV	2140	SM3EVR	1697	KL7AF	1249	W9IL	1029	YU7RU
2801	K6JG	2102	N6CW	1695	N6JM	1242	JA6GWU	960	K1BAZ/DV1
2707	VE3XN	2091	I6SF	1680	K2POF	1241	YU1GR	943	K9BQL
2692	W4BOY	2064	I2UIY	1676	YU2TY	1239	K7CU	925	YU1PJ
2650	N4NO	2059	W9NUF	1665	K9LJN	1230	I0AOF	917	YB0EMJ
2639	EA2IA	2074	K9BG	1637	W4UW	1228	A16Z	909	NX9H
2622	N6JV	2046	PY4OD	1623	K8LJG	1224	NE6I	905	I5ZTC
2612	K6XP	2042	IN3ANE	1560	I1POR	1202	JA1WJ	890	W9IAL
2558	W9DWQ	2014	HA0DU	1558	W8UMR	1201	NV9S	858	OE1KJW
2570	N4MM	2005	K5UR	1557	WE2L	1199	K5DB	831	YU3PG
2508	PY1APS	1998	KA5W	1553	W6OUL	1184	F1HWP	798	JA7XBG
2470	WA8YTM	1979	I2MQP	1542	DK5AD	1171	GM4OBK	797	F6CDJ
2377	N9AF	1977	4X4FU	1509	K2OLG	1158	WD9IIC	781	NJ1T
2369	K0BLT	1955	IT9QDS	1488	YT7WW	1145	PY2DBU	777	RB5MP
2343	I2PJA	1945	DJ4XA	1479	YU2CQ	1130	KS0Z	776	W4WKQ
2257	YU1AB	1935	W0SFU	1458	SM6CST	1115	I2EAY	748	W4USW
2243	PA0SNG	1904	I1EEW	1450	4N7ZZ	1100	YU3NU	746	IK2BHX
2239	YU7BCD	1885	YU2NA	1387	WB8ZRL	1098	5H3RB	728	K6UXO
2225	I8YRK	1880	KF2O	1295	YB0TK	1095	DF4ZL	710	W6LC
2176	SM7TV	1740	I2DMK	1276	YU7DR	1049	WB3DNA	638	DL7UQ
2170	YU7SF	1737	N6AW	1274	I2EOW	1037	CT1QF		

SSB

3589	F9RM	1878	W9DWQ	1402	AC2J	1097	AG2K	815	WB6SRK
3256	I0ZV	1811	YU7BCD	1374	PY4OD	1084	DK5WQ	813	CT1DIZ
3030	ZL3NS	1810	I2MQP	1322	CT1BY	1072	I8LEL	804	W5ILR
2983	YU2TW	1757	I2UIY	1316	KD9OT	1044	K2POF	797	LU8DWN
2906	K2VV	1718	WF4V	1302	I1POR	1041	IK8GCS	792	A16Z
2669	K2POA	1709	WA4QMQ	1301	KL7AF	1041	K8LJG	778	5Z4BP
2527	K6JG	1703	K5UR	1278	I2EOW	1033	WA2FKF	776	KB4HU
2468	VE1YX	1695	I1EEW	1276	IK5ACO	1029	YB3CEV	758	HR1FC
2350	I2PJA	1626	EA8AKN	1246	N6FX	1029	G4SDJ	752	IK7DBB
2349	I0AMU	1626	W9NUF	1234	K9LJN	1017	EA1AK	749	EA3FHT
2338	N4MM	1615	KA5W	1221	KE6KT	1005	CX6BZ	744	GM4OBK
2328	K6XP	1608	KF2O	1220	LU8ESU	1001	W3GXX	744	IK0EIM
2292	WD8MGO	1594	G4CHP	1215	SM0AJU	989	WN5MBS	729	KB2DE
2227	W0YDB	1590	CT1FL	1214	YU7SF	989	KS0Z	702	IK2AEO
2171	CT4NH	1586	IT9TON	1199	F6BVB	959	WB6GFJ	698	A41JV
2169	I4ZSO	1574	W4UW	1197	I2TZK	951	HK6BER	697	A4XJV
2073	ZP5JCY	1554	I5ZJK	1194	AB9O	948	KB0C	696	IK7BDN
2061	I6ZJC	1549	HA8XX	1184	F1HWP	941	W6OUL	662	KA5YCM
2042	W4BOY	1523	K5RPC	1181	CT1AHU	940	K3IXD	661	NM5Y
2006	N4NO	1521	KC8YM	1176	YV1CP	931	IT9JKY	648	KA0ZFX
2004	OZ5EV	1507	CT4UW	1171	N2AC	910	IK2DUU	645	K8MDU
1982	WA8YTM	1487	EA3AQC	1169	SM6DHU	876	I3ZSX	643	EA3EQT
1976	PA0SNG	1482	G4CPJ	1153	PY4VX	895	N2AIF	631	KA5RNH
1965	I8YZP	1470	YU2NA	1151	EA2AOM	894	NK2H	630	SM6CST
1933	I8YRK	1440	WE2L	1136	KC8CC	875	NE6I	612	K1BAZ/DV1
1906	EA2IA	1440	XE1OX	1121	WB8ZRL	850	IT9ONV	607	I6KYL
1888	NJ0C	1420	PY4OY	1106	I8WYD	834	K9BQL	602	K5HT
1884	I4CSP	1416	EA4KK						

CW

2753	K2VV	1741	4X4FU	1292	W9PWM	1083	G3VQO	817	WB8ZRL
2653	WA2HZR	1711	N4MM	1240	F6HKD	1053	AK9Z	813	JA2GCW
2602	N6JV	1630	VO1AW	1236	W1WAI	1052	ZS6BCR	803	W0JIE
2369	ON4QX	1609	W9NUF	1234	KF2O	1047	OH3TO	801	KA1CLV
2324	N4NO	1587	K5UR	1215	YU2NA	1024	NN4O	762	OE1KJW
2301	VE7CNE	1517	DJ4XA	1205	I7PXV	1008	HA5LZ	754	K1BAZ/DV1
2206	W3ARK	1515	N4YB	1203	I8YRK	1006	HA8XX	753	NJ1T
2116	W9DWQ	1504	JH3CXL	1194	OK1CZ	1004	OZ5UR	752	VS6UW
2112	W4BOY	1497	IT9TOH	1166	SM6DHU	994	DL2HBX	728	YU3PG
2091	K6JG	1497	IT9VDQ	1151	LA9XG	993	VE4CE	708	I1EEW
2049	YU7SF	1476	KA7T	1150	DJ1YH	985	A16Z	707	W9IAL
2031	EA2IA	1444	I2DMK	1144	G4UOL	965	I2EAY	704	K6UXO
1980	N2AC	1396	KA5W	1138	SM0AJU	960	NF5Z	700	WE2P
1971	K6XP	1374	I2UIY	1134	N2AIF	917	EA1AK	660	RB5MP
1903	I1YRL	1371	K9LJN	1128	W6OUL	910	SM5DAC	641	YU1PJ
1840	I6SF	1346	N6FX	1127	EA7OH	855	GM4OBK	639	IS0FIC
1838	WA8YTM	1341	SM6CST	1123	K8LJG	845	NE6I	618	PY4WS
1808	YU7BCD	1334	K2POF	1117	YU2CQ	838	JJ1FSK	603	KA9GZM
1801	LZ1XL	1301	VE1ACK	1106	YU3NU	830	YU2GIJ		
1766	PY4OD	1299	KL7AF	1092	G4SSH	826	G4MVA		



Bouvet wasn't the only very rare country on the air at the end of 1989. Mr. Inh Si-phachanh, on the left, is the licensee of XW8KPL in Vientiane, Laos. Yoshi Haya-shi, JA1UT, on the right, was instrumental in setting up the XW8KPL station. (Photo by Mobile Ham Magazine of Japan.)

hotel. The Southeastern DX Club and the Kansas City DX Club always have great gatherings, with videos, contests, prizes, and the inevitable lies about how you worked 3Y5X on the first call with 1 watt into a bent coat hanger, etc. On Saturday the DX Forum in Room 1 at the Hara Arena always draws a good crowd. Saturday evening those DXers who can still stand again hit the hospitality rooms at Stouffers. And anyone at the Arena should stop by and say hello. I'll be at the CQ booth or at my own *The DX Bulletin* booth. See you in Dayton.

QSL Notes

QSL the St. Kitts operations in 1989 as follows: **V47K** and **V47KS** via WB2P; **V47KO** via K3NZ; **V47KH** via K3IPK; **V47QQ** via W9QQ; **V47KR** via K2DOX. QSL **PJ4U** via K3IPK.

DK9FN, QSL manager for **8Q7CQ**, reports that 1200 cards have been sent out



F6DZU (left) and F9RM, both top WPX-ers, going through QSLs looking for that new one.

CQ DX Awards Program

SSB

1741	KZ4V	1744	PY4OY
1742	WB9PTN	1745	KB6LZW
1743	HK1LAQ		

CW

773	KZ4V	775	14EAT
774	KK4UJ		

SSB Endorsements

320	DJ9ZB/323	300	PY4OY/300
320	W9DWQ/322	275	KZ4V/299
320	ZL3NS/322	275	IK8BMW/285
320	W0YDB/322	250	XE1YO/258
310	K9AB/318	200	HK1LAQ/242
310	WA4WTG/313	150	N4ODI/154
300	K4MQG/308	150	DU1JZ/150
300	IK8GCS/302	28 MHz	KB6LZW
300	IN3ANE/301	28 MHz	KL7AF
300	KC2FC/301	3.5/7 MHz	W5LLU

CW Endorsements

320	W9DWQ/323	310	OK1MP/317
310	DL3RK/318	275	KZ4V/296
310	K9AB/318	3.5/7 MHz	KL7AF

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.

direct, and the rest of the cards answered via the bureau.

