ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945
JANUARY 1988 $2.50
CANADA $3.50

"It Takes Keen Hearing To Sniff Out The Rare Ones"

0 74820 08241 01

THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur Radio

Kenwood: from Novice

Kenwood has been producing the finest communications equipment for over three decades. Kenwood is the name recognized the world over as the number one manufacturer of Amateur Radio equipment.

Being number one means that we are committed to offer you the finest selection of equipment available. It's all here—everything for a truly "top notch" station. Commercial grade receivers for the Short Wave Listener. The latest in 220 MHz transceivers for the enhanced Novice. The finest selection of VHF and UHF rigs. Our legendary HF line continues to earn top billing in Product Reviews, winning contest stations, and DXCC Honor Roll. All in your choice of base, mobile, or portable packages. All designed with the latest innovations in communications technology.

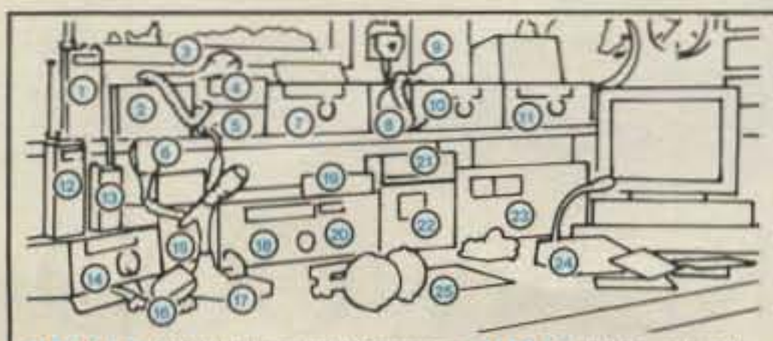
When you are on the air with a Kenwood rig, fellow Amateurs recognize that "Kenwood Sound"—it separates you from the pack and lets everyone know that you are serious about communications, whether it's traffic handling, contesting, DX chasing, or just plain rag chewing.

Leading edge technology, and superior field-proven performance—that's the Kenwood Experience!

Contact your nearest Authorized Kenwood Amateur Radio Dealer for more details on the hottest ham gear in the world!

Listen for WD6DJY Kenwood's Club Station

o Amateur Extra Class!



(1) TH-315A: 220 MHz Hand-held Transceiver; **(2) PS-50:** DC Power Supply; **(3) MC-43S:** UP/DWN Microphone, included with **(4) TM-2530A:** Deluxe 25 W, 2m FM Transceiver; **(5) TM-3530A:** Deluxe 25 W, 220 MHz Transceiver (also comes with MC-43S mic.); **(6) MC-48B:** 16-key DTMF Microphone; **(7) R-5000:** High Performance Receiver; **(8) SP-430:** Matching External Speaker for TS-430S/TS-440S; **(9) MC-48B; (10) TS-711A:** 2m, 25 W, All Mode Base Transceiver; **(11) TS-811A:** 70cm, 25 W, All Mode Base Transceiver; **(12) TH-215A:** 2m, Full-featured HT; **(13) TH-21BT:** Pocket-sized, 2m FM Transceiver; **(14) TS-440S:** HF Transceiver (with AT-440 installed); **(15) SP-940:** Matching External Speaker for TS-940S; **(16) MC-48B; (17) MC-60A:** Base Station Microphone with UP/DWN controls; **(18) TS-940S:** Competition Class HF Transceiver with General Coverage Receiver (AT-940 installed); **(19) IF-232C:** Computer Interface Level Translator; **(20) IF-10B:** Computer Interface Module (installed inside TS-940S); **(21) SW-2000:** SWR/Power Meter; **(22) SM-220:** Station Monitor with pan display option BS-8 installed; **(23) TL-922A:** HF Linear Amplifier; **(24) MC-85:** Multi-function Desk Microphone with Graphic Equalization and three outputs; **(25) HS-5:** Deluxe Headphones.

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

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

KENWOOD

...pacesetter in Amateur Radio

All New Compact HF

"DX-citing!"

TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

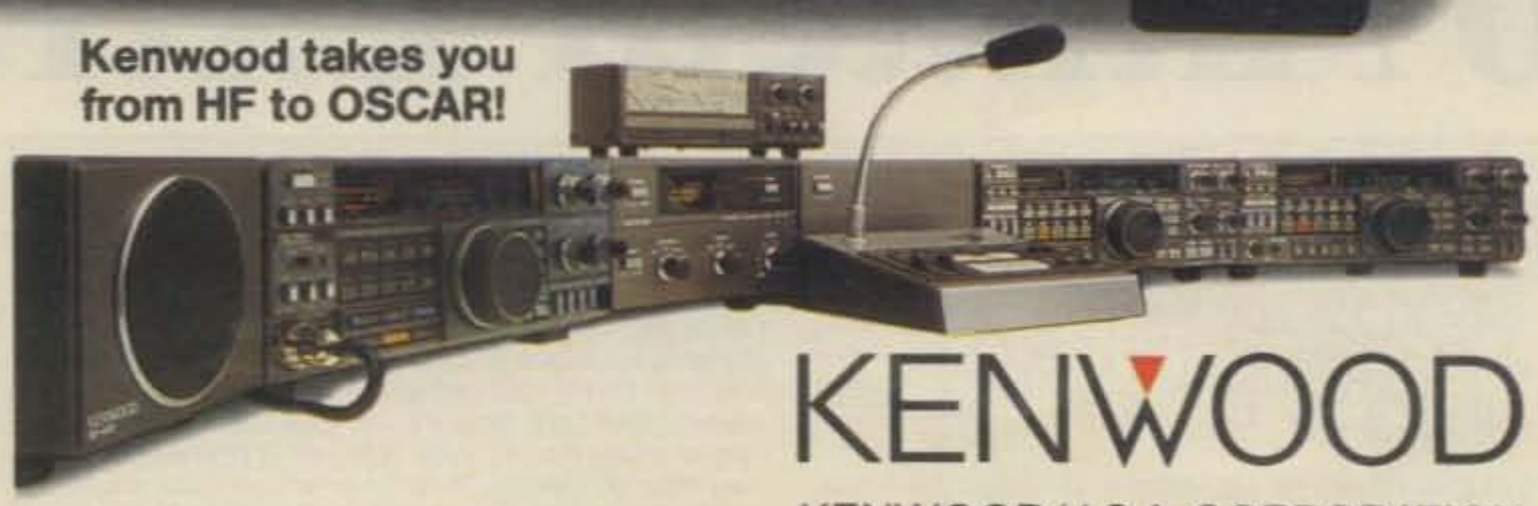
- **Covers All Amateur bands**
  General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
  Subtone is memorized when TU-8 is installed.
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-43S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**

Optional accessories:

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-5/6/7 headphones
- SP-40/50B mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2S extra DC cable.

Kenwood takes you from HF to OSCAR!



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

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

MASTHEAD

EDITORIAL STAFF
Alan M. Dorhoffer, K2EEK
Editor
Gail M. Schieber
Associate Editor
Peter O'Dell, WB2D
Associate Editor
Lew McCoy, W1ICP
Technical Representative

CONTRIBUTING STAFF
Frank Anzalone, W1WY
Contest Chairman
John A. Attaway, K4IIF
Chairman, CQ DX Committee
Steve Bolia, N8BJQ
WPX Contest Director
Larry Brockman, N6AR
Robert Cox, K3EST
W.W. Contest Directors
Hugh Cassidy, WA6AUD
DX Editor
Leo Haijsman, W4KA
WAZ Awards Manager
Dave Ingram, K4TWJ
Amateur Specialties
George Jacobs, W3ASK
Propagation Editor
Dorothy H. Johnson, WB9RCY
USA-CA Director
Steve Katz, WB2WIK
VHF Editor
Norman Koch, K6ZDL
WPX Award Manager
Donald McClenon, N4IN
160 M. Contest Director
Karl T. Thurber, Jr., W8FX
Antennas & Accessories
Adrian Weiss, K8EEG/0
QRPp Editor
Bernie Welch, W8IMZ
Contest Advisor
Bill Welsh, W6DDB
Novice Editor
Billy Williams, N4UF
CQ DX Awards Manager

BUSINESS STAFF
Richard A. Ross, K2MGA
Publisher
Dorothy Kehrwieder
General Manager
Arnie Sposato, KA2TYA
National Advertising Manager
Emily Kreutz
Sales Assistant
Frank V. Fuzia
Controller
Arlene Caggiano
Accounting
Catherine Ross
Circulation Director
Melissa Kehrwieder
Customer Service

PRODUCTION STAFF
Dorothy Kehrwieder
Production Manager
Elizabeth Ryan
Art Director
Barbara Scully
Artist
Pat Le Blanc
Florence V. Martin
Phototypographers
Hal Keith
Illustrator
Larry Mulvehill, WB2ZPI
Contributing Photographer

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: 516 681-2922. CQ (ISSN 0007-893X) is published monthly by CQ Publishing Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year $18.00, two years $35.00, three years $52.00; Canada/Mexico—one year $20.00, two years $39.00, three years $58.00; Foreign—one year $22.00, two years $43.00, three years $64.00; Foreign Air Mail—one year $75.00, two years $149.00, three years $223.00.

Allow six weeks for change of address. Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

The Radio Amateur's Journal

ON THE COVER: No bones about it, DXing is a dog-eat-dog world. This happy DX hound is Sushi, owned by Barry Gorodetzer, N4IFE. Photo by Larry Mulvehill, WB2ZPI.

JANUARY 1988 **VOL. 44, NO. 1**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

Welcome to 1988. The holidays have come and gone, and the bills have yet to arrive. All in all it was a good season this year and a nice time to be at home. Our official travel schedule doesn't begin until next month, so we are enjoying another month at home.

Did you get all the things on your "wish list"? Probably not, but I hope that at least you got some of them. One of the problems with amateur radio (as with any other exotic pastime) is that the items you truly want (need, desire, have to have) are hard to explain to the layman, especially a family member. Even if the item is reasonably priced, you still have to explain what it does. This is usually met with a puzzled look that translates to:

"What do you need that for?"

"Why would you want to do that?"

"Where are you going to put that?"

"Where am I going to get one?"

While the jargon and the language we use every day make perfect sense to us, it usually makes no sense to a nonamateur. It's sometimes hard to rationalize the fact that people have real names rather than call-letter suffixes. I've been introduced to amateurs at hamfests simply as "EEK this is XZW." A nonamateur listening in might think our parents played a horrible joke on us, but we understand exactly what it means.

So as we start a new year we'll keep that long-standing resolution of cleaning up the shack, labeling all those cables, making an inventory, collecting all our tools in one spot (returning those we've borrowed), showing up at club meetings, and so on. Perhaps it's also a year in which we can introduce our family members to amateur radio in plain English so that when the next holiday season rolls around or when your birthday approaches and you're asked what you want, an "XK-ZOOMER, Mk II" doesn't sound so strange. You might also be surprised by someone else in the family coming up with a better idea after they have learned what amateur radio is all about.

Travels With CQ

Our last hamfest of the 1987 season turned out to be a local event held in November. For once there was no rush to airports, no hotels, and no car rentals to worry about. About 2,000 locals turned out at Suffolk Community College for what was billed as a "giant indoor hamfest" sponsored by the Radio Central Amateur Radio Club. I don't know how "giant" it was, but it was a pretty good turnout. I brought some "good stuff" from home to put on our table—some gems I've collected over the years—and even they sold. People came to look and buy. Yes, I brought home someone else's "good stuff."

Next month, February, we'll start off the 1988 season in Miami with the 28th annual Tropical Hamboree. We're also adding a new one this year in February, the Ohio ARRL State Convention in Cincinnati. Steve Bolia, N8BJQ, our WPX Contest Director, and I will be manning the *CQ* booth, so stop by.

1988 Antenna Season

One of the things that January marks, besides the start of a new year, is traditional amateur radio antenna weather. For some reason—maybe it's genetic—amateurs love to tell tales about the horrendous weather they picked to work on their antennas. One reason for the choice of weather may be that it is the lesser of two evils. It's more dramatic to brave the elements and do antenna work than to clean the shack as per a hastily agreed upon New Year's resolution. We've all seen the winners of the "Messy Shack Contest" that *QST* ran last year, and although most of us thought that there was nothing wrong with those shacks and that they did look kind of typical, we did see a smattering of humor in the contest. There does seem to be something fundamentally wrong with a clean shack. I know they exist, and we've all seen those enviable pictures of well-equipped, neat, highly functional, spotless shacks that a few of us compulsive types proudly display. However, it's been my experience and the experience of most amateurs to whom I speak that there is a certain charm, beauty, and an esthetic warmth in just the term *rat's nest*. It conjures up a place where most of us would feel at home. Why? I don't know, but that aspect of amateur life doesn't spread over into our antenna systems. Somehow we always find time to work on them, improve them, and add more and more aluminum. Maybe it's just the part that the outside world can see. Of course, the outside world rarely sees where all those cables and wires come into the house, so there is some room left for free expression in antenna work.

So whether some clever amateur is busily designing a 100 foot tower in the shape of a tree so that it gives new meaning to the concept of hidden antennas, or stringing more and more wire around, winter is antenna weather. Probably what keeps most of us warm during this process is the thought that this latest change or improvement will enable us to work further and further, and somehow it will be better. Generally, cleaning the shack won't make things work any better or differently.

Most amateurs would agree that there are probably only two times when one should rearrange a working shack. After all, if it works, don't fix it. The first time it's okay to shift things around is if you are planning picture QSLs. Then you dump almost everything out in the halls, kitchen, bedrooms, attic, and basement. You get down to a few pieces of equipment. Now you rent a nice desk on which to put the gear, borrow a dog (preferably a golden retriever), hang all sorts of certificates on the wall, and practice looking casual as a professional photographer snaps away. The other time it's permissible to shift things is if you have a contest station and you want to send in some shots with the results. Then you do the opposite. You borrow everything you can from every other amateur you know to load up the station. If you only have six or seven transceivers, it isn't enough. The object here is to create power stations designed to intimidate. So what if you only sent in a checklog or just asked for logs. People will notice. Next year you're the one to look out for.

It's kind of hard to fake pictures of antennas, so that's why you really have to keep working on them. This is true especially with wire antennas. Let's face it: almost any picture of a beam shows a beam. Some shots I receive that are supposed to depict a wire antenna in someone's yard between some trees only show the kids' toys and the barbeque. We all know the antenna is there, but unless you take a heavy grease pencil and draw it in like ship's hawser, you can't see it. However, when it's covered in ice and snow, wire stands out. For the amateurs who live out west or where it's usually warm, just pick days or months that coincide with typical bad weather. January and February are good times to say you worked on your antenna. If you have to, you can spread some Spanish moss on the wire and pretend.

As we start our new year and our new antenna season, remember that amateur radio has many seasons to enjoy. We have a whole new year of events, activities, and happenings in which to take part and have a good time. We'll also be there to answer the call for emergency communications and to provide our expertise in time of need.

73, Alan, K2EEK

Handheld DX with the DX Handy™

The idea of handheld DX seems far-fetched, but it's actually very simple. The DX Handy is a battery powered (six penlight AA drycells included) SSB/CW transceiver with two watts output. DX Handy can also use nicad rechargeable batteries, or be powered with 9 VDC.

Two variable crystal oscillators (VXOs), each with 50 KHz range, can be selected with a top panel switch. Crystals for 28.250 to 28.300 and 28.300 to 28.350 Mhz are included, and other crystal ranges for the 10 meter band are also available at a nominal cost.

CW operation can be by either the built-in push button or with an external key or keyer. External speaker and microphone jacks are also provided, and the telescoping antenna is included. The DX Handy also has a top panel S-meter/ output power meter and an effective noise blanker circuit. DX Handy is housed in an attractive gray metal case comparing in size to popular VHF FM handhelds.

Ten meters is coming back strong. With DX Handy all amateurs, novice to extra class, can enjoy the thrill of working handheld DX.

AEA
Advanced Electronic Applications
P.O. Box C2160
Lynnwood, WA 98036-0918
(206) 775-7373

AEA Retail $379.95 **Amateur Net $319.95**

Specifications

General
- Frequency Coverage: Any two 50 KHz segments in the 28.0–29.0 MHz Amateur Band (28.25–28.30 and 28.30–28.35 MHz supplied)
- Frequency Control: VXO provides 50 KHz of continuous tuning with a single crystal
- Frequency Stability: Within ±500 Hz from a cold start
- Antenna: 50 Ohms Unbalanced, BNC connector
- Power Requirement: 8.4–9.0 VDC
  (Included): 6-AA Dry Cells (1.5 volt/cell) = 9.0 VDC
  (Optional): 7-AA NiCads (1.2 Volt/cell) = 8.4 VDC
- Current Drain: Receiving - Approx. 70 mA
  Transmitting - Approx. 620 mA
- Dimensions: (W) 66mm × (H) 39mm × (D) 142mm
- Weight: 710 Grams (1 lb. 9 oz.) with batteries and antenna

Transmitter
- Output Power: 2 Watts at 9.0 VDC
- Emission modes: A3J (USB) and A1 (CW)
- Spurious Emissions: More than 40 dB down

Receiver
- Sensitivity: less than 0.5 uV for 15 dB S/N
- Intermediate Frequency: 11.2735 MHz

Controls and Indicators
- On/Off Volume control Top mounted Potentiometer
- Receiver Incremental Tuning (RIT): Top mounted Potentiometer with center off detent position
- Frequency: Top mounted 50 KHz VXO
- Frequency Range: Top mounted 2-position switch
- Noise Blanker: Top mounted On/Off switch
- S/RF meter: Top mounted S/RF meter
- Built in CW key: Top mounted momentary switch
- External Speaker output: Top mounted 1/16" phone jack
- External Microphone input: Top mounted 1/8" phone jack
- Antenna Connector: Top mounted Female BNC
- Transmit Indicator: Top mounted Transmit LED
- Push-To-Talk: Side mounted momentary switch
- External Power: Bottom mounted 2.1 mm coaxial
- External key input: Bottom mounted 1/8" phone jack
- Mode Selector Switch: Bottom mounted 2-position switch
- Charge/External Power: Bottom mounted 2-position switch selecting 12 VDC external power function

Our Readers Say

160 Meter Antenna Update

Editor, *CQ*:

In the April 1987 issue of *CQ*, you were kind enough to publish my article, "Variation On A Theme By Marconi," concerning an antenna design I have been successfully using on 160 meters over the past two seasons.

In the article I gave credit to Bill Orr, W6SAI, as having provided me with the initial idea for the antenna in one of the old issues of the Editors and Engineers *Radio Handbooks*. In the ensuing months, I have learned that Bill Fanckboner, W9INN, commercially produced a version of this antenna during the late 1970s and early 1980s under the name "Folded Uniroid." This information came to me purely by accident in a telephone conversation with Bill recently. Let me emphasize that Bill, W9INN, did not ask for credit for the antenna design, but I feel it is only fair of me to write to you and point out that I was unaware of Bill's work when I came up with my idea. Had I known of his endeavors, I would surely have credited him in the article.

By the way, for those who have tried the antenna, may I say that W9INN's design made use of an impedance matching transformer at the base of the antenna. The transformer was built on a toroid core, hence the "roid" in the name he gave his design.

In literature he provided with his antenna design (a copy of which I requested), he quite correctly pointed out that the secret to operational success with this type of antenna is a *good* ground system. Several hams who read my article were quick to point out to me that I had not stressed this fact adequately enough in the article. I concur heartily with this observation!

Because this antenna is a variation of the folded unipole design, radiation resistance will be higher than with a traditional Marconi-fed vertical. Hence, ground losses will be lower. But my experience has been, certainly, that one can expect only marginal results with this antenna unless *at least* a dozen radials of 65 feet each are used.

It may be of interest to your readers who have tried this antenna that, subsequent to publication of the article, I wound a 2:1 toroidal matching transformer, designed for me by Jerry Sevick, W2FMI, and found that it provides an excellent match to this antenna for direct feed with 50 ohm coax. However, the antenna is not as broad-banded as I would have hoped. The use of a wide-range T-match tuner, in conjunction with the 2:1 transformer, yields 1800–2000 kHz coverage, however.

Although the antenna is not the prettiest thing in the world, it continues to perform more than adequately for me. Continuing to use only 600 watts output maximum, I have now topped 100 countries on 160. The antenna was first erected in September 1986. As of this writing (October 1987), I have worked 61 countries on it, including VK, ZL, JA, 3B8, ZS, and others of equal distance.

Drayton Cooper, N4LBJ
Bishopville, SC

Yaesu's mini HTs. The smallest, smartest, toughest radios. Anywhere.

Whether you're a Novice or Extra class operator, you're sure to appreciate the high power, durability and size of Yaesu's FT-23R Series mini-HTs.

To begin with, you'll find a model that's right on your wavelength. The 2-meter FT-23R. The 220-MHz FT-33R. Or the 440-MHz FT-73R.

Whichever you choose, you benefit from incredibly small packaging. (Take a look at the actual size photo.) Aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. And moisture-resistant seals that really help keep the rain out.

But perhaps best of all, each radio blends sophisticated, microprocessor-controlled performance with surprisingly simple operation. In fact, it takes only minutes to master all these features:

Ten memories that store frequency, offset and PL tone. Memory scan at 2 frequencies per second. Tx offset storage. Priority channel scan. Channel selection via tuning knob or up/down buttons. PL tone board (optional). PL display. Independent PL memory per channel. PL encode and decode. LCD power output and "S"-meter display. Battery-saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch.

The FT-23R comes with a 7.2-volt, 2.5-watt battery pack. The FT-73R with a 7.2-volt, 2-watt pack. And the FT-33R with a powerful 12-volt, 5-watt pack.

You can choose the miniature 7.2-volt, 2-watt pack shown in the photo below. And all battery packs are interchangeable, too.

And consider these options: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And more.

Check out the FT-23R Series at your Yaesu dealer today. Because although we can tell you about their incredible performance, toughness and small size, seeing is really believing.

YAESU

CIRCLE 44 ON READER SERVICE CARD

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100.

Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc. FT-33R shown with optional FNB-9 battery pack.

Announcing

• **Atlanta Radio Club Scholarships** - The Atlanta (Georgia) Radio Club will have up to two $1000 scholarships available for young amateur operators in 1988. In addition to being licensed amateurs, applicants must be high school seniors graduating in 1988 and entering an accredited college or university as a freshman for the first time. Candidates will be judged on their high school grades, ham radio achievements, and citizenship/leadership qualities. Residents of Georgia and its contiguous states will be given extra consideration. For application forms write to Phil Latta, W4GTS, 259 Weatherstone Parkway, Marietta, GA 30068.

• **Wyoming State Hamfest** - Plan to attend this event in Laramie, Wyoming. For details write to University ARC, P.O. Box 3625, Laramie, WY 82071.

• **Florida Two Meter Repeater Directories** - The Hernando County ARA of Brookville, Florida has available free directories which can be obtained by mobile operators who stop at Florida Welcome Centers. They will also be sent to anyone sending a request and SASE to Repeater Directory, HCARA, P.O. Box 1721, Brooksville, FL 34601.

• **Calgary ARA's VE6OCO** - The Calgary ARA will operate VE6OCO from January 1 to February 29 starting at 1200 UTC on all bands for the 1988 Winter Olympics.

• **WARAC Swapfest** - The 16th Annual Midwinter Swapfest will be held on January 9 at the Waukesha Co. Expo Center Forum from 8:00 a.m. to 3:00 p.m. Admission: $2.00 in advance, $3.00 at door. Tables (4 ft.) $3.00 in advance, $4.00 at door (electrical outlet $5.00, as available). Advance deadline January 2, 1988. Dealers welcome. Amateur exams given; write for details. Sponsored by the West Allis Radio Amateur Club. For tickets or information write: WARAC Swapfest, P.O. Box 1072, Milwaukee, WI 53201 (SASE, please).

• **Bicentennial Special Events Station** - In conjunction with the National Bicentennial of the Constitution activities and the special "We the People" WAS Award, the Bethel Educational ARS (BEARS) will be operating KZ1Z (KZ200Z) on all HF frequencies using SSB, CW, Packet, RTTY, and SSTV modes in both the General and Novice portions of the bands during the week of January 9–15. QSL with SASE to: BEARS, Bethel Middle School, 1 School Street, Bethel, CT 06801.

• **Morristown, New Jersey** - To commemorate the 150th anniversary of the first public demonstration of the electromagnetic telegraph by Samuel F.B. Morse and Alfred Vail, the AT&T Bell Labs Whippany ARC and the Bellcore Pioneers ARA will operate W2TW on Jan. 9, 1300Z to Jan. 10, 0100Z and Jan. 10, 1300Z–2000Z from Historic Speedwell Iron Works. SSB operation in the lower 25 kHz of the General 80, 40, 20, 15, and 10 meter bands, 144.220 MHz, 146.58 MHz FM. CW operation in the lower 25 kHz of the General 80, 40, 20, 15, and 10 meter bands. Novice CW operation will take place the first 15 minutes of each hour in the 80, 40, 15, or 10 meter Novice bands, and 10 meter Novice phone. Three HF stations on the air covering all bands. For special QSL card, send QSL and business SASE to K2ASM via callbook.