Dick, K4UTE, handles the cards for the CQ WW 1989 SSB operation of **HS0E**, as well as the Oct. 27, 1989 QSOs.

Juan Galvezc, **CE00GZ**, has a new QSL address: P.O. Box 4178, Valpariso, Chile.

Veikko Komppa, OH5VD, handles cards for his own operations as **FROVD** 1989, **VK9YD** 1987, and **VK9YD/VK9** 1987/1988. His address is Paaskynkula 7, SF-03100 Nummela, Finland.

Mauri Lehtosaari, OH4ML, has returned to Finland after his 30,000-plus QSO tour of the Pacific. QSL his **OH4ML/H44**, **5W1ML**, **A35ML**, and **3D2ML** operations to his home call: P.O. Box 13, 19601, Hartola. Include the callsign worked and mode on the outside of the envelope to speed processing.

Roland Halmann, DJ4LK, can confirm his 1977-1980 **ZS3LK** operations from possible new DXCC country Walvis Bay.

Eric Sjolund, SM0AGD, will QSL his recent African operations by his home address: Ormbersvgen 17, S-19300 Sigtuna, Sweden. He does *not* collect cards, so you don't need to waste a fancy QSL to get his in return. Simply send him your QSO data in QSL card format, with your call clearly indicated in large letters, along with your SAE and IRCs or SASE.

The **TU4B** and **TU4DT** operations from November can be confirmed via Arlen Turriff, K6VNX, 8819 East Callita St., San Gabriel, CA 91775.

The **LO5E** operation can be confirmed



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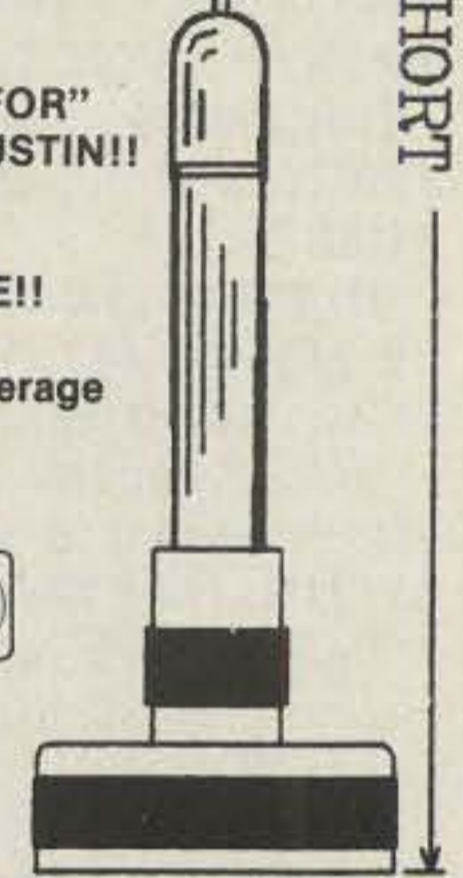
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The **CT500**- operations can be confirmed via P.O. Box 2483, Lisbon 1112, Portugal.

Keith Hoyt, K6GXO, who operated as **J6LRV**, reports that his mail box has been blown up, literally. Thus, mail will get to him faster via his new address: P.O. Box 901846, Palmdale, CA 93590.

QSL AI, **ZF2LY**, via Page Pyne, WA3EOP, 109 S. Artizan St., Williamsport, PA 21795 with SASE or SAE and one or two IRCs.

Duane Heise, AA6EE, will confirm his **XE2GCK** and **XE2/AA6EE** cards direct: 16832 Whirlwind, Ramona, CA 92065.

JE1JKL handles cards for **NH6J/KH0**, **NH6J/NH0**, **NH6J/NH8**, **KC6CS**, **9M6NA**, **5Z4CS**, **5Y4CS**, **5W1EZ**, **JE1JKL/9M6**, **SM3/JE1JKL**, **XE2VJO**, **JY9SY**, and the Oct. 1979 operation of **KC6SZ**.

DL0MAR and other — **MAR** calls from the Medical Assistance Radio team can be confirmed via **DL8XAR**.

KC3EK reports that he can no longer confirm contacts with **8P6RE**, **HK1AMW**, **6Y5HN**, and **6Y6A**. Try direct.

QSL **VP2VE** and **VP2V/NP2CG** via Howard Messing, WA2NHA, 90 Nellis Drive, Wayne, NJ 07470.

Eric Scafe, K3NA, can handle **OH0MM** cards for his May 1988 and August-Sep-

QSL Managers

388DB to NA5U
388FP to KN2N
389FR to F6FNU
3D2ML to OH4ML
3D2VD to OH5VD
3D2WZ to G3WZ
3D2XR to SM7PKK
3DAB/DF3EC to DF3EC
3W5JA to JA7PZ
3Y5X to LA6VM
5H1TW to K3ZO
5H3TW to K3ZO
5H3ZW to IK8DOI
5N0ELT to G4OHX
5T5CK to DL1HH
5U7NU to F6FNU
5V7DP to KA1DE
5W1HM to JH11FF
5Z4BI to W4FRU
6W6JX to F6FNU
6W70G to F2YT
6Y3A to AB5A
7P8EG to K0JZM
7S4BX to SK4BX
7S8AAA to SK0MT
7X4AN to DJ2BW
8P6MY to W2GBX
8P9EM to G3VBL
8PGRY to KU9C
8Q7BX to I4ALU
8R8T to F6FNU
9G0R/MM to LZ1KVZ
9H3LP to N6LL
9J2B0 to W6ORD
9J2FR to I2ZZU
9Q5DX to KQ3M
A22BW to DK3KD
A25/DF3EC to DF3EC
A92QL to YASME
AH6HQ/TJ to AH6HQ
BV2A to K2CM
BV2DA to DL7FT
BV2FA to DJ9ZB
BZ4RCC to BY4WNG
C6A/KR8V to KR8V
C07CD to W3HNC
CT3MAW to CT3EE
CT500A to CT1REP
CT500C to CT1REP
D2/LU2ELF to N4THW
EA8/G0KPW to G4BAH
EA9EU to W3HNC
ED2SIL to EA2CBY
EL2CX to N2AU
EL2FA to WA4FFW
EL2MR to WA8LUS
ES1AR to UR2AR
ES4RZ to UR2RZ
FG5ED to FG7AS
FK8GJ to F6CXJ
FM5WD to W3HNC
FR4FD to F6FYA
FY5EY to F6BFH
FY5FA to F6GNG
GIBJ0B to GI0DQJ
GU4VPM to G4VFG
GZD7KM to G3JKB
HC5VR to HC5AI
HH7PV (6 meter only) to N2AU
HI3HBD to HI8LC

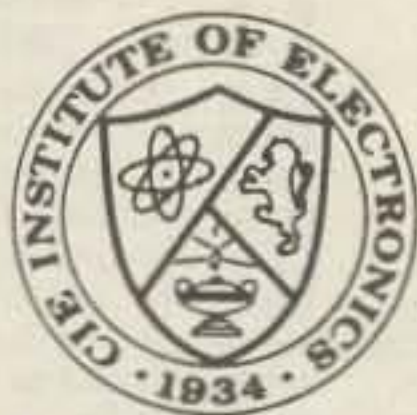
HL9EP to K0UZR
HL90B to N4GNR
HP1XJN to ND3N
HR1LW to JA1LW
HS0E to K9EL
HV3SJ to I0DUD
HZ1AB to K8PYD
HZ1HZ to N7RO
IY0ONU to I5KKW
J6LRT to NC8Q
J6LSC to N9AG
J79DX to AA5DX
J888S to WA4WIP
JD1BFA to JD1AMA
JX8KY to LA7ZO
JX9CAA to LA5NM
JY9MO to WB2OQV
JY9SR to W3FYT
KC4AAC to KE9AS
KC6MX to KQ1F
KD7P/NH4 to NY6M
KH0AC to K7ZA
KH3/KN0E to K9UIY
LP1J to LU4BR
LU1ZA to LU2CN
LY2DM to UP1DM
LY2ZZ to UP1BZZ
N4X0/C6A to N4XO
N7ET/DU7 to N7ET
NH4/KD7P to NY6M
NH6RT/KH8 to JH4IFF
NK6K/FY0 to KO5I
NY6M/NH4 to NY6M
OD5MM to HB9CYH
OD5PL to HB9CRV
OY30N to OZ1ACB
P29VPY to K1XM
P29Y to WT4Y
P43TH to PA3ABE
PJM1 to K2PEQ
R10/RA3SS to RA3SD
RABAD/JT to RA9YD
RABBB to RB5CB
RA10Q/RABQ to RA1QX
RA3SS/RIB to RA3SD
RH8AY to UA9AB
RJB/RA3SS to RA3SD
RW9H/UW90Q to UA9HTT
S01MZ to EA2JG
SM00IG/YN to SM0KCR
SM7CRW to W3HNC
ST4/WZ6C to W4FRU
SU1FE to SU1AL
T29GN to IK2GNW
T32BE to WC5P
TA3F to DL5YCO
TG9VT to W3HNC
TK5XN to YU1FW
TL8CM to DL9CM
TL8SC to K4UTE
TR8CR to F6AJA
TR8XX to F2CW
TU20P to TU2MA
TU2PA to KE0LS
TU2UI to WA8WZR
TY0AS to IT9AZS
TZ6PD to KB6ORK
TZ6RC to NM3B
TZ6VV to N0BLD
UA0B/UA6WCG to UA6WAW
UA0BCA/UA10 to RA3YA
UA0UBG/UA8V to UA9AB

UB5MAL/UA10 to UZ1PWA
UC7W to UC2WO
UH9WWA to UL7VV
UR1RWX to JA3UB
UW1ZC/UA10 to UW1ZC
UZ0KWA to UA0QT
UZ2FWA to UA2FM
V31AT to K5TA
V31BB to K3FEN
V31DX to KA6V
V31MZ to K1MZB
V63CQ to KB5FGL
V63JC to KC6JC
V73AK to V73AK
V73AS to KK4QY
V73AZ to KX6DC
VE3CPU/J8 to VE3CPU
VK8AV to KK4QY
VP2EM to KV4AM
VP2EXX to KC8JH
VP2VE to WA2NHA
VP5P to WN5A
VQ9DM to N5DM
VQ9DX to K7PQS
VS6AU to W6BUY
VU2TC to W8XM
W8QID/J6L to W8QID
XE2UZL to W6UZL
XF4T to XE2TCQ
XT2KG to YASME
XV2A to JA3UB
XW8KPV to JH1AJT
XX900 to N2OO
YB3ASQ to W7TSQ
YL1WW to UQ1GWW
YL1XX to UQ1GXX
ZB2/F2JD to F6AJA
ZD7KM to G3JKB
ZD8VJ to G4ZVJ
ZF2AG/ZF8 to N8AG
ZF2NM to K1MD
ZF2OA to KD6WW
ZF2OF/ZF8 to W0GLG
ZF2OK to W1OU
ZF2ON to KN4F
ZS3UN/OH7NRW to OH7XE
ZWF to PY2ZZ
ZX4AN to DJ2BW
ZZ5NL to PY1SL
4S7NE to Box 907, Columbia
4X1FC to Box 2412, Natanya
53123
5N9ABY to Yakubu, Box 1915,
Sokoto
5N9FEA to P.O. Box 65, Zaria
5W1KT to Box 1672, Apia
9L1CM to Route 1, Box 11A,
East Burke, VT 05832
8Y1SK to Box 2916, Beijing
8Y3CC to P.O. Box 2, Tienjin,
P.R. China
8Y5VZ to Box 238, Fuzhon
BZ10K to Box 6111, Beijing
BZ4RC to Box 538, Nanjing
BZ4WH to Box 413, Zhenjiang
CE0GZ to Box 4178,
Valpariso
CP5UT to Box 522,
Cochabamba
EK9JG to Box 1, Surgut
626400
FH5EL to Box 161, Mayote

Zaoudz 97610
FK0BN to Box 257, New
Caledouta
GJ5NO to Box 338, Jersey
HI3JH to Box 122, Santiago
HP1XOR to PSC Box 944, APO
Miami, FL 34002
JT1BJ to Box 124, Ulan Bator
JT1BV to Box 106, Ulan Bator
51
JT1CD to Box 94, Ulan Bator 28
JT2AB to Box 119, Chojbalsan
JT2KAA to Box 119,
Chojbalsan
JY3AB to Ban, Box 119,
Chojbalsan, Mongolia
005KB to Box 70364, Antelias,
Lebanon
PT9FH to Box 343, 79300
Corumba Mato Grosso Do
Sul, Brazil
PZ1EH to P.O. Box 8161,
Paramaribo
R050P to P.O. Box 67, Beltsy
City
SV5TS to P.O. Box 7,
Paradissi, Rhodes 85106
SV98AI to Box 92, Chania
73100
T77C to Tony, 47031 Murath
Via Delle Carrare 67 Rep San
Marino, Italy
TA3D to Box 963, Izmir
TT8GA to P.O. Box 88, Bruz,
France 35170
U1ZA/A to Box 1087,
Murmonle
UA2FER to P.O. Box 88,
Moscow
UA2FG0 to P.O. Box 88,
Moscow
UA3TEG to P.O. Box 78,
Dzeazhinsk 606000 USSR
UC5A/UA6ECS to Box 352,
Minsk 220009
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370000
UF6DZ to Box 15, Tbilisi
UF6FDR to Box 98, Tbilisi,
Georgia Republic 38004 USSR
UJ8JX to Box 327, Dushanbe
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tember 1988 operations *only*, and *not* for the **CQ WW CW** operation. Cards for the latter operation should be sent to OH2MM. Eric is forwarding missent OH0MM cards, so you don't need to re-send cards.

Veka Nurminen, OH2VB, made about 15,000 contacts in his Pacific trip with OH2BGD. QSL **3D2VB**, **A35VB**, **5W1VB**, and **ZK2VB** via OH3GZ.

The South African Radio League has a new QSL bureau address: P.O. Box 807, Houghton 2041, Republic of South Africa.

Baldur, DJ6SI, confirms that he will *not* respond to cards sent via the DARC bureau. He says he *will* confirm cards sent with a self-addressed, stamped envelope

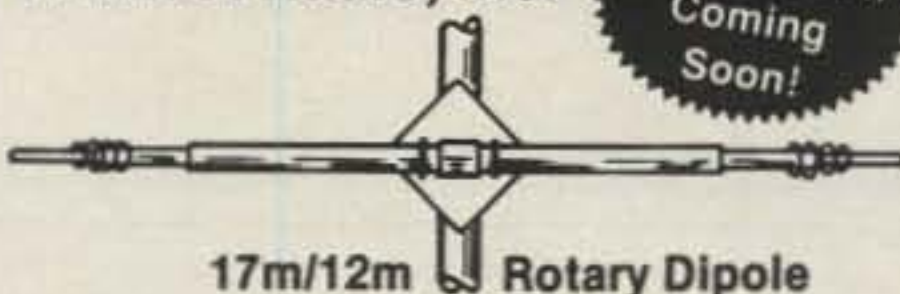
with German postage, or SAE and US \$1.00.

Brett Graham, **VS6BG/XX9TDM**, and ex-**VS6UP** QSLs with the aid of a computer and will confirm all QSLs with a station at one time. Once the cards have been sent, he does *not* send duplicate cards. QSL direct only to P.O. Box 12727, Hong Kong. He reminds DXers that cards sent to Hong Kong stations who have moved away, or cards sent via the bureau to temporary Macau XX9 stations will not be delivered. The only XX9 callsigns that can be confirmed via the bureau are AN, JN, KA, MD, YN, CT, DX, and TDM.

QSL **ZF2BB**, **ZF2HM**, and **ZF2KE** via K9QVB.

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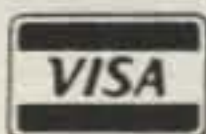
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1.2 GHz		
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TS-140S Compact, Gen. Cvg. Xcvr	949.95	Call \$
TS-680S HF Plus 6m Xcvr	1149.95	Call \$
TL-922A HF Amp	1982.95	Call \$
Receivers		
R-5000 100 kHz - 30 MHz	1049.95	Call \$
R-2000 150 kHz - 30 MHz	799.95	Call \$
RZ-1 Compact Scanning Recv.	599.95	Call \$
VHF		
TS-711A All Mode Base 25w	1059.95	Call \$
TR-751A All Mode Mobile 25w	669.95	Call \$
TM-231A Mobile 50w FM	459.95	Call \$
TH-225A New 2m HT	399.95	Call \$
TH-26AT Compact 2m HT	369.95	Call \$
TM-731A 2m/70cm, FM, Mobile	749.95	Call \$
TM-621 2m/220, FM, Mobile	729.95	Call \$
TM-701A 25w, 2m/440 Mobile	599.95	Call \$
TH-75A 2m/70cm HT	TBA	Call \$
UHF		
TS-811A All Mode Base 25w	1265.95	Call \$
TR-851A 25w SSB/FM	771.95	Call \$
TM-431A Compact FM 35w Mobile	469.95	Call \$
TH-46AT Compact 440 FM, HT	399.95	Call \$
TH-45AT 5w Pocket HT NEW	389.95	Call \$
TH-55 AT 1.2 GHz HT	524.95	Call \$
TM-531A Compact 1.2 GHz Mobile	569.95	Call \$
220 MHz		
TM-3530A FM 220 MHz 25w	519.95	Call \$
TM-331A Compact Mobile	469.95	Call \$
TH-315A Full Featured 2.5w HT	419.95	Call \$

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HF Equipment	List	Jun's
FT-1000D Top Performer	\$4399.00	Call \$
FT-747 GX Economical Performer	889.00	Call \$
FT-757 GX II Gen. Cvg. Xcvr	1280.00	Call \$
FT-767 4 Band New	2299.00	Call \$
FL-7000 15m-180m Solid State Amp	2279.00	Call \$
Receivers		
FRG-8800 150 kHz - 30 MHz	784.00	Call \$
FRG-9600 60-905 MHz	808.00	Call \$
VHF		
FT-411 New 2m "Loaded" HT	406.00	Call \$
FT-212RH New 2m, 45w Mobile	499.00	Call \$
FT-290R All Mode Portable	610.00	Call \$
FT-23 R/TT Mini HT	351.00	Call \$
UHF		
FT-712RH, 70cm, 35w Mobile	536.00	Call \$
FT-811 70cm built-in DTMF HT	410.00	Call \$
FT-790 R/II 70cm/25w Mobile	681.00	Call \$
VHF/UHF Full Duplex		
FT-736R, New All Mode, 2m/70cm	2025.00	Call \$
FEX-736-50 6m, 10w Module	294.00	Call \$
FEX-736-220 220 MHz, 25w Module	322.00	Call \$
FEX-736-1.2 1.2 GHz, 10w Module	589.00	Call \$
FT-690R MKII, 6m, All Mode, port.	752.00	Call \$
Dual Bander		
FT-4700RH, 2m/440 Mobile	996.00	Call \$
FT-470 Compact 2m/70cm HT	576.00	Call \$
Repeaters		
FTR-2410 2m Repeaters	1154.00	Call \$
FTR-5410 70cm Repeaters	1154.00	Call \$
Rotators		
G-400RC light/med. duty 11 sq. ft.	242.00	Call \$
G-800SDX med./hvy. duty 20 sq. ft.	390.00	Call \$
G-800S same/G-800SDX w/o presets	322.00	Call \$

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THE SCIENCE OF PREDICTING RADIO CONDITIONS

Another prediction for the peak of Cycle 22 has been received. This one is from the Space Environment Services Center (SESC), Boulder, Colorado. They came closest to predicting the course of the previous solar cycle, Cycle 21. The SESC is currently predicting a maximum smoothed sunspot number of 191 (plus or minus 19) to have occurred during March 1990.