• **Fort Myers ARC Hamfest** - The Fort Myers ARC (W4LX) will hold its annual hamfest at Fort Myers, FL on January 23. Vendors will provide goods and services of many manufacturers of amateur radio equipment and supplies. There will be forums and prizes. Advance tickets are available at $3.00 each and tables may be reserved for $10.00 each. Admission tickets and table reservations may be arranged through N.M. Cornwell, Jr., Fort Myers ARC, P.O. Box 4814, North Fort Myers, FL 33918-4814. Talk-in on 146.28/88 (W4LX). Doors open at 9:00 a.m. The location is Moose Hall, Park Meadow Drive, Fort Myers, FL (just west of U.S. 41).

• **WB2JSM, Queens, New York** - The Hall of Science ARC will operate club station WB2JSM, a permanent amateur radio exhibit at the Hall of Science, on January 24th from 1500 to 2100 UTC to celebrate their 15th anniversary. SSB—14.265, 21.365, and 28.365. CW—21.135 and 14.065. For certificate, QSL with large SASE (44 cents or 1 IRC) to Arnie Schiffman, WB2YXB, 81-22 250th St., Bellrose, NY 11426.

• **Eighth Annual Citrus County Hamfest** - Sponsored by the Sky High ARC, this event will be held January 30 at Inverness, Florida in the air-conditioned auditorium at the County Fairgrounds, 4 miles South of Inverness on US Route 41. Opens to vendors at 7 a.m. and to the public at 9 a.m. Ham gear, new equipment, surplus items, rare parts, and computers featured. Tables are $5, not including admission. Admission is $3 advance and $4 at the door. XYLs admitted free with OM. Talk-in on 146.355/955. For more information or tickets call Bob Gordon at (904) 628-5045 or write to SHARC Hamfest, P.O. Box 572, Lecanto, FL 32661.

• **Alumni Reunion on the Air** - The University of Idaho ARC (W7UQ) will hold its third annual 'Alumni Reunion on the Air' from 2100 UTC January 30 through 0300 UTC on January 31. The goal is to make 100 contacts to celebrate the U of I centennial. Frequencies will be around 14.283 (2100–0000Z), 14.050 (2200–0000Z), 7.223 (0000–0200Z), 7.123 (0100–0300Z) and 3.953 (0200–0300Z). Listen for "CQ Reunion" on phone and "CQ R" on CW. Full-color QSL available for SASE to callbook address. All alumni and interested persons are encouraged to participate.

• **Wheaton Hamfest** - Wheaton Hamfest '88 will take place on January 31 at the Odeum, Villa Park, Illinois. Contact Wheaton Community Radio Amateurs, P.O. Box QSL, Wheaton, IL 60189. Information phone (312) 629-8006. Tickets $4.00 advance with triple prize stubs, $5.00 at the door. All tables reserved.

• **Winter Electronics Fair** - On January 31 The Yonkers ARC is sponsoring their Winter Electronics Fair at Lincoln High School in Yonkers, NY. Admission is $3.00, children under 12 free. Sellers tables $10.00 or a $1.00 a foot, if you bring your own table. Registration in advance for club provided tables (limited number available). Doors open for sellers at 8 a.m., buyers at 9 a.m. Fleamarket hours from 9 a.m. to 3 p.m. Talk-in on 146.865 MHz or 440.150 MHz. For more information contact Otto Suppliski, WB2SLQ, after 5 p.m. at 914-969-1053.

WORLDWIDE DISTRIBUTION

HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

FREE SHIPMENT
MOST ITEMS UPS SURFACE

7 STORE BUYING POWER

ICOM IC-761

HF SUPERIOR GRADE TRANSCEIVER

SALE! CALL FOR PRICE

ICOM IC-275A/275H

138 - 174 MHz
IC-275A (25w) IC-275H (100w)

GREAT PRICE!

ICOM IC-900 MULTI-BAND MOBILE

YOU CAN OPERATE **SIX BANDS** WITH ONE CONTROLLER!
2 MTR 25/45W, 440 MHz 10 MTR, 6 MTR, 220 MHz & 1.2 GHz 10 MEMORIES

ARE YOU READY FOR 1.2 GHz OPERATION?

ICOM IC-28A/28H

NOW! IC-38A 220 MHz

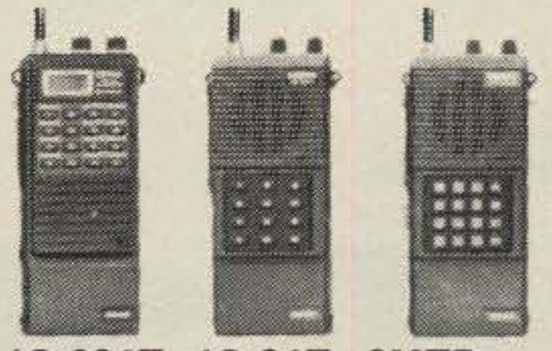
2-METER MOBILES
IC-28A (25w) IC-28H (45w)

LOW PRICE!

NOW! RAPID DELIVERIES

FROM STORE NEAREST YOU

ICOM HAND-HELD VHF/UHF



IC-02AT IC-2AT 2MTR
IC-03AT IC-3AT 220 MHz
IC-04AT IC-4AT 440 MHz

ICOM IC-735

The Latest in ICOM's Long Line of HF Transceivers

CALL FOR LOW, LOW PRICE

ICOM IC-R7000

25 MHz-1300 MHz

IN STOCK FOR IMMEDIATE DELIVERY

ICOM IC-u4AT/u2AT

440 MHz, 2MTR
Mini Hand-Held AT Model w/ TT Pad

GREAT PRICE!

Bob Ferrero W6RJ
President

Jim Rafferty N6RJ
VP So. Calif Div.
Anaheim Mgr.

All Major Brands in Stock Now!

ANAHEIM, CA 92801
2620 W. La Palma
(714) 761-3033, (213) 860-2040
Between Disneyland & Knotts Berry Farm

ATLANTA, GA 30340
6071 Buford Hwy.
(404) 263-0700
Neil, Mgr. KC4MJ
Doraville, 1 mi. north of I-285

BURLINGAME, CA 94010
999 Howard Ave.
(415) 342-5757
George, Mgr. WB6DSV
5 miles south on 101 from SFO

OAKLAND, CA 94606
2210 Livingston St.
(415) 534-5757
Al, Mgr. WA6SYK
17N-5th Ave./17S-16th Ave.

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
Bob, Mgr. K7RDH
East of Hwy. 17

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
Tom, Mgr. KM6K
Hwy. 163 & Claremont Mesa Blvd.

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
Al, Mgr. K6YRA
San Diego Fwy. at Victory Blvd.

STORE HOURS
10 AM-5:30 PM
CLOSED SUNDAYS

FREE SHIPMENT
Most items UPS surface

CALL TOLL FREE (800) 854-6046

MasterCard VISA

Toll free including Hawaii. Phone Hrs: 7:00 am to 5:30 p.m. Pacific Time. California, Arizona and Georgia customers call or visit nearest store.
California, Arizona and Georgia residents please add sales tax. Prices, specifications, descriptions subject to change without notice.

KENWOOD

...pacesetter in Amateur Radio

NEW!

Affordable DX-ing!

TS-140S

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.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **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/HS-7** 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-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **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.

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).
- Preamplifier 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.

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

OPTOelectronics inc

NEW POCKET SIZE

SIZE: 4" H x 3.5" W x 1" D
MADE IN USA

$99.95 - $150.00

FREQUENCY COUNTERS

TO 1.3 GHZ

8 LED DIGITS • 2 GATE TIMES
ANODIZED ALUMINUM CABINET
INTERNAL NI-CAD BATTERIES INCLUDED
AC ADAPTER/CHARGER INCLUDED

EXCELLENT SENSITIVITY & ACCURACY

AC-DC • PORTABLE OPERATION

#TA-100S

#P-100

#AC-1200
AC ADAPTER
CHARGER

#1200H 1.2 GHZ

Small enough to fit into a shirt pocket, our new 1.2 GHz and 1.3 GHz, 8 digit frequency counters are not toys! They can actually out perform units many times their size and price! Included are rechargeable Ni-Cad batteries installed inside the unit for hours of portable, cordless operation. The batteries are easily recharged using the AC adapter/charger supplied with the unit.

The excellent sensitivity of the 1200H makes it ideal for use with the telescoping RF pick-up antenna; accurately and easily measure transmit frequencies from handheld, fixed, or mobile radios such as: Police, firefighters, Ham, taxi, car telephone, aircraft, marine, etc. May be used for counter surveillance, locating hidden "bug" transmitters. Use with grid dip oscillator when designing and tuning antennas. May be used with a probe for measuring clock frequencies in computers, various digital circuitry or oscillators. Can be built into transmitters, signal generators and other devices to accurately monitor frequency.

The size, price and performance of these new instruments make them indispensible for technicians, engineers, schools, Hams, CBers, electronic hobbyists, short wave listeners, law enforcement personnel and many others.

STOCK NO:

#1200HKC	Model 1200H in kit form, 1-1200 MHz counter complete including all parts, cabinet, Ni-Cad batteries, AC adapter-battery charger and instructions	**$ 99.95**
#1200HC	Model 1200H factory assembled 1-1200 MHz counter, tested and calibrated, complete including Ni-Cad batteries and AC adapter/battery charger	**$137.50**
#1300HC	Model 1300H factory assembled 1-1300 MHz counter, tested and calibrated, complete including Ni-Cad batteries and AC adapter/battery charger	**$150.00**

ACCESSORIES:

#TA-100S	Telescoping RF pick-up antenna with BNC connector	**$12.00**
#P-100	Probe, direct connection 50 ohm, BNC connector	**$18.00**
#CC-70	Carrying case, black vinyl with zipper opening. Will hold a counter and accessories	**$10.00**

1.3 GHZ
#1300H

ORDER FACTORY DIRECT

FLA (305) 771-2050

1-800-327-5912

MasterCard VISA

AVAILABLE NOW!

OPTOelectronics inc
5821 N.E. 14th Avenue
Ft. Lauderdale, Florida 33334

Orders to US and Canada add 5% of total ($2 min., $10 max)
Florida residents add 5% sales tax. COD fee $2.

CIRCLE 3 ON READER SERVICE CARD

Magnetic Attraction

Tired of paying higher and higher prices for V.H.F. magnetic mount antennas? Hustler has the solution. Two new series of antennas at suprisingly affordable prices. Built with the same quality and performance you expect from a Hustler product. Designed to offer you years of trouble-free operation. Priced to **save you money.**

FX SERIES (pictured mounted)

- 3.4 db gain | 5/8 wave
- 200 watt rating
- 15 foot coax
  PL-259 connector installed
- Magnetic mount holds to
  100 mph

Model FX-2 — 2 Meter, black & chrome
Model FX-220 — 220 MHz, black and chrome

24.95 ea.

Also Available in Black
Model FX-2B, 2 Meter
Model FX-220B, 220 MHz ..... **29.95** ea.

RX SERIES (pictured lying down)

- 3.4 db gain | 5/8 wave
- 100 watt rating
- 15 foot coax
  PL-259 connector installed
- Magnetic mount holds to 75 mph

Model RX-2, 2 meter black and chrome
Model RX-220, 220 MHz, black & chrome

19.95 ea.

Also Available in Black
Model RX-2B, 2 meter
Model RX-220B, 220 MHz ..... **24.95** ea.

Model FX-2
(Also Available in Black)

Model RX-2
(Also Available in Black)

HUSTLER®

One Newtronics Place
Mineral Wells, Texas 76067
(817) 325-1386

Sometimes a DXpedition takes in more than just operating statistics. N7DF had the opportunity to check out a country that has been all too often in the news—Tchad.

N7DF/TT8, The Tchad Story

BY LARRY STRAIN*, N7DF

The stewardess of the UTA jumbo jet announced "It is not considered prudent to take pictures of N'Djamena airport," and I hurriedly stuffed my camera to the bottom of my carry-on bag after one last picture.

I was somewhat prepared for a lot of new experiences during my 12 week tour of duty with the famine relief programs in Tchad, but this kind of welcome definitely did nothing to reassure me. Neither did the machinegun-armed soldiers who met deplaning passengers.