According to SESC data, in terms of 10.7 am radio flux values Cycle 22 continues to track closely Cycle 19, which is the strongest of previously recorded solar cycles. Cycle 22 smoothed sunspot values have fallen behind Cycle 19, but those recorded to date are higher than all other cycles. It seems almost certain now that we are experiencing at least the second highest level of solar activity in recorded history.

According to data compiled at the *Royal Observatory of Belgium*, the mean monthly sunspot number for December 1989 was 186, with a low of 77 recorded on the 15th and a high of 263 observed on the 31st. This results in a smoothed sunspot number of 158 centered on June 1989. A smoothed sunspot number of approximately 177 (plus or minus 27) is forecast for April 1990.

The Algonquin Radio Observatory at Ottawa, Ontario reports a mean level of 206 for the 10.7 cm solar flux values measured during December 1989. This results in a 12-month running smoothed solar flux number of 212 centered on June 1989.

Notes

The upgraded SESC Bulletin Board is now on-line. To try the new system, call area code (303) 497-5042 and you will be given up to 15 minutes of use. There is no charge for using this Bulletin Board, but you must pay the telephone-line costs. Modem speeds of 2400, 1200, and 300 bps can be used. The Bulletin Board contains the very latest solar, geomagnetic, and propagation data available. It is menu driven and very user friendly.

The National Geophysical Data Center at Boulder, Colorado calls attention to its monthly *Solar Indices Bulletin*. It contains daily tabulations of sunspot numbers. The Bulletin includes explanatory text in plain, easily understandable English. It is sent out expeditiously by first-class mail, and it reaches most subscribers while

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LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1990

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 6-7, 12, 22, 25	A	A	B	C
High Normal: 1, 5, 8, 10, 13, 19, 21, 23-24, 27-28	A	B	C	C-D
Low Normal: 3-4, 11, 16, 18, 20	A-B	B-C	C-D	D-E
Below Normal: 2, 9, 14, 17, 26, 29-30	B-C	C-D	D-E	E
Disturbed: 15	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 good (B) on the 1st, fair-to-poor (C-D) on the 2nd, good-to-fair (B-C) on the 3rd and 4th, good (B) on the 5th, excellent (A) on the 6th and 7th, etc.

much of the data is less than a month old. The annual subscription price is \$21, postpaid. Orders should be placed directly with the National Geophysical Data Center, Dept. 807, Solar-Terrestrial Physics Division (E/GC2), 325 Broadway, Boulder, Colorado 80303. Payment should be included with your order. The Bulletin can also be ordered by calling area code (303) 497-6346, with payment made by credit card.

Digressing for a moment from propagation, and wearing my editor's hat, an interesting note arrived recently from Rich Rosen, K2RR. He has compiled a 1260 panel microfiche database of individually-generated references from nearly 300 sources published between 1909 and 1988 in the field of radio communications. This includes every article on every subject that's ever been published in every issue of *CQ*, *QST*, *Ham Radio*, and *73* magazine since January 1945! In addition, the last 10 years of the British amateur journal *RadCom* have been referenced. Rich has entitled the database *From Beverages Thru Oscar—A Bibliography 1909-1988*. On the subject of ra-

dio propagation, it contains references to 1230 articles dating back to 1909. If you have ever had to reference material in the field of radio communications, amateur radio, or propagation, you know what a valuable tool this database can be. The 1260 microfiche set is available directly from K2RR at a special price of \$49.95 to radio amateurs. For more information contact Rich Rosen directly at Didah Publishing, P.O. Box 7368, Nashua, NH 03060-7368.

April Propagation

The 10 meter and 12 meter bands should remain very much alive during April and the spring months for DX openings to most areas of the world. Expect considerable DX from an hour or two after sunrise to just after sunset. While normal seasonal changes will result in fewer east-west openings, conditions towards southern and tropical areas should hold up very well. Expect peak signals to most areas of the world during the late afternoon hours.

Expect 15 and 17 meters to be the optimum DX bands during most of the daylight hours of April and the spring months. The bands should be loaded with DX openings from just after sunrise to well beyond sunset. Signals should be strongest to most areas of the world during the afternoon hours, but expect good, solid openings towards southern and tropical areas to as late as midnight and sometimes beyond.

Twenty meters should be a 24-hour DX band during April and the spring months. Besides the usually good openings to most areas of the world during the daylight hours, this band should be optimum for DX openings during most of the darkness period. Strongest signals, with DX openings to almost all areas of the world, should take place during a two hour window after local sunrise and again during the late afternoon and through the evening hours to about midnight. Many of the nighttime DX openings are expected to be associated with exceptionally strong signal levels.

Fewer hours of darkness and increasing static levels in the northern hemisphere will result in somewhat poorer DX conditions on the 40, 80, and 160 meter bands during April and the spring months. Nevertheless, expect strong, stable conditions to most areas of the world on 40 and 30 meters during the hours of darkness. Signals should peak from an easterly direction about an hour or two before midnight, and from most other directions about an hour or so before local sunrise

April 15- June 15, 1990
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	10-13 (1) 13-17 (2) 17-18 (1)	07-09 (1) 09-11 (2) 11-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	09-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-01 (3) 01-04 (2) 04-07 (3) 07-09 (2)	19-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 20-21 (1)* 21-22 (2)* 22-00 (3)* 00-01 (2)* 01-02 (1)*
Northern Europe & European USSR	10-15 (1) 15-17 (2) 17-18 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-18 (2) 18-19 (1) 22-00 (1)	06-09 (2) 09-13 (1) 13-16 (2) 16-20 (3) 20-22 (4) 22-02 (3) 02-03 (2) 03-06 (1)	19-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediterranean & Middle East	14-17 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	12-16 (1) 16-18 (2) 18-21 (3) 21-00 (4) 00-02 (3) 02-03 (2) 03-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1) 21-23 (1)*
Western Africa	10-11 (1) 11-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-21 (1) 10-13 (1)**	07-08 (2) 08-10 (3) 10-13 (2) 13-16 (3) 16-20 (4) 20-23 (3) 23-04 (2) 04-07 (1)	07-14 (1) 14-16 (2) 16-18 (3) 18-02 (4) 02-05 (3) 05-07 (2)	20-22 (1) 22-02 (2) 02-03 (1) 22-02 (1)*
Eastern & Central Africa	16-17 (1) 17-19 (2) 19-21 (1)	08-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	14-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-01 (3) 01-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	21-01 (1) 22-00 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1) 01-03 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 00-01 (1) 01-02 (2) 02-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	21-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Central & South Asia	19-21 (1)	09-12 (1) 15-18 (1) 18-20 (2) 20-22 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1) 05-06 (1) 06-08 (2) 08-09 (1)	05-07 (1) 19-21 (1)
Southeast Asia	18-21 (1)	08-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	05-07 (1)
Far East	18-20 (1)	08-10 (1) 15-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-08 (1)
South Pacific & New Zealand	15-17 (1) 17-18 (2) 18-20 (4) 20-21 (2) 21-22 (1) 15-18 (1)**	09-11 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-00 (2) 00-01 (1)	19-21 (1) 21-22 (2) 22-23 (3) 23-04 (4) 04-08 (3) 08-09 (2) 09-10 (1)	00-02 (1) 02-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 02-07 (1)*
Australasia	17-19 (1) 19-21 (2) 21-22 (1)	09-10 (1) 10-11 (2) 11-12 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	23-00 (1) 00-03 (2) 03-05 (3) 05-08 (4) 08-09 (3) 09-10 (2) 10-11 (1) 17-19 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 11-14 (1)**	07-08 (1) 08-09 (2) 09-14 (3) 14-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	02-06 (2) 06-07 (3) 07-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-23 (4) 23-02 (3)	19-20 (1) 20-21 (2) 21-05 (3) 05-07 (2) 07-08 (1) 21-02 (1)* 02-05 (2)* 05-06 (1)*

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-10 (1) 10-14 (2) 14-17 (3) 17-19 (4) 19-20 (2) 20-21 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	05-06 (1) 06-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-05 (2)	20-21 (1) 21-04 (2) 04-06 (1) 23-03 (1)* 03-04 (2)* 04-06 (1)*
McMurdo Sound, Antarctica	17-19 (1)	16-18 (1) 18-20 (2) 20-21 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-07 (2) 07-08 (1)	20-01 (1) 01-05 (2) 05-06 (1)

Time Zones: CDT & MDT (24-Hour Time)
CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	11-15 (1) 15-16 (2) 16-17 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-09 (2) 09-11 (2) 09-14 (1) 14-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-05 (1)	19-21 (1) 21-23 (2) 23-01 (1) 00-01 (1)*
Northern & Central Europe & European USSR		08-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1) 21-23 (1)	01-07 (1) 07-09 (2) 09-14 (1) 14-19 (2) 19-23 (3) 23-01 (2)	19-21 (1) 21-23 (2) 23-01 (1)
Eastern Mediterranean & Middle East	15-18 (1)	10-13 (1) 13-17 (2) 17-18 (1) 20-22 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	20-00 (1)
Western Africa	10-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1) 10-12 (1)**	09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-00 (3) 00-01 (2) 01-03 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Eastern & Central Africa	14-16 (1) 16-18 (2) 18-19 (1)	12-14 (1) 14-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-03 (1) 07-09 (1)	20-23 (1)
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	09-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1) 00-02 (1)	14-16 (1) 16-19 (2) 19-22 (1) 22-00 (2) 00-02 (3) 02-04 (2) 04-05 (1) 05-07 (2) 07-08 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Central & South Asia	18-21 (1)	08-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	05-07 (1)
Southeast Asia	18-20 (1)	08-10 (1) 15-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-08 (1)
Far East	17-18 (1) 18-20 (2) 20-21 (1)	08-11 (1) 15-16 (1) 16-17 (2) 17-21 (3) 21-23 (2) 23-00 (1)	23-02 (1) 02-04 (2) 04-06 (3) 06-08 (4) 08-09 (3) 09-11 (2) 11-13 (1)	03-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
South Pacific & New Zealand	11-14 (1) 14-16 (2) 16-20 (4) 20-21 (2) 21-22 (1) 14-18 (1)**	08-09 (1) 09-11 (2) 11-14 (1) 14-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-01 (2) 01-03 (1)	16-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-07 (3) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1)	00-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-05 (2)* 05-06 (1)*
Australasia	15-17 (1) 17-19 (2) 19-21 (3) 21-22 (1) 15-18 (1)**	08-09 (1) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-22 (4) 22-23 (2) 23-00 (1)	05-07 (3) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-05 (4)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.
2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.
3. The *propagation index* is the number that appears in () after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
 - (4) Opening should occur on more than 22 days
 - (3) Opening should occur between 14 and 22 days
 - (2) Opening should occur between 7 and 13 days
 - (1) Opening should occur on less than 7 days
4. 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.
5. 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. wtc. Appropriate *daylight* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.
6. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength 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.
7. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado, 80302.

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Caribbean, Central America & Northern Countries of South America	09-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 11-14 (1)**	07-09 (1) 09-11 (2) 11-14 (3) 14-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	03-06 (2) 06-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-23 (4) 23-03 (3) 04-06 (1)*	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-10 (1) 10-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	05-06 (1) 06-09 (2) 10-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-05 (2)	21-22 (1) 22-00 (2) 00-02 (1) 02-05 (2)* 05-07 (1)* 01-05 (1)*
McMurdo Sound, Antarctica	18-20 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-00 (1)	16-18 (1) 18-19 (2) 19-02 (3) 02-04 (2) 04-06 (1)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1)

April 15-June 15, 1990 WESTERN USA TO: Time Zone: PDT (24-Hour Time)

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	09-12 (1) 16-17 (1)	08-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	01-07 (1) 07-10 (2) 10-13 (1) 13-17 (2) 17-19 (3) 19-21 (2) 21-23 (3) 23-01 (2)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	14-16 (1)	11-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	02-07 (1) 07-09 (2) 09-13 (1) 13-16 (2) 16-18 (3) 18-22 (2) 22-00 (3) 00-02 (2)	19-23 (1) 21-22 (1)*
Eastern Mediterranean & Middle East	NIL	09-11 (1) 11-15 (2) 15-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-20 (2) 20-22 (3) 22-23 (2) 23-03 (1)	20-23 (1)

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Eastern & Central Africa	15-18 (1)	10-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1) 21-23 (2) 23-00 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-23 (3) 23-00 (2) 00-02 (1)	19-22 (1)
Southern Africa	09-11 (1)	07-09 (1) 09-11 (2) 11-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-18 (2) 18-22 (1) 22-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	17-18 (1) 18-19 (2) 19-20 (1)	08-09 (1) 09-11 (2) 11-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-23 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	05-08 (1)
Southeast Asia	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	08-09 (1) 09-12 (3) 12-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-23 (1)	04-07 (2) 07-10 (3) 10-11 (2) 11-13 (1) 22-00 (1) 00-02 (2) 02-04 (3)	04-07 (1) 05-06 (1)*
Far East	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (1) 15-18 (1)**	08-10 (1) 10-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	04-07 (2) 07-08 (3) 08-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 12-14 (2) 14-21 (1) 21-23 (2) 23-00 (3) 00-03 (4) 03-04 (3)	01-03 (1) 03-07 (2) 07-08 (1) 03-06 (1)*
South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-20 (3)	09-10 (1) 10-12 (3) 12-16 (2) 16-17 (3) 17-21 (4)	06-08 (2) 08-11 (3) 11-12 (2) 12-17 (1) 17-19 (2)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1)
Australasia	20-22 (2) 22-23 (1) 12-18 (1)**	21-00 (3) 00-02 (2) 02-03 (1)	19-21 (3) 21-02 (4) 02-06 (3)	01-02 (1)* 02-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	10-12 (1) 12-14 (2) 14-15 (3) 15-18 (4) 18-20 (2) 20-21 (1) 11-14 (1)**	07-08 (1) 08-09 (2) 09-13 (3) 13-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	00-03 (3) 03-05 (2) 05-06 (3) 06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-00 (4)	19-20 (1) 20-21 (2) 21-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1) 21-00 (1)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	00-02 (3) 02-03 (2) 03-05 (1) 05-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-00 (4)	19-22 (1) 22-03 (2) 03-04 (1) 20-03 (1)*
McMurdo Sound, Antarctica	15-19 (1)	15-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-01 (4) 01-03 (3) 03-05 (2) 05-07 (1)	21-22 (1) 22-00 (2) 00-05 (1) 05-07 (2) 07-08 (1)

*Indicates best times to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a Propagation Index of (2), or higher.

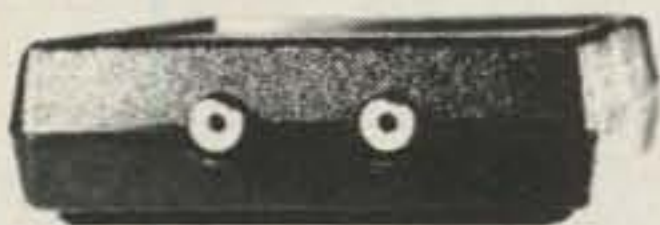
**Indicates best times to listen for F-2 layer openings on 6 Meters.

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.

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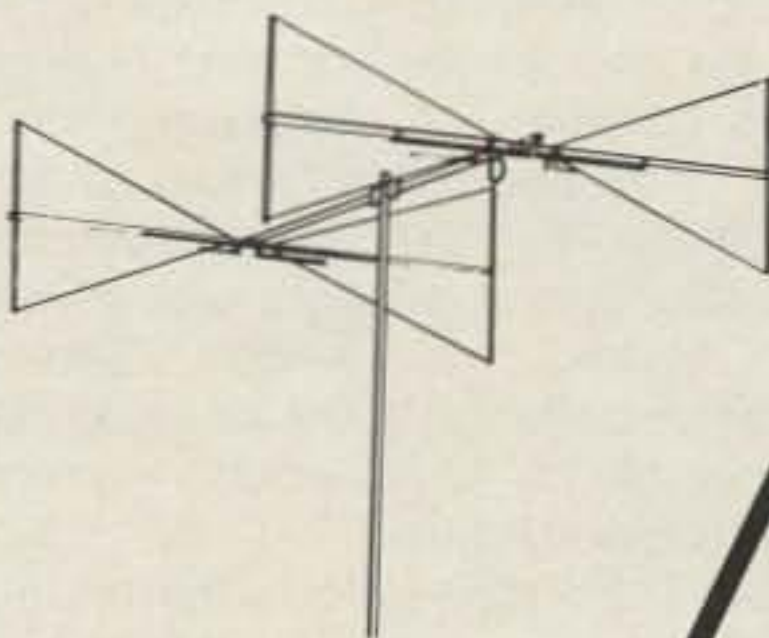
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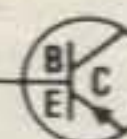
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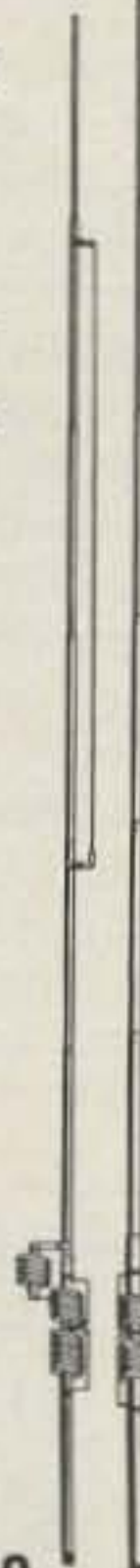
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at the USA end of the path. Fairly good DX openings should be possible to many areas of the world on 80 meters during the hours of darkness. Propagation patterns should be similar to those on 40 meters, but 80 meter openings will be noisier and weaker. There is also a chance for some DX openings on 160 meters during the hours of darkness, but expect to encounter seasonally high static levels.

The favorable equinoctial propagation conditions discussed in last month's column should continue through April for openings between the northern and southern hemispheres. Check both long and short path on inter-continental openings during the sunset and sunrise periods, on all bands between 80 and 10 meters.

For short-skip openings between distances of approximately 50 and 250 miles, use 80 meters during the day, 80 or 160 meters from sunset to midnight, and

160 meters from midnight to sunrise. For distances between 250 and 750 miles, 40 and 30 meters should be best during the day, 40 and 80 meters from sundown to midnight, and 80 meters from midnight to sunrise. For openings between distances of 750 and 1300 miles, 20 and 17 meters should be optimum most of the day, with 30, 40, and 80 meters best during the hours of darkness. Between 1300 and 2300 miles, check 12, 15, and 20 meters during the day; 20, 30, and 40 meters from sundown to midnight; and 40 meters from midnight to sunrise. Short-skip openings beyond 1300 miles also should be possible on 10 meters during most of the afternoon hours.

The DX Propagation Charts in this month's column contain DX propagation predictions for each amateur band between 6 and 160 meters for the period April 15 to June 15, 1990. Beginning this month and continuing through the sum-

mer and early fall, the times shown in the charts will be local daylight time (EDT, CDT, MDT, and PDT). For detailed predictions of short-skip openings between distances of 250 and 2300 miles, see the Short-Skip Propagation Charts, which appeared in last month's column.

VHF Ionospheric Openings

A seasonal decline is expected in F-2 layer 6 meter openings during the spring and summer months. Some openings should be possible during April, however, between the USA and southern and tropical locations. Openings towards Africa, the Caribbean, and South America may occur from shortly before to an hour or two after noon. Openings towards South America, the Pacific, and Australasia should peak again during the afternoon hours. Openings are more likely to occur when conditions are High Normal or better.