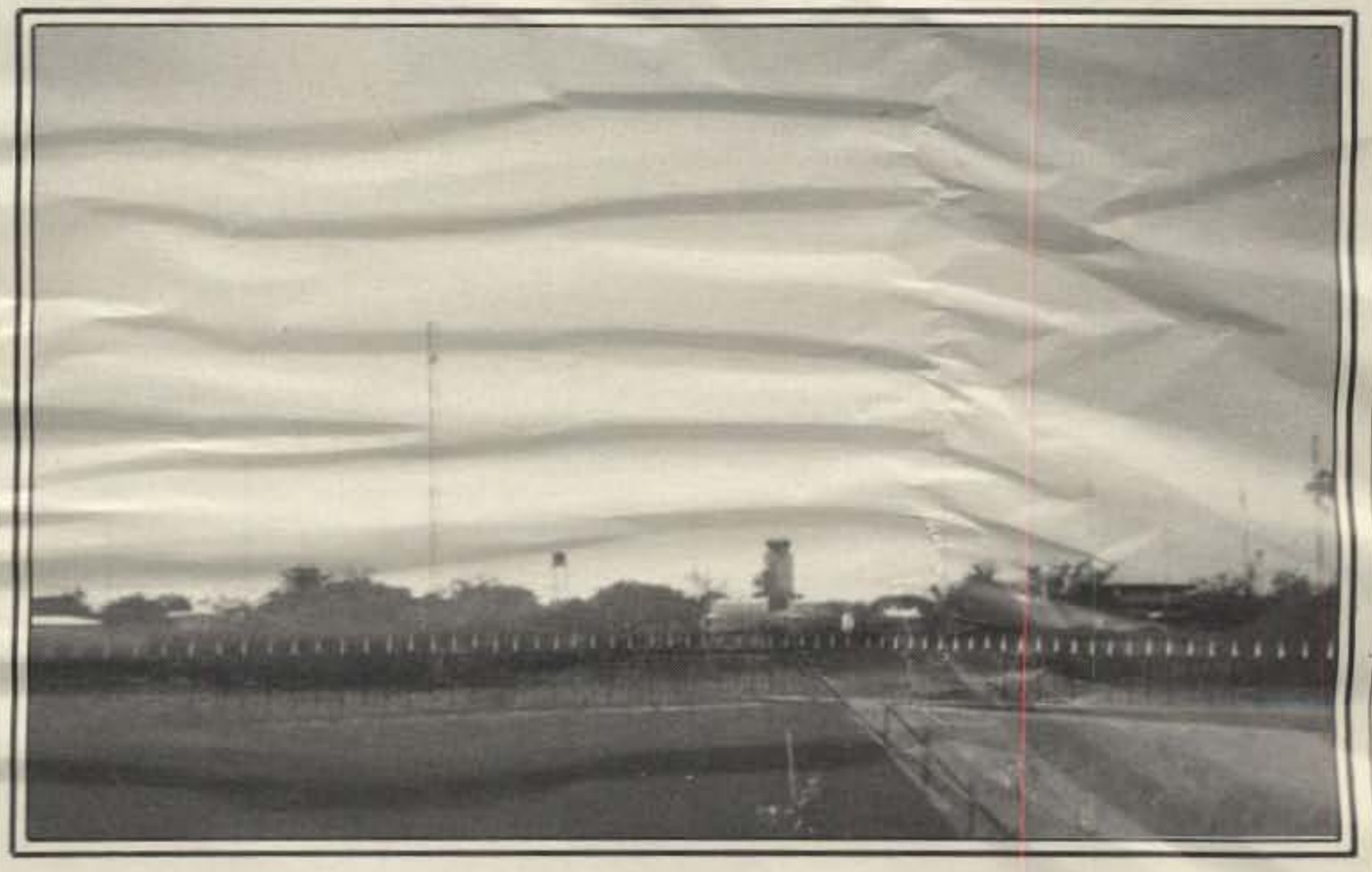
Fortunately, the United States Agency for International Development officer whisked me through customs with a minimum of trouble. I told the customs inspector that my FT-902 was for listening to ball games on American radio.

On the trip to the Hotel Tchadienne we passed many burned-out ruins of shops and homes, scars of the civil war that raged across the country from 1979 to 1981. Checking into the hotel, I was escorted to my room. It had no towels or bedcovers and the air conditioner sounded like it was in the terminal stage of some dread disease. There was dust everywhere and even my own private bullethole in the window. When I requested that the room be cleaned up the clerk at the desk said it would be, first thing in the morning! Luckily I had brought a sleeping bag just for such contingencies.

In the lobby I met another American, Peter Coates, who was in Tchad to set up operations for the International Human Assistance Program. We immediately became great friends, and he provided invaluable help in my getting acclimated to the country. We went out back of the hotel to a patio restaurant where I ordered a plate of spaghetti. It was very good after I evicted two large black beetles that came with it.

The next morning a USAID Toyota Landcruiser was waiting for me when I finished breakfast. The trip to the AID offices went past the presidential palace. It was heavily fortified, indicating the continued state of unrest in the country.

My purpose in being in Tchad was directly related to the need to provide safe water supplies in the famine refugee relief camps and resettlement projects throughout the country. With my field of specialization in the United States Public Health Service being in water supply and waste disposal, the Office of International Health had recommended me for assignment to the Tchad Ministry of Health for a 12 week tour of duty. Unfortunately, however, upon my arrival at the AID offices I learned that no one really had any idea of what I was supposed to do. The first day was taken up with a flurry of introductions to Tchadian officials and with the directors of relief and reconstruction agencies. Since my French vocabulary didn't extend much beyond asking where the men's room was, one of the secretaries from AID acted as interpreter for me.



Much of the operating was from the IHAP headquarters, only a few hundred feet from the airport. The LORAN station prevented 160 meter operation.

Between jet-lag and a growing feeling of "What am I doing here?" I collapsed into bed early that night. The second morning I awoke to find that the room's permanent inhabitants had dined during the night. I had over 200 bedbug bites on my arms, shoulders, and chest! Also there was no water in the bathroom.

To put all that I learned from reading material in the AID library in a nutshell, Tchad is the poorest nation on earth. It has the lowest per capita income, the shortest life expectancy, and the lowest literacy rate of any country. I found, though, that the tremendous courage of the Tchadian people offset this to a great extent.

In the meantime, I had gotten temporary operating permission from the Ministry of Information to put N7DF/TT8 on the air. A quarter-wave 20 meter vertical on the balcony rail was the only thing I could manage at first, but conditions were good into Europe in the evenings.

By the second week a plan of action for my work had been laid out. The first thing on the agenda was to make some field trips to the camps and get first-hand knowledge of conditions. AID had a fleet of Toyota Landcruisers with Tchadian drivers, so it didn't seem as if transportation would be a significant problem. Little did I know!

By now a Tchadian English teacher had been hired as my full-time interpreter and an English speaking sanitary engineer from the Ministry of Health had been assigned to work with me.

Our first trips were to villages within an hour's drive of N'Djamena to see the types of wells used for water supply. In the first village were two wells that had been installed by the Peace Corps in the late 70's. These were small, drilled wells that produced good water but, according to a report I had read, the average life of the pumps was less than 8 months. After some investigation I found that the extremely fine sand underground was getting in the wells and destroying the pumps. There was little that could be done to prevent this, so I began to study other types of wells.

The next trip took us to a more traditional setting for village water supplies. Here, dug wells, about 40 feet deep, were lined with concrete rings and steel barrel sections. These wells were not covered, though, and were open to pollution.

With the Health Programs Coordinator and his family going on six weeks leave to the States, I was offered the use of his house while he was gone. One catch: I had to take care of their Doberman Pinscher. This proved to be quite a task since he considered himself to be

*P.O. Box 125, Holton, KS 66436

Desert oases were welcome sights to tired travelers. Sand dunes over 300 feet high loomed against the horizon.

Overland travel had many problems from getting stuck to running low on fuel and over- heated engines.

the head of the household. We finally reached a workable solution; he stayed head of the household and I stayed a temporary guest!

My next trip was to a UNICEF resettlement project about 100 miles south of N'Djamena. Our stay lasted three days, during which we visited three camps, each containing some 100 families. In these camps the refugee families were building permanent homes of mud brick and reeds with vegetable gardens on the quarter-acre plots of ground assigned them. Here I met with the first instance of Tchadienne hospitality which included being served the choicest cuts of roast goat, the intestines! On our return trip we got the landcruiser stuck in a marsh and it took us four hours to dig it out.

Back in N'Djamena I managed to get up a 20 meter beam and could begin to get on the air seriously. Unfortunately, the AID executive officer objected to my having such a visible antenna, so I had to take it down after only a few days. It was replaced by quarter-wave verticals for both 20 and 40 meters which were concealed in trees in the courtyard of the house. Most of the operating was on 20, though, since it was still too early in the year for good Stateside openings on 40, and constant thunderstorms in the southern rain forests created too much noise on the lower bands.

The next field trip was to Abeche, which is nearly 400 miles from the capital. Our driver showed up the next day on camelback! He had run the car off into deep water about 40 miles west of town and had to hitch a ride on a passing caravan. The CARE director sent out a repair truck, but it was nearly two weeks before we saw the car and driver again.

In the meantime we were shown several water-supply systems that the various relief agencies had constructed. At one site a spring was being developed for a water source. Seeing black and green sand in the spring, I did a little panning and found several specks of gold dust among the sand grains. A report on this discovery was later turned in to the Ministry of Natural Resources.

The next day we were waiting for a CARE truck to arrive when we heard gunshots and saw soldiers running in the streets. The deputy military commander had been assassinated! We were escorted to the Prefectural Palace and placed under protective house arrest. Machinegun and mortar emplacements were set up and about 100 soldiers were brought in to protect the palace. When a nervous soldier began shooting at shadows right outside the window, I took the opportunity to examine the beautiful Persian carpets on the floor from close up!

The plane arriving to take us home the next day was a welcome sight. On the return trip we flew low over the road across the marshlands, where we were able to accurately locate over 20 trucks loaded with food supplies which had become mired in the mud. Our information permitted rescue parties to find the trucks and get them out.

Back in the capital, writing reports and preparing for our next trip took up the entire week and gave us an opportunity to get on the air more often. Forty meters was picking up, and several long periods of good propagation stateside gave the first opportunity to provide a new country on 40 to many of my friends and acquaintances. CW had become my primary mode of operation, since it was the greatest need from TT8, and it permitted much higher QSO rates than SSB, what with the immense pileups.

Our next trip was to take us to visit the large refugee camps located in the recession bed of Lake Tchad some 180 miles north. The first 45 miles were on open road, but once we turned off onto the dirt track, indicated by maps to be the main route to the lake, conditions deteriorated rapidly. Since the civil war, there had been no road maintenance on any of the secondary roads, and it came down to simply trying to navigate through the marshlands along the river as best we could. After getting bogged down 7 times, the last of which required over 8 hours and the assistance of 17 villagers to get us out, we abandoned the route and turned back to the main road. This abortive side trip cost us three days of valuable travel time as well as using fully a third of our reserve fuel supplies.

The next port of call was at Cheddra, where CARE had several small resettlement camps along the Bahr Al Gazhel, or Valley of Gazelles. This is a great rift valley in the desert floor, and it is lower in elevation than Lake Tchad. It always has good ground water near the surface, permitting the use of shallow wells and the Chadouf pivot device for irrigation of crops.

Going on from Cheddra, we drove up the valley to Mossouro, an historic city on the ancient caravan routes. Here we contacted the director of a UNICEF hospital. It had been our intent to visit the resettlement project at Am Silep, a large oasis some 70 miles into the Sahara Desert to the southeast. We were told that food supplies had run out and the camp had been abandoned.

Based on this information, which we learned later was incorrect, we headed northwest across the desert to Nokou, where CARE had 10 resettlement camps along a string of oases. It was necessary to deflate our tires for traction in the deep sand, and we had to navigate by compass, since winds kept covering the trails with sand. Sometimes the compass seemed to be telling us that north was not the direction we thought. Luckily we ignored it on those occasions. I learned later that there are powerful magnetic anamolies from meteoric fragments under the desert floor.

Heat was overpowering, and frequent stops to cool off the landcruiser were necessary. Many times we saw large collections of animal bones where livestock had died of thirst and starvation during the drought.

At the Nokou project we were within 20 miles of the Libyan forward positions and missile batteries, and heavy guns were seen in several locations dug in on the tops of sand dunes.

The first of the two sites we visited had 40 families settled along the rim of the oasis, which is a sinkhole in the desert floor. The second oasis had a large lake in it and was breathtakingly beautiful! An approaching sandstorm cut our stay short, and we hightailed it south to outrun the storm.

The driver was about to collapse from exhaustion, so we stopped frequently to let him rest. We finally made it back to N'Djamena, which was beginning to look more beguiling after every trip into "the wilds"!

There was no rest for the weary, and I was only able to snatch a few hours to be on the air by cutting my sleep to a minimum. The hectic pace and frequent exposure to the elements began to tell on my health. My first bout with malaria took place, and an assortment of unnameable native ailments often put me low. On more than one occasion I awoke with my head resting on the log, having fallen asleep operating. Many people may have wondered why I sometimes suddenly went QRT!

We hit the road again for the Am Silep Oasis. The UNICEF Director now said that it was go-

Introducing the next logical step.

Yaesu's Dual Band Handie.

Two affordable radios in one—that's exciting.

Yaesu's dual-band FT-727R packs our best HT know-how into one compact design. At a price that's in step with your ham budget.