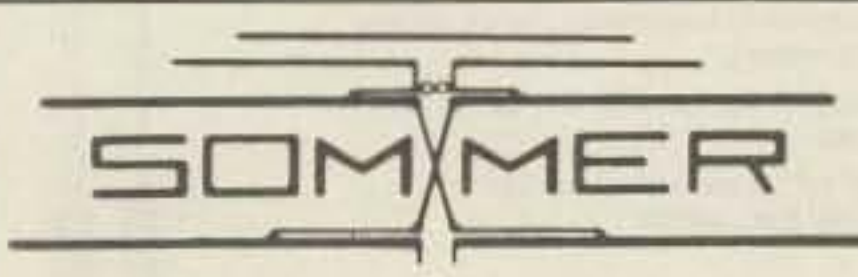
Trans-equatorial propagation (TE) between the USA and South America often reaches a seasonal peak during April. These openings are most likely to occur on 6 meters, with some also possible on 2 meters, between 8 and 11 PM local time. TE openings favor the southern tier states, but an occasional one may be possible further to the north. Unlike F-2 layer openings which can produce strong signals on 6 meters, TE openings are usually very weak and often with severe flutter fading.

A seasonal increase in sporadic-E ionization, with associated short-skip openings on both 6 and 2 meters, usually begins during April and intensifies during the spring and summer months. While as its name implies sporadic-E ionization can occur at any time, there is a tendency for it to peak between 8 AM and noon and again between 5 and 9 PM local time. Occasional short-skip openings on 6 meters, ranging between 750 and 1300 miles, should be possible during April.

A major meteor shower called the *Lyrids* should take place between April 22 and 23, with a peak expected on the 22nd. Up to 15 large-size meteors should enter the earth's atmosphere hourly when the shower is at its peak. This should produce sufficient localized ionization to permit fairly good meteor-scatter communications for short periods of time on the VHF bands.

Widespread auroral activity can occur during April producing unusual ionospheric short-skip openings on the VHF bands. The best times to check for such auroral-type openings would be during periods of radio storminess. See the Last Minute Forecast at the beginning of this column for those days during April that are expected to be Below Normal or Disturbed.

73, George, W3ASK



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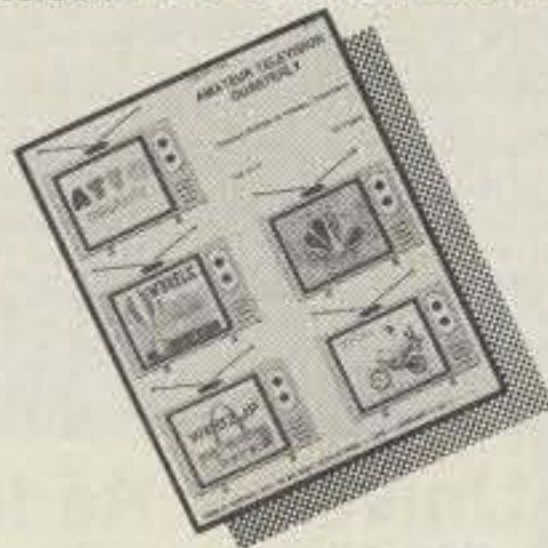
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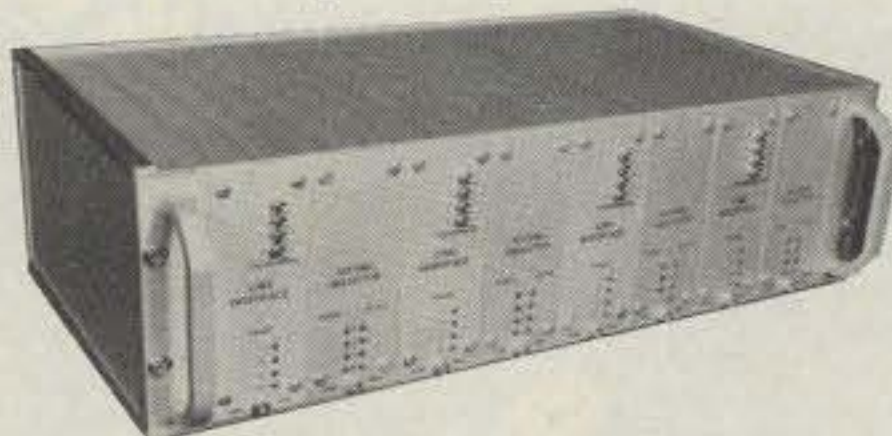
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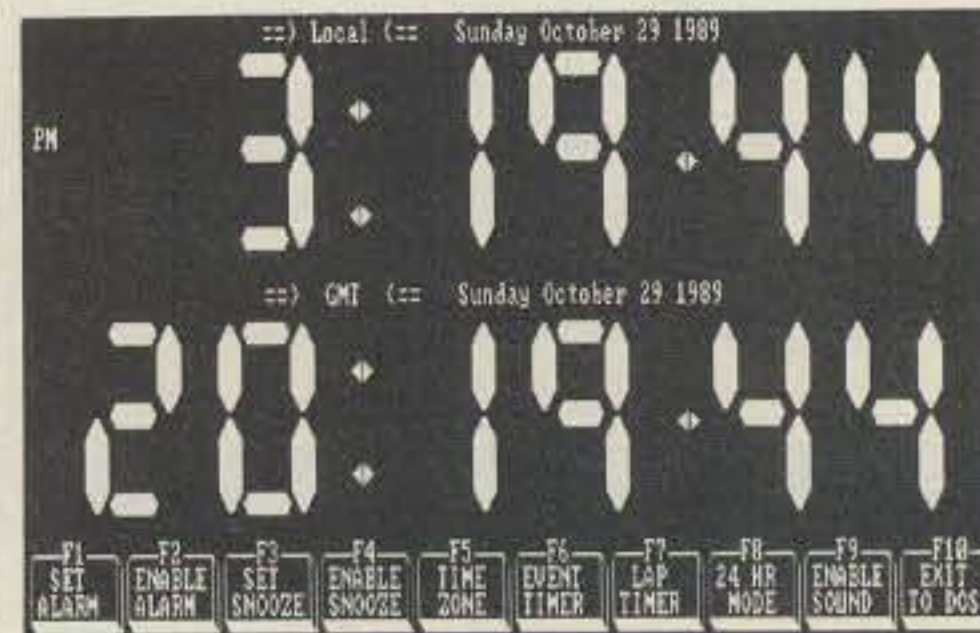
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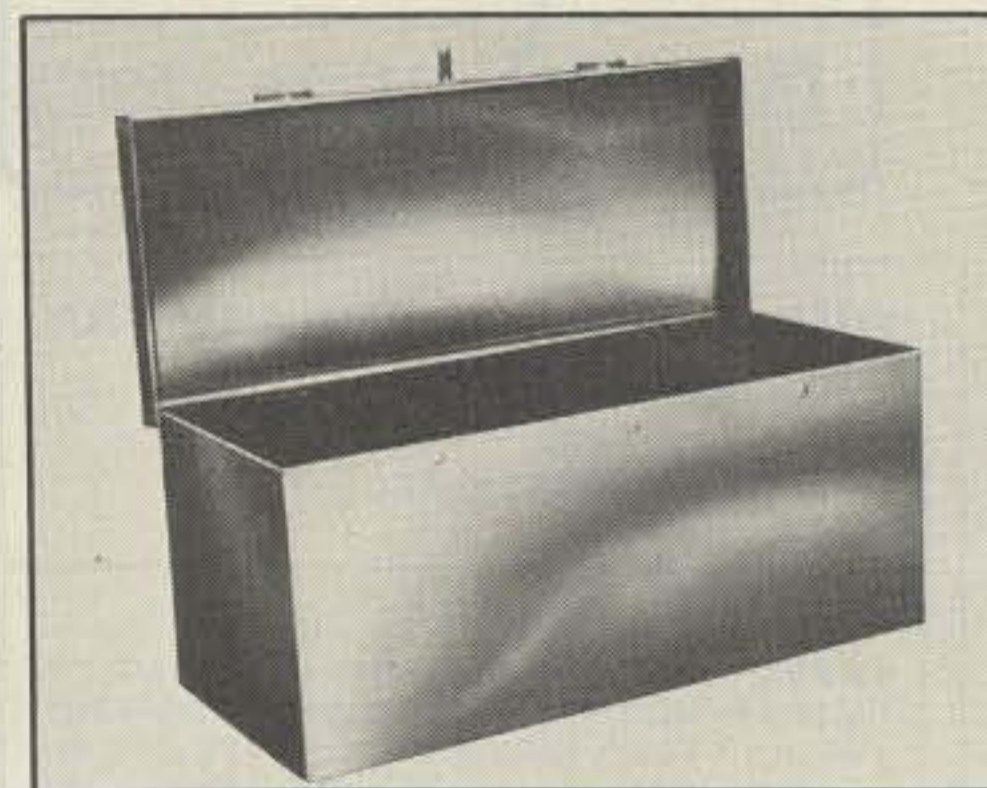
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Aluma Tower Storage Box

Aluma Tower Company has announced an optional storage box to be used in conjunction with trailer/tower unit. This new Model #615 storage box can be used on all trailer models (TM-11, TM-51-20, and TM51-35). This box provides storage for coaxial cable used with the Model #T-1100 100 foot crankup tower, plus guy wire, ground anchors, and other accessories. Special boxes in either stainless steel or aluminum can be manufactured to suit special needs.

For more information, contact Aluma Tower Company, Inc., P.O. Box 2806, 1639 Old Dixie Highway, Vero Beach, FL 32961-2806, or circle number 102 on the reader service card.