Hit hard-to-reach repeaters with a powerful 5 watts on both 2 meters and 440 MHz.

Work the bands quickly and easily with a wealth of microprocessor-controlled commands:

Jump between the separate VHF and UHF VFO registers. Program each of the ten memories for instant recall of repeater input and output frequencies, odd splits, and tone encode/decode.

Scan the memory channels, the entire band, or a band segment. And return to any special frequency with the priority feature.

Use link repeaters by programming TX on one band and RX on another.

Conserve power with the battery saver. It lets you monitor silently while drawing negligible current. And measure your battery level with the digital battery voltmeter. There's even a "Low Battery" LED.

Finally, your operation is rounded out with features like VOX capability. A one-touch repeater reverse switch. An LCD readout with illumination lamp. A high/low power switch. Remote computer control capability. An optional CTCSS module. And Yaesu's full line of optional accessories.

So step up your operating capability now with the logical choice in HT operation.

Yaesu's dual-band FT-727R.

YAESU

Yaesu USA
17210 Edwards Road, Cerritos, CA 90701
(213) 404-2700
Repair Service: (213) 404-4884
Parts: (213) 404-4847

Yaesu Cincinnati Service Center
9070 Gold Park Drive, Hamilton, OH 45011
(513) 874-3100

ALINCO ELECTRONICS INC.

20705 South Western Ave., Suite 104 Torrance, CA 90501 • (213)618-8616

Dual Bander

MONEY SAVING OFFER
(See Details Below)

Tiny, Tough & Terrific

2m/70cm Dual Band
Mobile Transceiver

ALD-24T

Cross Band
Full Duplex!

5½" (W) × 2" (H) × 6½" (D)
Smallest Dual Band
Transceiver Available

CIRCLE 141 ON READER SERVICE CARD

- 25 Watt High - 5 Watt Low Power Both Bands
- 21 Memories
- Dual VFO's
- CTCSS Encoder/Decoder: Standard
- Memory Scan and Memory Lockout
- Many MORE Features, See Your Dealer!

ALINCO'S ANTENNA BONANZA

You save on every Alinco product because of our value. Now, for a limited time you can save again on your purchase of a Larsen mobile antenna. With your purchase of an ALD-24T dual band mobile, ALR-22T or HT 2 meter mobile or an ALR-72T 70cm mobile you can save from **$25.67** to **$34.72** on a brand new Larsen antenna with the mounting hardware included.

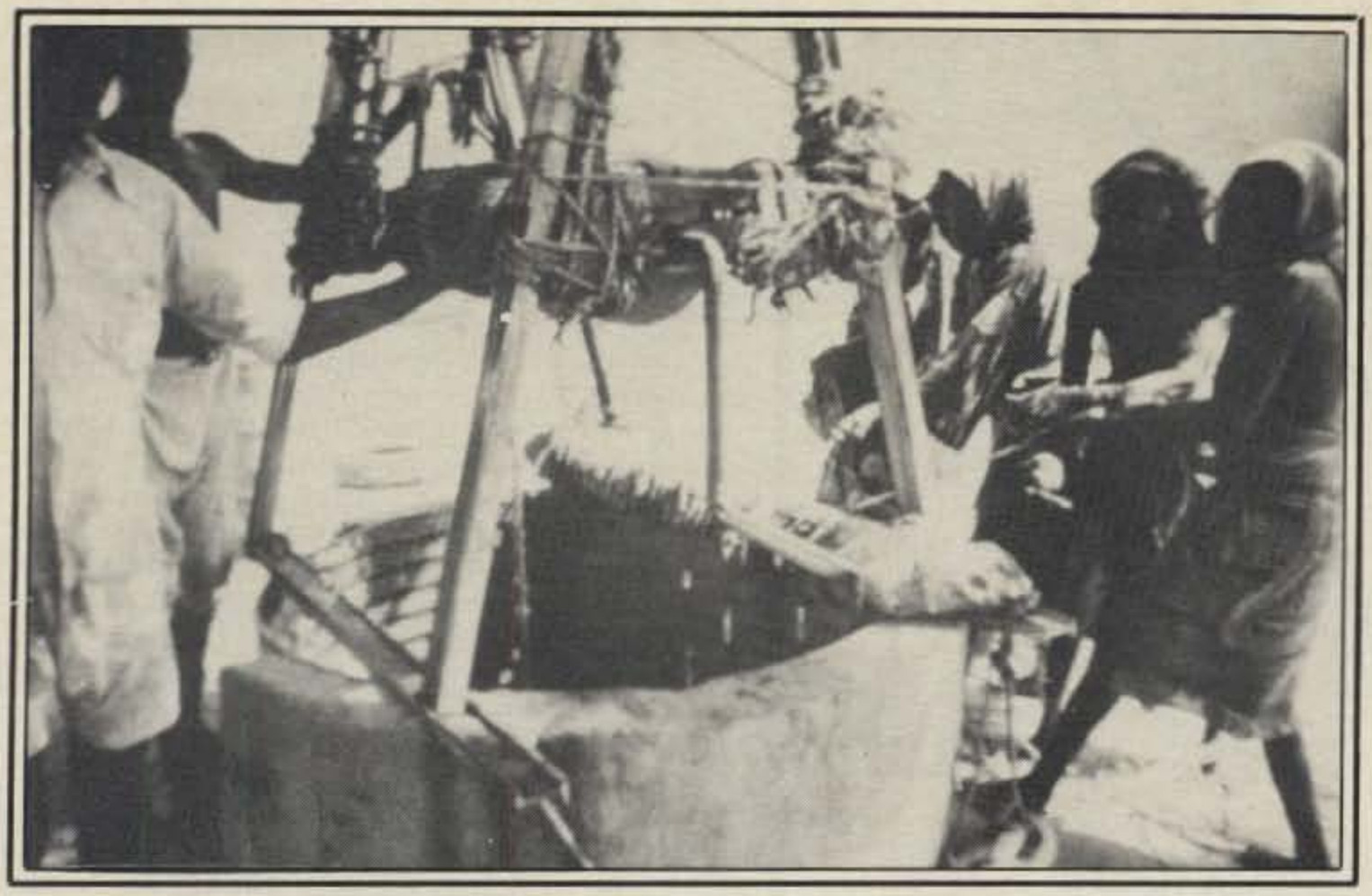
Model	Type	Larsen Antenna w/Coax Assembly	Suggested List Price	Your Cost	Savings
ALD-24T	Dual-Band Mobile	NMO-2/70	$59.72	$25.00	$34.72
ALR-22T(HT)	2 Meter Mobile	LM-150	$40.67	$15.00	$25.67
ALR-72T	440 MHz Mobile	LMC-440	$40.67	$15.00	$25.67

Just send your check or money order along with your warranty card and photocopy of your receipt to Alinco and we'll ship your antenna freight paid (continental USA only). Hurry, this offer effective **January 1, 1988** through **March 31, 1988**.

Alinco's products are carried by these fine dealers

Amateur & Advance Comm. - Wilmington, DE
Amateur Comm. ETC., - San Antonio, TX
AES - Milwaukee, WI
AES - Wickliffe, OH
AES - Orlando, FL
AES - Clearwater, FL
AES - Las Vegas, NV
Austin Amateur Radio Supply - Austin, TX
Barry Electronics - New York, NY
Burghardt Amateur Center - Watertown, SD
Colorado Comm Center, Denver, CO
Delaware Amateur Supply - New Castle, DE
Doc's Communications - Rossville, GA
El Original Electronics - Brownsville, TX
EEB - Vienna, VA
EGE, INC. - Woodbridge, VA
EGE, INC. - Salem, NH
Erickson Communications - Chicago, IL
Floyd Electronics - Collinsville, IL
The Ham Station - Evansville, IN
The Ham Hut - Amarillo, TX
Hatry Radio - Hartford, CT
Henry Radio - Los Angeles, CA
Hirsch Sales Co., Williamsville, NY
HR Electronics - Muskegan, MI
HRO - Anaheim, CA
HRO - Atlanta, GA
HRO - Burlingame, CA
HRO - Oakland, CA
HRO - Phoenix, AZ
HRO - San Diego, CA
HRO - Van Nuys, CA
HSC - Sunnyvale, CA
International Radio Systems - Miami, FL
Jun's Electronics - Culver City, CA
Kennedy Associates - San Antonio, TX
KJI Electronics - Cedar Grove, NJ
Madison Electronics - Houston, TX
Maryland Radio Center - Laurel, MD
Memphis Amateur Electronics - Memphis, TN
Michigan Radio - Mt. Clemens, MI
Mission Consulting - Houston, TX
Missouri Radio Center - Kansas City, MO
N & G Electronics - Miami, FL
Omni Electronics - Laredo, TX
Quement Electronics - San Jose, CA
RF Enterprises, Merrifield, MN
Reno Radio - Reno, NV
Rivendell Associates - Derry, NH
Rogus Electronics - Southington, CT
Rosen's Electronics - Williamson, WV
Ross Distributing Co. - Preston, ID
Satellite City, Minneapolis, MN
Tel-Com Electronic Comm. - Littleton, MA
Texas Comm. Center - Houston, TX
Texas Towers - Plano, TX
VHF Communications - Jamestown, NY
Williams Radio Sales, Colfax, NC

CANADA:
Atlantic Ham Radio Ltd. - Downsview, Ontario
C.A. Munro Ltd. - St. Johns, NB
Comtech Communications, Edmonton, ALB
C.M. Peterson Co. Ltd. - N. London, Ontario
Com-West Radio Systems - Vancouver, BC
Hobby Tronique Inc. - Ville St. Laurent, Quebec
R&S Electronics Ltd. - Dartmouth, Nova Scotia
Texpro Sales Inc. - Burlington, Canada



The purpose of the Tchadian trip was to find ways to safeguard water supplies from contamination.

ing strong, counter to what we were told before. The rainy season was tapering off, so traveling was much easier. Strange that rain was our worst adversary in a country beset by a drought. It just rained too much in the wrong places and not enough in the right ones.

Approaching Am Silep we crossed some of the worst terrain yet. The magnetic problems were so severe that using a compass was impossible, and we became hopelessly lost in a wilderness of sand and dead oases. Fortunately, our driver was a native of this part of Tchad and recognized the signs leading to a nomad camp. The people in the camp were typically suspicious, but the camp leader and his brother agreed to show us the route. They traveled with us for nearly 5 miles and then pointed out the trail. I offered them 5000 CFA (about $10.00), and they protested that it was too much. They finally agreed to take 1000 CFA, and I gave them gifts of books printed in Arabic, some matches, and some lemon-flavored Koolaid. This last I found was the most popular item I had. It was brought along to disguise the taste of the disinfectants in the drinking water, but I ended up trading most of it for information and shelter at night.

Am Silep was a refreshing contrast! The oasis floor was a beautiful garden, and the people were among the best fed and most cheerful we had seen at any of the relief camps.

We traveled on to Ati, where the Prefect had beds laid out in the palace guesthouse. It wasn't his fault that we were awakened at about 1:00 a.m. by gunfire. This time it was much too close! I heard bullets striking the wall only inches from my head. I also heard screams of at least one person hit. It turned out that a drunken soldier had taken offense when a palace worker refused to give him cigarettes, and he had decided to shoot up the whole palace in retaliation. The head of palace security disarmed him before too much damage was done, and the only casuality was one person hit in the leg. The prefect's car was parked beside ours and stopped several bullets. If it hadn't I would have had a hard job explaining why we had bullet holes in ours!

In Ati we made the usual inspections of relief camps, wells, feeding centers, and medical clinics before heading for Bokoro, about 175 miles to the southwest. At Bokoro we saw a clinic and feeding center for children which was operated by the Medicine Sans Frontiers organization.

Beyond here we went to Tchoweye, where we located two of the IHAP staff members who had been in the field for five weeks with no outside contact. I delivered packets of mail and medical supplies. To them, the mail was by far the most important item. Here I took many pictures for the United States Information Service, IHAP, and AID. The feeding center and camp was by far the best we had seen to date.

We made good time on our return to N'Djamena, but it was late at night before we arrived at home base once again. Since the family whose house I was living in had returned, I was offered the hospitality of the IHAP headquarters, where I had a private room and bath. Unfortunately, it was less than 100 yards from the antennas of the airport LORAN station, which operated on 1829 kHz. So much for 160 meters! Also I could only have antennas up during the darkness hours, since there were no trees big enough to hide them. By this time my operating was about 75% on 40 meters anyway, so the only factor was my being able to work 12 to 16 hour days and get by on 3 to 4 hours sleep a night. Several excursions to 80 meters were made by stringing one of the 40 meter ground radials from the top of the 40 meter vertical to the roof, making an inverted L of sorts.

The next trip took us by an alternate route to the refugee camps at Lake Tchad where a Catholic relief organization cared for some 30,000 persons. In the town of Karal, where we stayed one night, I got a chance to see a large solar power station installed by the Lake Tchad Authority for pumping water. The trip was uneventful for a refreshing change.

Enroute back to N'Djamena we stopped in the town of Massaguet to watch the celebration in honor of the new Prefect. Dancers and drummers kept going through the night, and we were provided food and lodging for the night by the school headmaster.

More report writing kept me busy for several days, but I managed to get in several long nights of operating on 40 and 80. A promised shut-down of the LORAN station did not materialize, so my one chance at 160 was lost. Excellent conditions to the midwest and west coast occurred several nights in a row, and rates of over 100 QSOs per hour were possible. Virtually all my operating was now on 40 CW with me transmitting on 7001 kHz and listening up. On more than one instance I was able to tune in stations calling as much as 35 kHz higher in the band. A good mix of USA, Europe, and Asia stations was always possible for several hours each night with conditions peaking to Stateside in strict accordance with the evening gray-line. It was interesting to note that while on the east coast the opening peaked for about an hour, the time duration of the peak rapidly shortened until the west coast only peaked for 15 to 20 minutes. During that time, however, west coast signals were 10 to 20 dB stronger than east coast signals.

An extension to my stay was authorized, but the operating permit that I had gotten when I

This antenna was too visible, according to the USAID Executive Officer.

first arrived was only good to October 14, so I closed down the station before my last field trip into southern Tchad. Since I had not yet received the formal authorization I had been promised, I contacted the Minister of Telecommunications before I started out, and he promised that it would be waiting for me when I got back.

Traveling by road in the south was too dangerous because of the Libyan-supported guerrilla fighters in the area, so we made the entire trip by air.

In Moundou I stayed at a small hotel, since I was not certain about the security of the Prefectural Palace. A hospital inspection was the first item on the agenda the next day. Here we saw people who had traveled as much as three days to see the doctor, and then had to camp out in the hospital courtyard for as much as two or three days more until their turn came.

In the afternoon we met with the local government officials about the water-supply situation and the USAID programs contingent upon my findings and report. We then flew to Sahr for another short meeting on the same subjects. Between Moundou and Sahr we were accompanied by the military commander of the southern regions who had not been able to travel by road due to the guerrillas and had no military aircraft available. Upon our arrival we were greeted by a military honor guard, and I basked in the unaccustomed VIP treatment.

The return to N'Djamena gave me only 10 days to go with about 100 pages of reports and innumerable conferences demanding my attention. I had received the letter from the Ministry of Telecommunications and only took the time to have my interpreter check to make sure it covered the necessary authorizations. I should have looked at it closer. It gave me unrestricted operating privileges through December 31! I could have been on the air for at least 7 or 8 more days!

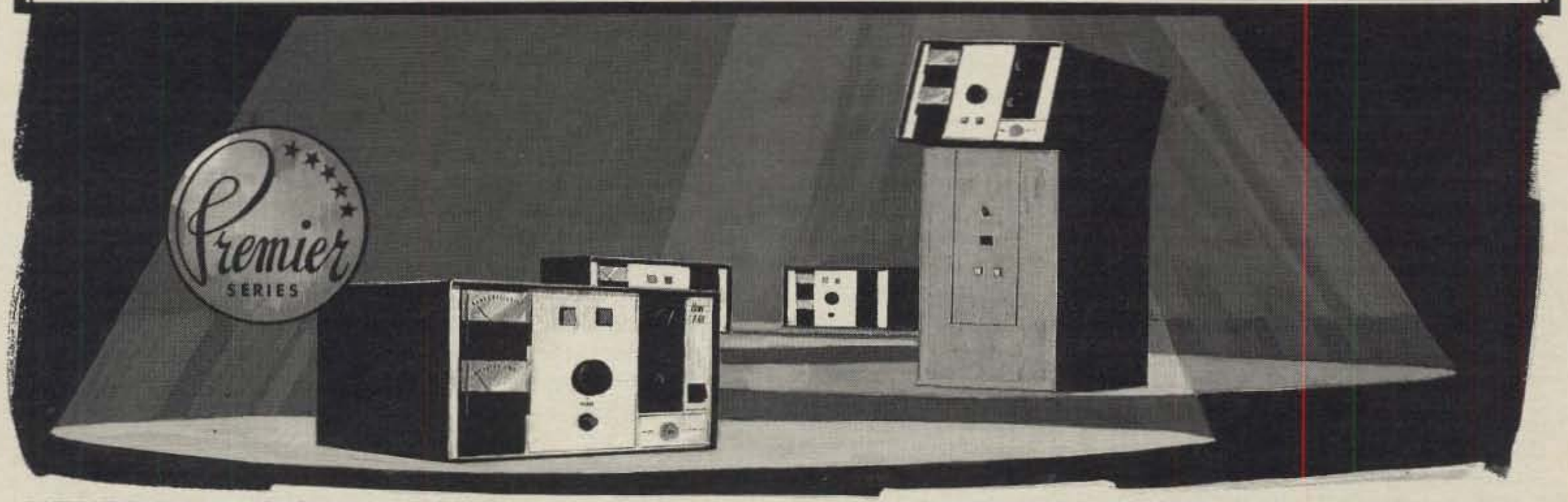
I had planned to take a few days of leave before returning Stateside and visit some of the more friendly mideast countries, but I was hit hard by malaria again and couldn't make it.

Upon my return to the States I stopped in Washington, D.C. for debriefings at the State Department and the Department of Health and Human Services. Between meetings I spent a lot of time at the Bethesda Medical Center to get rid of my Tchadian "bugs."

Since my brother, KØHGW, who had been collecting cards for me as QSL manager, had not received all the logs I sent back, I took two weeks leave to visit him in California and get started on answering the over 3500 QSLs that had accumulated. With the help of KØNL all the information from the original logs was entered on a TRS-80 computer and stick-on labels for all contacts were printed in alphabetical order. These were placed on cards, printed by KØNL, and then the task of envelope stuffing, stamp licking, and trips to the post office began in earnest. It wasn't until after Christmas that the backlog began dwindling as cards being received slowly became less than cards being sent out. One shortcut was taken by immediately sending off all UA QSLs directly to the bureau. Finally, by May 1986 the cards coming in dropped to only one or two a week, so all remaining cards were sent to the outgoing ARRL bureau.

The single memory of Tchad that I most treasure was a parting comment from our driver, M'Baibe, who had shared our triumphs and hard times equally. "To me, you will always seem a Tchadian in a white skin!" CQ

ANNOUNCING
A NEW LINE OF SUPER STARS..HENRY RADIO'S
PREMIER SERIES



HENRY RADIO'S NEW PREMIER SERIES . . . AMPLIFIERS FOR THE DISCRIMINATING AMATEUR WHO REFUSES TO COMPROMISE . . . THE 3K PREMIER AND 3KD PREMIER DELUXE AMPLIFIERS. ALL OF THE MATCHLESS QUALITY AND FEATURES OF THEIR PREDECESSORS PLUS QSK BREAK-IN KEY AND 160 METER BAND.

THE PREMIER SERIES

☆ **The 3K Premier Console** --- all the rugged reliability of the 3K Console plus QSK and the 160 meter band.

☆ **The 3KD Premier Desk Model** --- the same RF deck in a smaller and lighter configuration.

☆ **The 3002-A Console** --- maximum legal power in a two meter block buster.

☆ **The 3004-A Console** --- a unique new approach to high power UHF amplification at 440 MHz.

Attention: *All HF amplifiers can be modified for 10 meters • All export HF amplifiers are shipped with 10 meter operation included • Please call or write for a complete information packet*

FCC type acceptance pending on 3K Premier and 3KD Premier models.

Henry amateur amplifiers are available from select dealers throughout the U.S. and are being exported to amateurs all over the world. Henry Radio also offers a broad line of commercial FCC type accepted amplifiers for two way FM communications to 500 MHz, as well as special RF power generators for industrial and scientific users. Call or write Ted Shannon for full information.

We stock these plus many other fine names:
AEA • ARCO • ARRL • ASTRON • B & K • B & W • BIRD • CDE • CONNECT-SYSTEMS • CUSHCRAFT • EIMAC • HAL • HUSTLER • HY-GAIN • ICOM • KENWOOD • LARSEN • NYE • TEMPO • VIBROPLEX • YAESU

THE CLASSIC LINE
(Still available as before)

2KD Classic Desk Model ---3.5 – 21.5 MHz. (Two 3-500-Z tubes---the design Henry made famous)

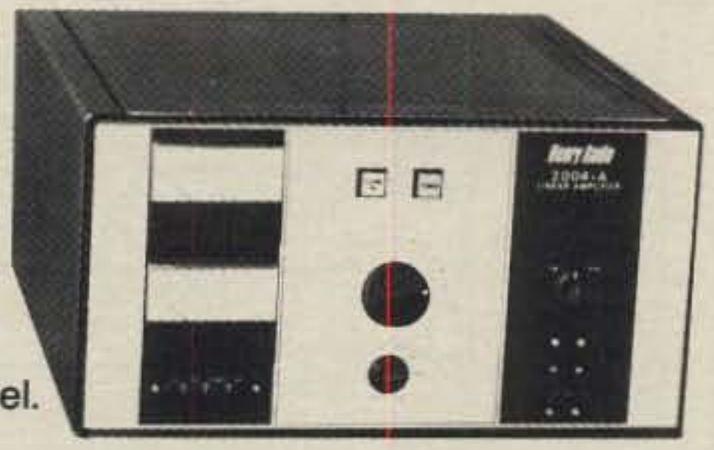
2K Classic Console --- the original and still the standard workhorse.

2K Classic "X" Console --- made heavy duty, rugged and reliable for a lifetime of service.

3K Classic Console with the magnificent 3CX1200A7 final tube.

2002-A...a two-meter desk model using the Eimac 3CX800A7... because this tube is rated at a 15dB gain, only about 25 watts drive is required for full output.

2004-A UHF desk model.



HENRY RADIO 60 YEARS OF SERVICE

Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
Butler, Missouri 64730 (816) 679-3127

TOLL FREE ORDER NUMBER: (800) 421-6631 For all states except California. Calif. residents please call collect on our regular numbers.
Telex: 67-3625 (Henradio) FAX (213) 826-7790

CIRCLE 30 ON READER SERVICE CARD

CQ REVIEWS:

The Kenwood TS-440S Transceiver Part II

BY JOHN J. SCHULTZ*, W4FA/SV0DX

Last month W4FA looked at the technical side of the Kenwood TS-440S. This time he takes you through the performance and operation of the unit in the shack.
—K2EEK

Setting the TS-440S into operation for a basic mode like SSB or CW is simplicity itself. Plug in the supplied microphone (or CW key) along with ground, power supply, and antenna connections, and you can start enjoying the rig. For AFSK, you have to make the suitable FSK in/out connections. With a linear amplifier, you have to make the usual interconnections, paying particular attention to an ALC feedback connection, as previously mentioned. Computer interface will be mentioned later.

Fig. 5 shows the front panel of the TS-440S. As with many of the advanced transceivers available these days, I suggest that you just appreciate the basic operating functions available first. Then slowly advance to the point where you can take advantage of all the features contained in a transceiver.

In the case of the TS-440S the basic controls are all intuitively obvious—analog controls for AF/RF gain, microphone, and carrier level, and switches for mode selection, meter functions, selectivity, band up/down, etc.

The only "basic" control that might deserve a bit of mention is the selectivity switch. In the "AUTO" position, it means that the transceiver uses the internal IF filter suitable for the mode selected. In other switch positions, it means that you select which IF filter should be used. Table III summarizes the possibilities.

If the optional antenna tuner is installed, the "AUTO/THRU" switch is set at "THRU." When tune-up is desired, the "AT/TUNE-OFF" switch is set to "TUNE." The "AT TUNE" LED below the digital display will light and then extinguish when tuning is complete. The "AT/TUNE-OFF" switch is then returned to its "OFF" position. No further action is necessary before transmitting, and the mode and send/receive switches need not be touched regardless of the mode in use. The meter switch may be placed in the "SWR" position to verify that the automatic tuner has done its job, but this is not necessary. Normally, the meter switch would be left in its "ALC" or "PWR" position. In the latter it functions as a peak reading output power indicator.

Progressing a simple step beyond the very basic controls, there are the obvious controls and switches for RIT/XIT, squelch, notch on/off, notch tuning, IF shift tuning, AGC fast/slow, "F.LOCK" (tuning knob inactive), noise blanker on/off, attenuator on/off, and manual send/receive.

The band up/down switches select through the various amateur bands, unless the "1 MHz" switch is depressed, in which case the up/down switches move the frequency band in 1 MHz steps from the last selected amateur band frequency.