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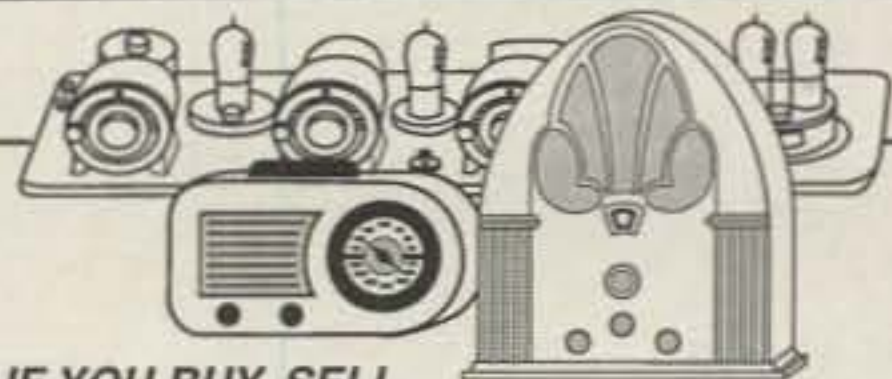
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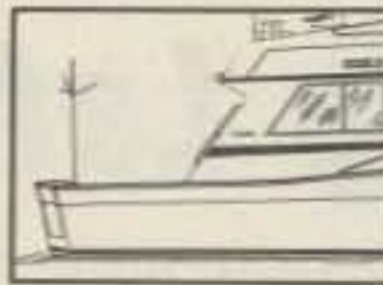
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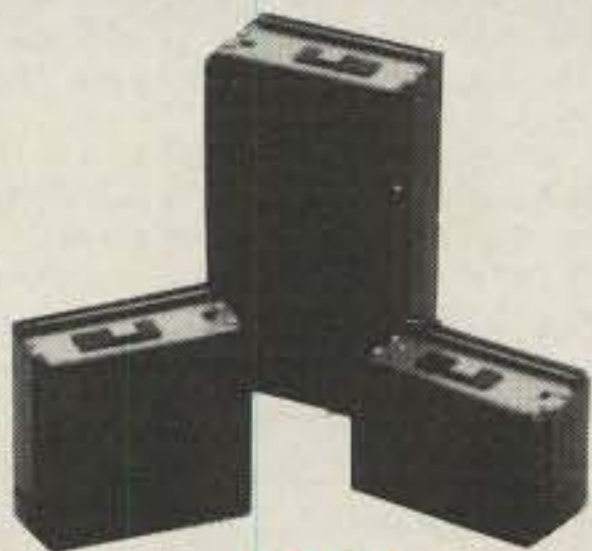
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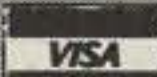
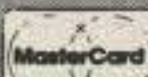
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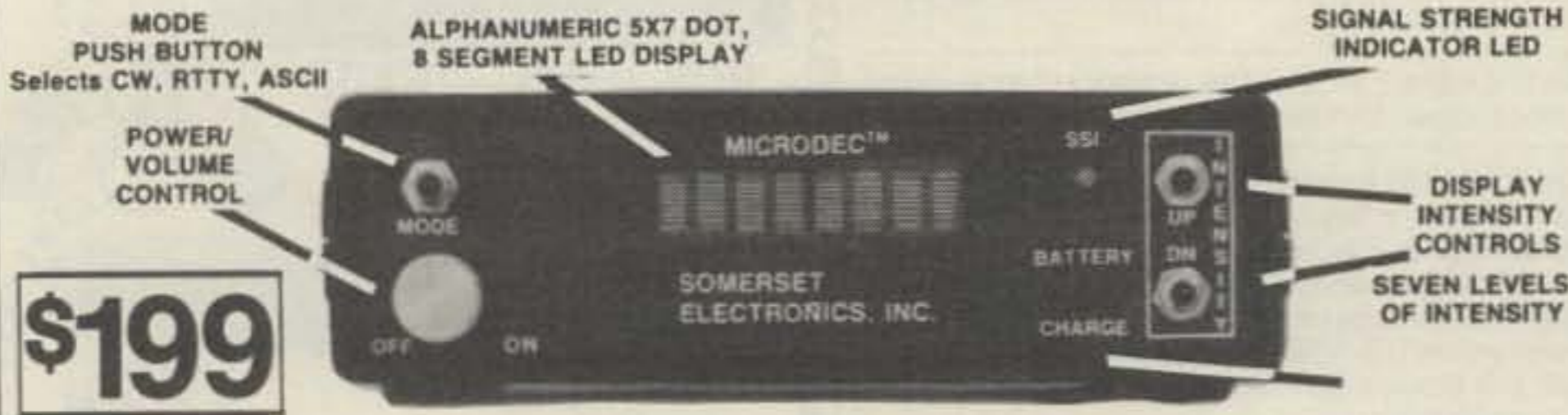
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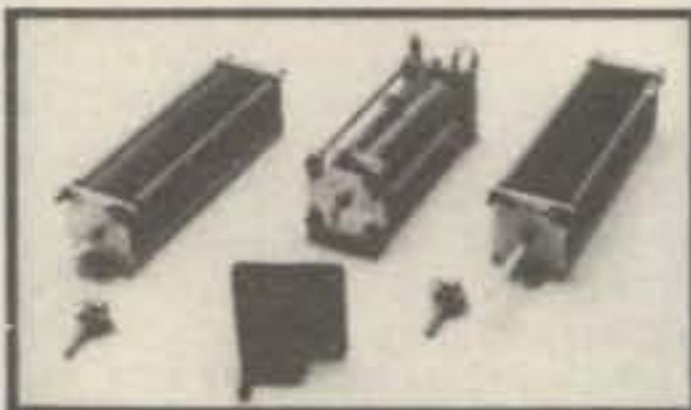
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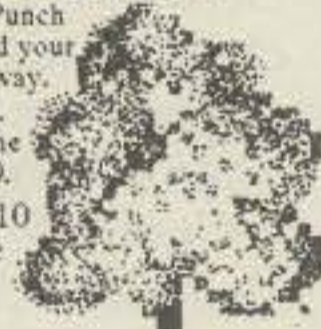


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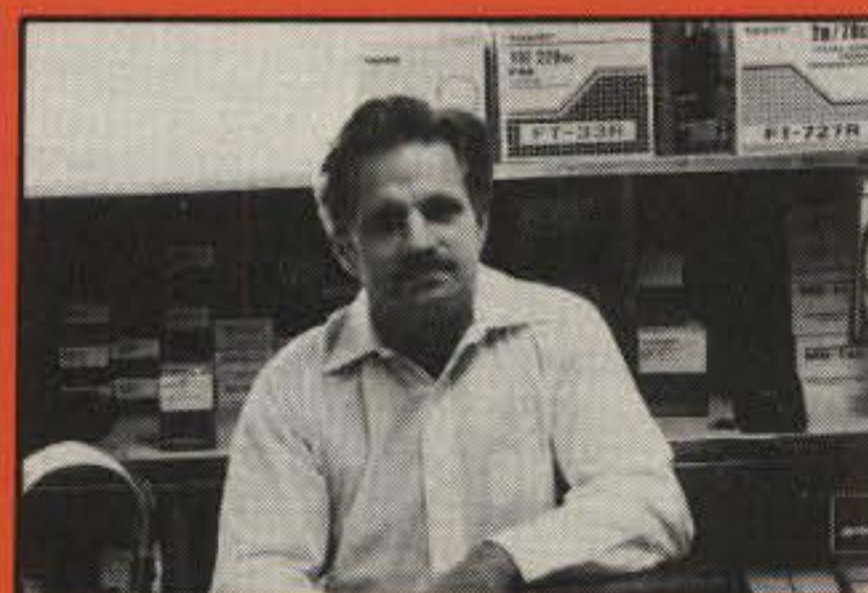
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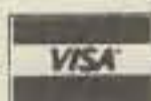
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HAMMARLUND EQUIPMENT WANTED. I am looking for all types of Hammarlund Equipment. Use your QSL card and state price and condition. All inquiries will be answered. KD4AJ, 1968 Huntington Hall Court, Atlanta, GA 30338.

WANTED: YAESU FR-101 Receiver, TC-2 2M converter, and TC-6 6M converter. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

IBM XT Compatible 512K, 2FD, RS-232, Para, mono, like new, 6 mo. warranty, \$495. Call (408) 739-1833, Mike Bae, Box 4808, Santa Clara, CA 95054.

WANTED: Old plastic or bakelite AM broadcast radios. Please write with description, condition, and price. Gerry Skloot, 2923 Mandalay Beach Road, Wantagh, NY 11793.

DONATE old ARRL Handbooks, QST, CQ for Korean ham club, KARL. U.S. contact Mike Bae, 1340 Miravalle Ave., Los Altos, CA 94022.

NYC QTH: 1 bdrm co-op apt in Astoria with rooftop antennas. 20 min to midtown. Off-street parking, A/C, more! Andy, KB7UV, 718-956-0027.

WANTED: QSTs for 1916 and 1917. R. Arrowsmith, W4JNN, 3505 Woodburn Rd., Annandale, VA 22003 (703-560-7161).

FOR SALE: Ten-Tec Paragon line complete with mike, power supply, antenna tuner, and voice synthesizer. KL7BT, A.C. Perry, Box 871643, Wasilla, Alaska 99687 (Phone 907-376-4854).

HELP PLEASE: Junior High School Radio Program needs your donations of unwanted equipment, parts, books, etc. Contact G. Skloot, Junior High School 180, 320 Beach 104 Street, Rockaway Park, NY 11694. Thank you.

NCL-2000 Band Switch, new, \$30 p.p. Maximilian Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

TELECOMMUNICATIONS VLF digital receiver manufactured by Wandel-Goltermann, the Cadillac of European electronics. Selling for 1/10 cost, \$500. SASE for data. Joseph Cohen, 200 Woodside, Winthrop, MA 02152 (617-846-6312).