The six switches under the "FUNCTION" heading mainly involve the built-in dual VFOs. VFO A and B can be independ-

*CQ magazine

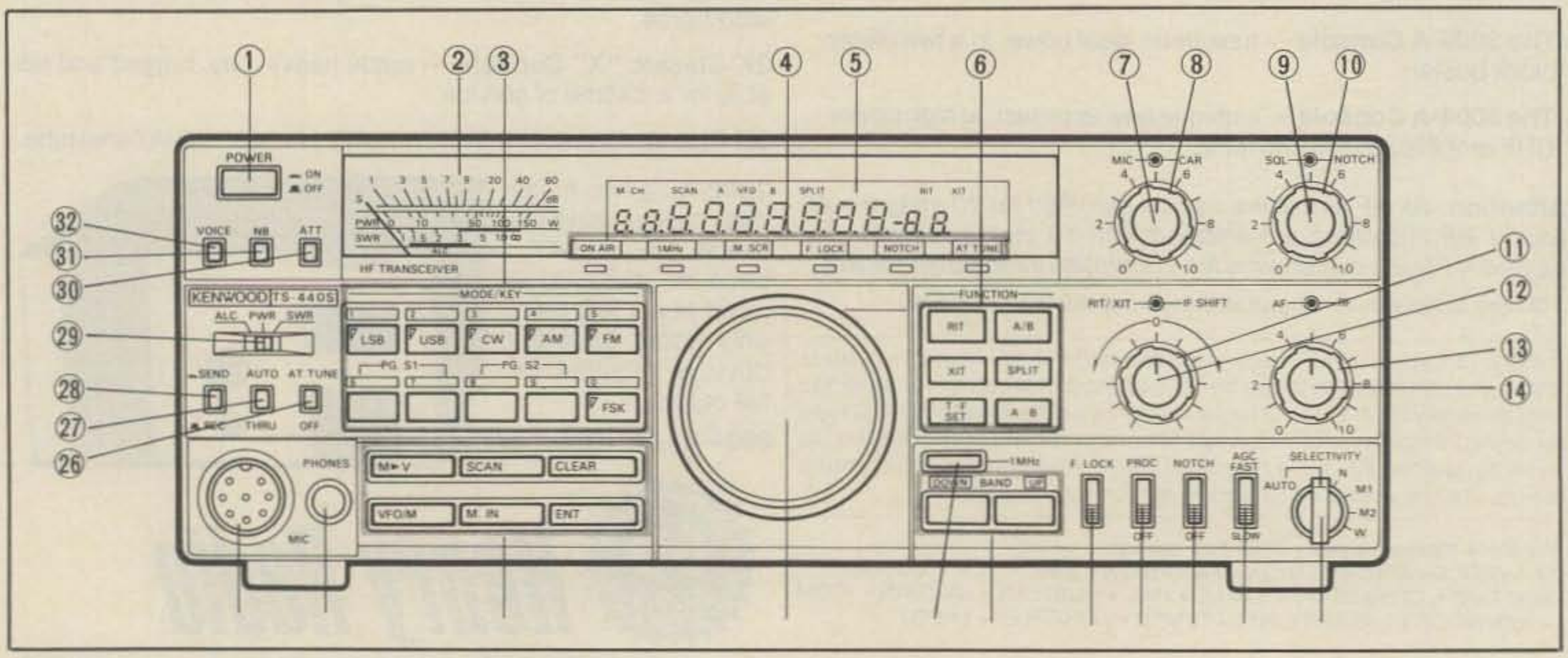


Fig. 5– Front-panel layout. Packed with controls, the TS-440S front panel is neatly arranged for easy day-to-day operation.

AUTO MODE

MODE	Without optional filter ( ): – 6 dB bandwidth
SSB	8.83 MHz + 455 kHz (2.2 kHz)
CW	8.83 MHz + 455 kHz (2.2 kHz)
AM	8.83 MHz + 455 kHz (6.0 kHz)
FSK	8.83 MHz + 455 kHz (2.2 kHz)

MODE	With optional filter (YK-88C/88CN/88S/88CN) ( ): – 6 dB bandwidth
SSB	8.83 MHz + 455 kHz (2.2 kHz) (2.4 kHz or 1.8 kHz)*
CW	8.83 MHz + 455 kHz (2.2 kHz) (500 Hz or 270 Hz)*
AM	8.83 MHz + 455 kHz (6.0 kHz)
FSK	8.83 MHz + 455 kHz (2.2 kHz) (500 Hz or 270 Hz)*

* Can be selected by changing the jumper line connection in the IF unit

MANUAL MODE

POSITION	Without optional filter ( ): – 6 dB bandwidth
N	No output signal
M_1	No output signal
M_2	8.83 MHz +455 kHz (2.2 kHz)
W	8.83 MHz +455 kHz (6.0 kHz)

POSITION	With optional filter ( ): – 6 dB bandwidth
N	8.83 MHz +455 kHz (2.2 kHz) (500 Hz or 270 Hz)
M_1	8.83 MHz +455 kHz (2.2 kHz) (2.4 kHz or 1.8 kHz)
M_2	8.83 MHz +455 kHz (2.2 kHz)
W	8.83 MHz +455 kHz (6.0 kHz)

Table III– IF selectivity options using Auto or Manual modes.

ently selected for frequency and mode, equalized, and used for split-mode and/or cross-band frequency operation. Their operation is quite simple, and it's just like having available two completely independent VFOs in every sense. Only one restriction applies. On CW semi or full break-in, the TS-440S VFOs cannot be used for cross-band operation. Full break-in is only possible within the same band. For the great majority of users, these restrictions are minor.

The set of switches under the "Mode/Key" block heading really unlocks the tremendous frequency control possibilities built into the TS-440S, and yet, the functions are not difficult to use. For simple direct keyboard entry of a frequency (using either VFO A or B) the "ENT" switch is depressed followed by the numeric switches, but trailing zeros don't have to be entered. For instance, if you are using VFO A on a 14 MHz frequency and want to check an approximate 3.8 MHz frequency, you use the sequence "ENT-3-8-ENT" to have the VFO switch to 3.800.0 MHz. You can, of course, enter the exact frequency down to 10 Hz if desired.

The TS-440S has 100 memory channels all fully usable using only the front-panel controls! To get a frequency into memory, it has to be transferred from one of the VFOs. To use a frequency in memory, the information regarding it has to go to one of the VFOs. The transfer of information is not at all complicated, but you do have to get used to a set routine regarding the use of the front-panel controls. A scroll feature is provided whereby you can review what is stored in the memory channels without affecting the operating mode. Ten of the memory channels (90 through 99) can store separate transmit and receive frequencies.

A further unique feature is that data can be transferred between memory channels. So any time you want to re-group, say, net frequencies or shortwave BC frequencies, you do it without having to re-enter all of the frequencies. Various scan modes are available whereby you can scan through all of the memory channels or only through selected memory channel limits.

Operating Notes

After a few months of using the TS-440S in both fixed and mobile installations, I would simply say that the TS-440S is a distinctly pleasant rig to operate. It has tremendous capabilities, but it is very easy to learn to operate it.

The receive section in the unit is definitely superior. It's sensitive yet "holds together" under the most crowded band conditions. The quality of the built-in speaker is excellent—a bit of a rarity. "Feel" of the tuning knob is very smooth, and it has an adjustable torque feature, which you can adjust by rotating a back rim on the tuning knob. The noise blanker is quite effective for ignition-type noise but not adjustable for other types of noise.

Optional CW and narrow SSB filters performed very well. I would say the 500 Hz CW filter is a "must" if you do any real CW operating. The narrow SSB filter definitely helps when the bands are crowded, but I don't regard it as a "must" if you need to hold back on spending money. On the other hand, the only negative point I could find is that there is no LED to indicate that the attenuator switch has been turned on. For one reason or other, I once used the attenuator and then spent a considerable amount of time wondering why the bands sounded so dead!

I (you) need 100 memory channels? I really don't know. So far I've only managed to program about 40 channels, but I suspect that number will double in a year or so. At any rate, it is nice to have such a great amount of memory capability available.

The optional antenna tuner performed perfectly and is extremely easy to operate. It will not match random-wire antennas, because it was not designed to do so. It operates perfectly for what it is intended to do—namely, to bring the SWR down to a 1:1 match when a beam, mobile whip, or dipole is used off of its resonant frequency but within the band for which it is dimensioned. The average tuning time was less than 10 seconds.

I received very good audio reports on transmit using the hand microphone supplied with the TS-440S. For fixed station usage, however, I preferred the Kenwood MC-85 microphone. It has a touch more audio "punch." Those who do extensive mobile operation might want to look into the MC-55 microphone. It's an electret type on a long gooseneck and can be permanently mounted in a vehicle.

The speech processor in the TS-440S is effective and does not produce any noticeable distortion. I left it switched on continuously. The TS-440S has CW sidetone but no audo monitoring on SSB. QSK operation was perfect, at least into the 20 wpm region, which is the best I can manage to do. The cooling fan within the transceiver is extremely quiet.

Power Supply

I used the TS-440S extensively with the PS-50 power supply. The PS-50 is a relatively small (about half the size of the TS-440S), but very potent unit. It has all sorts of regulation, contains a built-in cooling fan, and can deliver 20 amperes "key-down" continuously for at least one hour! It should more than satisfy the needs of any RTTY or SSTV user. I would really recommend it to anyone who might use a TS-440S in a fixed station setup, simply

Please send all reader inquiries directly.

CIRCLE 14 ON READER SERVICE CARD

CIRCLE 59 ON READER SERVICE CARD

- Programming and recall of VFO A and VFO B frequency
- MR (Memory Recall) and M.IN (Memory Input)
- Microphone UP/DOWN frequency control disable
- Control of the F.LOCK switch
- Memory channel selection
- MODE selection
- Control of RIT/XIT
- Selection of RIT/XIT frequency
- Scan operation
- Review of transceiver status

Table IV– Control possibilities if the TS-440S is interfaced to a PC using the optional interface kit (IC-10).

because the power supply is such a rugged unit. Besides powering the TS-440S, the supply does have accessory terminals for other gear such as a low-power 2 meter transceiver. The TS-440S itself has no direct provisions for use with transverters.

Computer Interface

An optional computer interface kit (IC-10) will allow many functions in the TS-440S to be controlled from a PC. Table IV lists the possibilities. The interface kit really consists of just two ICs that must be placed into sockets already provided in the TS-440S. The wiring interface to a PC is via a 13-pin "DIN"-type connector on the rear of the TS-440S (a 13-pin plug is supplied with the transceiver).

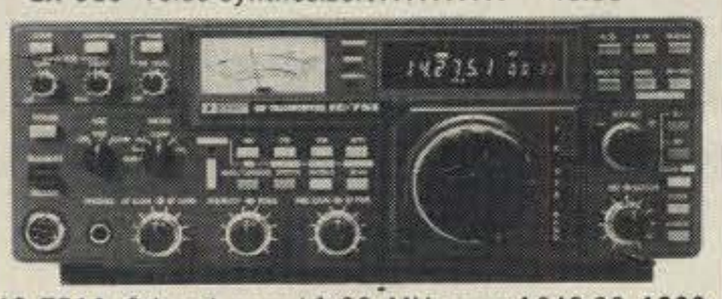
Manual

The instruction manual supplied with the TS-440S rates very high marks for being both complete and clear. It covers everything from basic installation of the TS-440S to operating the unit to installing various options to basic trouble-shooting. A very generous amount of illustrations is used, and the manual includes a full set of schematic and block diagrams but no PC board layouts. A service manual with such diagrams is available from Kenwood for a nominal cost. I would strongly recommend the purchase of the service manual at the time of purchase of the TS-440S.