WANTED: Zerox copy of the operator's manual, including the schematic and parts list, for the Hallicrafter's S-38EM and S-120 general-coverage receivers. Will pay copying, postage, and handling. KA1PRV, 14 Valley Road, Bath, ME 04530.

SELL/TRADE: SB102/HP23 \$195 firm, FT901DM \$545, GLA1000 \$285, MT2000A \$150, Kantronics KAM \$245. Ernie Clough, WA4MKF, 407-333-2060.

COMMODORE 128, 1702 monitor, 1670 modem, SP1000 VC printer, 1571 disk drive, PK64 with HF modem for RTTY, Am-tor, and Packet, \$650. K10IK 508-385-6962.

FOR SALE: Uniden HR-2510 CB/10 Meters; 250 Watt Tube Base Receiver preamp Polamar; Mobile 200 Watts receive preamp; Silver Eagle D-104. Four months old, \$600. Bearcast 50 XL Batt Pack, Charger \$90.00 Programmable Pocket Scanner. Call Joe (1) (609) 585-7938.

STAMP SWAP: 100 different European stamps for 100 from NA/SA. Prefer railway motifs. Gerhard Elsigan, OE3GEA, A-3361, Oberer Markt 7, Austria.

Wanted: Johnson Ranger II. Don Bishop, N0EA, Box 4075, Overland Park, KS 66204-0075.

RARE BUGS: Trade Albright or double paddle Vibroplex for transceiver. Bob Cutter, K10G, 701 19th, Glenwood Springs, CO 81601 (303-945-6653).

SWAP: Kenwood TS-820-WDR0 for IC-551, Yaesu FT-690R, or Drake TR6 W.P.S. Robert E. Tollison, K4JIA, 1000 Co. Rd. 18, Mt. Hope, AL 35651 (205-974-8503).

WANTED: 150 feet Heliac and connectors. Rod, W7OM, 5632 47th Avenue, Seattle, WA 98136.

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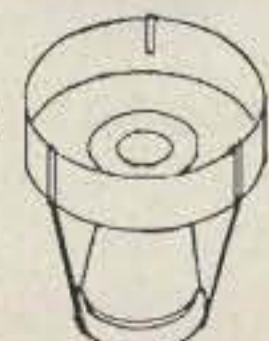
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THE 21ST ANNUAL B*A*S*H will be held on FRIDAY NIGHT of the Hamvention, April 27, 1990 at the Conference Center (Madison Room) of the HARA ARENA AND CONFERENCE CENTER (the same location as the Hamvention) starting at 7:00 P.M. There is no admission charge, and free continuous entertainment. Hot dinner, sandwiches, snacks, and beverages are available. Two exciting top awards, and many others. Stay right at HARA when the Hamvention closes on Friday evening and meet your friends and join us for an evening of fun and entertainment. ANNOUNCING!! Weather permitting, there will be a hot air balloon launch on Saturday, April 28, 1990 or Sunday, April 29, 1990 at approximately 6:45 A.M. conducting aeronautical QSO's. Frequencies to be announced at the B*A*S*H. Special Event QSL cards will be issued. Sponsored by the Miami Valley F.M. Association, P.O. Box 263, Dayton, Ohio 45401.

FOR SALE: Ten meter handheld transceiver, AEA DX Handy, Nicad batteries and charger, case, brand new, \$195 p.p. Tom Henchy, KA7NDH, 14 W. Lester Ave. #A18, Murray, Utah 84107 (801-268-1268).

TRADE: Bronica ETRS camera for HF transceiver of equal excellent condition, age, and value of about \$3000.00. Includes 120 back, waist level finder, prism finder, speed grip, 75mm, 150mm, 250mm lens. StanD, KA1UJT, Box 281, Bridgeport, CT 06601.

AMIGA, MACINTOSH, ATARI, XL/XE/ST Amateur Radio PD software \$4.00 disk. Two-stamp SASE brings catalog. Specify computer! Kinetic Designs Hamware, Box 1646, Orange Park, FL 32067-1646.

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CLEANING HOUSE: SASE for list. Brownie, W3CJI, 2705 Andrea Drive, Allentown, PA 18103 (215-433-4485).

WANTED: National NCX-3 and P/S, SB-200 manual and 572B tubes. Rod, 5Z4BH, Box 55A, APO NY 09675.

WANTED: Kenwood DFC-230, WD4HRN, 205-774-9531.

WANTED: H-89 Soft Sector Controller Card, Heathkit Part Number Z-89-37. Jeff Herbster, KJ6QO, 56E Rotary Way, Vallejo, CA 94591-8486 (707-553-8077).

HEATHKIT SA-2060 Deluxe 2 KW Antenna Tuner Kit, Roller Inductor. New in unopened box, Heath price new \$399.95, sell for \$185. Bill Mandale, W2WHW, 371 Prussian La., Wayne, PA 19087 (215-687-0917).

WANTED: Mint ICOM IC-735, T2X Tailtwister Rotor, Cushcraft 617-6B Boomer, Hy-Gain 155BAS, 8 cond. rotor cable, K0MK, 218-865-6541.

10 METER MONO, 103BA, CDE Rotator, 10 ft. HD Mast, Hy-Gain Balun. \$150, pickup only. Fred, WA2FKF, 201-445-2573.

IBM XT COMPATIBLE 512K, 2FD, Serial, Para, Mono, like new. \$495 FOB. Call (408) 739-1833, Mike Bae, Box 4808, Santa Clara, CA 95054.

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SELL: Slightly used 12BY7A tube, guaranteed OK, \$5 including postage. Ralph Cabanillas, Jr., W6IL, 2359 Creston Drive, Hollywood, CA 90068.

OMNIGRAPH FOR SALE with five disks, \$260.00 certified check. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

WANTED: AC power supply Heath Model HP-24. This is the power supply for the Heath HA-14 linear amplifier. K2CTJ, Mike, Phone 201-747-1512. I'm home most of the time.

WANTED: KDK FM-144-10SX any condition. Call 606-236-6510, WQ4Z, George Griebel, 650 Chestnut Grove, Parksville, KY 40464-9624.

DAYTON

Hamvention

April 27, 28, 29, 1990

Early Reservation Information

• General Chairman, Ed Hillman, N8ALN

• Asst. General Chairman, Dave Grubb, KC8CF

**Giant 3 day flea market • Exhibits
License exams • Free bus service
CW proficiency test • Door prizes**

1990 Deadlines

Award Nominations: March 15
License Exams: March 26
Advance Registration and banquet:
USA - April 4 Canada - March 31
Flea Market Space:

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

Flea Market Tickets

A maximum of 3 spaces per person (non-transferable). Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

Spaces will be allocated by the Hamvention committee from all orders received prior to February 1. Express Mail NOT necessary! Notification of space assignment will be mailed by March 15, 1990. Checks will not be deposited until after the selection process is complete.

Special Awards

Nominations are requested for "Radio Amateur of the Year," "Special Achievement" and "Technical Achievement" awards. Contact: Hamvention Awards Chairman, Box 964, Dayton, OH 45401.

Information

General Information: (513) 433-7720
or, Box 2205, Dayton, OH 45401
Lodging Information: (513) 223-2612
(No Reservations By Phone)
Flea Market Information: (513) 845-3683

License Exams

Service thru Extra exams scheduled Saturday and Sunday by appointment only. Send FCC form 610 (Aug. 1985 or later) - with requested elements shown at top of form, copy of present license and check for prevailing ARRL rates (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton, OH 45458

Lodging

Please write to **Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402** or refer to our 1989 Hamvention program for lodging information which includes a listing of hotel/motels located in the areas surrounding Dayton.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Advance Registration Form

Dayton Hamvention 1990
Reservation Deadline - USA-April 4, Canada-March 31
Flea Market Reservation Deadline: February 1

Enclose check or money order for amount indicated and send a self addressed stamped (#10) envelope.

Please Type or Print your Name and Address clearly.

How Many

Admission (valid all 3 days)	_____	@ \$10.00*	\$ _____
Grand Banquet	_____	@ \$22.00**	\$ _____
Women's Luncheon (Saturday)	_____	@ \$8.00	\$ _____
(Sunday)	_____	@ \$8.00	\$ _____
Flea Market (Max. 3 spaces)	_____	\$25/1 space \$50/2 adjacent	
Admission ticket must be ordered with flea market tickets		\$150/3 adjacent	\$ _____
		Total	\$ _____

* \$12.00 at door ** \$24.00 at door, if available

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2K CLASSIC X RF	RF Deck only	3K PREMIER	Console Amp. with 160 meters
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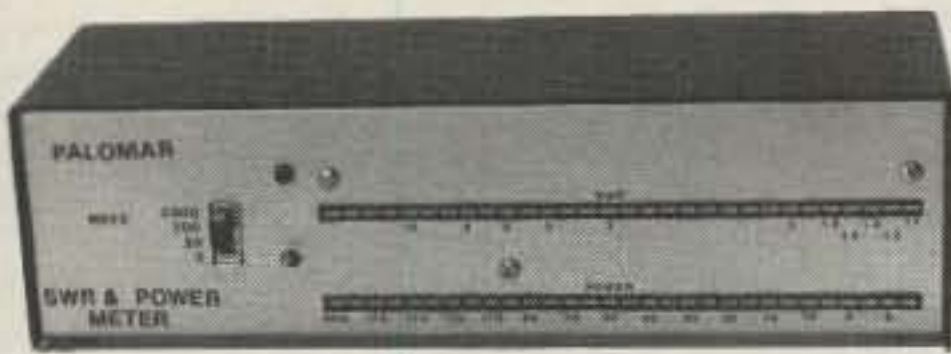
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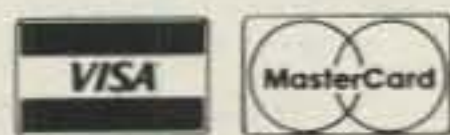
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