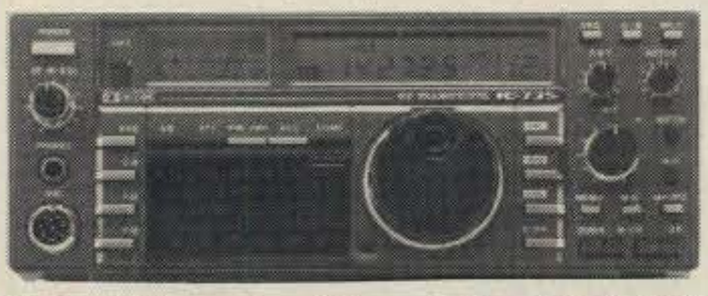
Summary

The TS-440S is a delightful rig to operate straight from its smooth tuning "feel" to its very efficient automatic antenna tuner. Its compact size makes it very attractive for mobile/portable operation. However, it should also prove to be a very satisfactory home station rig for amateurs who desire just about every feature possible in a state-of-the-art transceiver while staying *under* the $1K price line. Where is 4DØP? I just worked him using the TS-440S barefoot on 15 meters, and he gave me a 59 report! CQ

HF Equipment	Regular	SALE
IC-761 HF xcvr/SW rcvr/ps/AT	2499.00	**2149**
HM-36 Scanning hand microphone	44.50	
SP-20 Ext. speaker w/audio filter	149.00	**139.95**
FL-101 250 Hz 1st IF CW filter	69.95	
FL-53A 250 Hz 2nd IF CW filter	108.00	**99.95**
FL-102 6 kHz AM filter	56.00	
EX-310 Voice synthesizer	46.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	**1399**
PS-35 Internal power supply	199.00	**179.95**
FL-32A 500 Hz CW filter (1st IF)	66.50	
FL-63A 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	**99.95**
FL-53A 250 Hz CW filter (2nd IF)	108.00	**99.95**
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
RC-10 External frequency controller	39.25	



IC-735 HF transceiver/SW rcvr/mic	999.00	**869.95**
PS-55 External power supply	199.00	**179.95**
AT-150 Automatic antenna tuner	445.00	**349.95**
FL-32A 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	**1699**
PS-15 20A external power supply	169.00	**154.95**
PS-30 Systems p/s w/cord, 6-pin plug	299.00	**269.95**
MB Mobile mount, 735/751A/761A	24.50	
SP-3 External speaker	61.00	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal for 751A	63.00	
PP-1 Speaker/patch	179.00	**164.95**
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	**124.95**
AT-100 100W 8-band auto. antenna tuner	445.00	**389.95**
AT-500 500W 9-band auto. antenna tuner	559.00	**489.95**
AH-2 8-band tuner w/mount & whip	625.00	**549.95**
AH-2A Antenna tuner system, only	495.00	**429.95**
GC-5 World clock	91.95	**89.95**

VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1199.00	**1049**
IC-275H 100W 2m FM/SSB/CW	1389.00	**1229**
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	**1249**

ICOM

IC-475H 75W 440 FM/SSB/CW	1599.00	**1429**
IC-575A 25W 6/10m xcvr w/ps	1399.00	**1249**

IC-471A* 25W 430-450	**CLOSEOUT**	979.00	**749.95**
PS-25 Internal power supply		115.00	**104.95**
AG-1* Mast mounted preamplifier		99.50	
IC-471H* 75W 430-450	**CLOSEOUT**	1399.00	**989.95**
PS-35 Internal power supply		199.00	**179.95**
AG-35* Mast mounted preamplifier		95.00	

***Preamp $9.95 with 471A or 471H Purchase**

Accessories common to 271A/H and 471A/H		
SM-6 Desk microphone		44.95
EX-310 Voice synthesizer		46.00
TS-32 CommSpec encode/decoder		59.95
UT-15 Encoder/decoder interface		14.00
UT-15S UT-15S w/TS-32 installed		92.00

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM **CLOSEOUT**	639.00	**549.95**
IC-490A 10W 430-440 **CLOSEOUT**	699.00	**399.95**

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	429.00	**379.95**
IC-27H Compact 45W 2m FM w/TTP mic	459.00	**399.95**
IC-37A Compact 25W 220 FM, TTP mic	499.00	**439.95**
IC-47A Compact 25W 440 FM, TTP mic	549.00	**489.95**
PS-45 Compact 8A power supply	139.00	**129.95**
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, TTP mic	459.00	**399.95**
IC-28H 45W 2m FM, TTP mic	489.00	**429.95**
IC-38A 25W 220 FM, TTP mic	489.00	**429.95**
IC-48A 25W 440-450 FM, TTP mic	489.00	**429.95**
HM-14 Extra TTP microphone	55.50	
UT-28 Digital code squelch	37.50	
UT-29 Tone squelch decoder	43.00	
HM-16 Speaker/microphone	34.00	
IC-900A Transceiver controller	589.00	**529.95**
UX-29A 2m 25W unit	295.00	**269.95**
UX-29H 2m 45W unit	339.00	**309.95**
UX-39A 220MHz 25W unit	349.00	**319.95**
UX-49A 440MHz 25W unit	339.00	**309.95**
UX-59A 6m 10W unit	339.00	**309.95**
IC-3200A 25W 2m/440 FM w/TTP	599.00	**529.95**
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	37.00	
AHB-32 Trunk-lip mount	34.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	
RP-3010 440MHz 10W FM repeater	1229.00	**1089**
IC-1200A 10W 1.2GHz FM Mobile	699.00	**629.95**
IC-1271A 10W 1.2GHz SSB/CW Base	1229.00	**1089**
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	**104.95**
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	**119.95**
UT-15S CTCSS encoder/decoder	92.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1479.00	**1299**
RP-2210 220MHz 25W repeater	1499.00	**1329**

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2-meters	279.00	**249.95**
IC-2AT with TTP	299.00	**259.95**
IC-3AT 220 MHz, TTP	339.00	**299.95**
IC-4AT 440 MHz, TTP	339.00	**299.95**
IC-02AT 2-meters	365.00	**299.95**
IC-02AT/High Power	399.00	**339.95**
IC-03AT for 220 MHz	449.00	**389.95**
IC-04AT for 440 MHz	449.00	**389.95**
IC-u2A 2-meters	299.00	**269.95**
IC-u2AT with TTP	329.00	**289.95**
IC-u4AT 440 MHz, TTP	369.00	**329.95**
Accessories for micros - CALL $		
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	**399.95**
A-2 5W PEP synth. aircraft HT	499.00	**449.95**
A-20 Synth. aircraft HT w/VOR	599.00	**529.95**

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
MB-16D Mobile mtg. bkt for all HTs	24.50
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	34.95
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier	**SALE** **99.95**
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver	$949.00	**799.95**
RC-11 Infrared remote controller	67.25	
FL-32A 500 Hz CW filter	66.50	
FL-63A 250 Hz CW filter (1st IF)	54.50	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	42.50	
EX-310 Voice synthesizer	46.00	
CR-64 High stability oscillator xtal	63.00	
SP-3 External speaker	61.00	
CK-70 (EX-299) 12V DC option	12.25	
MB-12 Mobile mount	24.50	
R-7000 25MHz to 2GHz scan rcvr	1099.00	**949.95**
RC-12 Infrared remote controller	67.25	
EX-310 Voice synthesizer	46.00	
TV-R7000 ATV unit	131.95	**119.95**
AH-7000 Radiating antenna	89.95	**(7)**

HOURS • Mon. thru Fri. 9-5:30; Sat. 9-3

Milwaukee **WATS** line: **1-800-558-0411** answered evenings until 8:00 pm Monday thru Thursday.

WATS lines are for Quotes & Ordering only, use Regular line for other Info & Service dept.

All Prices in this list are subject to change without notice.

Order Toll Free: 1-800-558-0411 *In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195*

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 • Phone (414) 442-4200

AES® BRANCH STORES — Associate Store

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 34625
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
15 min. from O'Hare!

The 32nd Annual CQ World-Wide WPX Contest

SSB: March 26–27, 1988
CW: May 28–29, 1988

Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

I. Contest Period: Only 30 hours of the 48 hour contest period permitted for Single Operator stations. **Off periods must be a minimum of 60 minutes in length and clearly marked in the log.** Multi-operator stations may operate the full 48 hours.

II. Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 1.8, 3.5, 7, 14, 21, and 28 MHz bands may be used. No WARC bands.

IV. Type of Competition: 1. Single Operator (a) All Band, (b) Single Band (one entry per operator). 2. Multi-operator, All Band *only*. (a) Single Transmitter (only one transmitter and one band permitted during the same time period, defined as 10 minutes, no exception), (b) Multi-Transmitter (one signal per band permitted). **NOTE:** All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitter.

V. Exchange: RS(T) report plus a progressive three-digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000.) Multi-transmitter stations use separate numbers for each band.

VI. Points:

A. Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7, 3.5, and 1.8 MHz.

B. Contacts between stations on the same continent but different countries are worth one (1) point on 28, 21, and 14 MHz, and two (2) points on 7, 3.5, and 1.8 MHz. **Exception: For North American stations only—contacts between stations within the North American boundries count as two (2) points on 28, 21, and 14 MHz and four (4) points on 7, 3.5, and 1.8 MHz.**

C. Contacts between stations in the same country are permitted for multiplier credit but have zero (0) point value.

VII. Multiplier: The multiplier is the number of different prefixes worked. A "PREFIX" is counted only once regardless of the number of times the same prefix is worked.

A. A "PREFIX" is considered to be the letter/number combination which forms the first part of an amateur radio call sign (N1, NI1, AH2, W2, AZ1, IT9, UZ9, Y22, Y23, LX50, HG19, etc.). A station operating from a call area or country different from that indicated by its call sign is required to sign portable. **The portable prefix used must be a valid prefix of the DXCC country of operation.** The portable prefix would then be the multiplier. Example: N8BJQ/6 would count as N6, W8IMZ/LX would count as LX0, etc. KH6XXX portable in Ohio would not be KH8 which is normally assigned to American Samoa, but could

sign K8, W8, N8, NA8, etc., or any other prefix authorized for use in the USA 8th district.

B. Special event, commemorative, and other unique prefix stations are encouraged to participate.

VIII. Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score, QSO points on the band multiplied by the number of different Prefixes worked. See VII.

2. Multi-Operated stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, **prefix credit can be taken only once** regardless of the number of different bands on which the same station and/or prefix has been worked during the entire contest.

IX. QRPp Section: (Single Operator Only). Power must not exceed 5 watts output to qualify for QRPp section competition. **You must denote QRPp on the summary sheet and state the actual maximum power output used for all claimed contacts.** Results will be listed in a separate QRPp section and certificates will be awarded to each top scoring QRPp station in the order indicated in Section X. These certificates will be marked QRPp and will show your power output. QRPp stations will be competing only with other QRPp stations for awards. All other information contained in these rules is applicable to this section.

X. Awards: Certificates will be awarded to the highest scoring station in each category listed under Section IV.

1. In every participating country.

2. In each call area of the United States, Canada, Australia, and Asiatic USSR.

All scores will be published. However, to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single award **only**. If a log contains more than one band, it will be judged as an all band entry, unless specified otherwise. However, a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

XI. Trophies, Plaques and Donors:

SSB

Single Operator, All Band

WORLD - Stanley Cohen, WD8QDQ
U.S.A. - Atilano de Oms, PY5EG
CANADA - Ed Sleight, K4SB
EUROPE - Bernie Welch, W8IMZ
*JAPAN - The DX Family Foundation
SO. AMERICA - Ron Moorefield, W8ILC
OCEANIA - Down Under DX'ers
AFRICA - Southeastern DX Club
WORLD QRPp - Dayton A.R.A.

Single Operator, Single Band

WORLD - John N. Reichert, N4RV
U.S.A. - 7 MHz - William Diggins, WA8LXJ
*CANADA - Gene Krehbiel, VE7KB
EUROPE - Myron E. Crofoot, WB4VQO
JAPAN - Ken Ruddock, K6HNZ
*JAPAN - 28 MHz - Joe Arcure, W3HNK & Toshi Kusano, JA1ELY (Terry Appleton, W4GSM Memorial Award)
WORLD - 28 MHz - Jim Hoffman, N5FA
*WORLD - 21 MHz - Lee Wical, KH6BZF
WORLD - 7 MHz - William Diggins, WA8LXJ
U.S.A. - 14 MHz - Doug Zwiebel, KR2Q
U.S.A. - 3.7 MHz - Lance Johnson Engineering
U.S.A. - 28 MHz - Novice/Tech. only - Jon Engelhardt, KA0ZFX

Multi-Operator, Single Xmtr.

WORLD - Mike Badolato, W5MYA

Multi-Operator, Multi-Xmtr.

WORLD - Henry Thel, VE7WJ

Contest Expedition

WORLD - Kansas City DX Club

• • •

CW

Single Operator, All Band

WORLD - Terry Baxter, N6CW
U.S.A. - Steve Bolia, N8BJQ
*JAPAN - The DX Family Foundation
OCEANIA - Tom Morton, KT6V
*CANADA - Canadian Amateur Radio Federation (C.A.R.F.)
WORLD - QRP/p - QRP A.R.C.I.

Single Operator, Single Band

WORLD - Pedro Piza, Jr., NP4A (Pedro Piza, Sr., KP4ES Memorial)
U.S.A. - Kansas City DX Club
U.S.A. - 7 MHz - Dennis Younker, NE6I
ASIA - Bruce Frahm, K0BJ
WORLD - 3.5 MHz - Lance Johnson Eng.
U.S.A. - 14 MHz - Gene Walsh, N2AA
U.S.A. - 21 MHz - Wayne Carroll, W4MPY

Multi-Operator, Single Xmtr.

WORLD - Ron Blake, N4KE
U.S.A. - Austin Regal, N4WW
*CANADA - Tehrahedral Contest Circle

Contest Expedition

WORLD - Ed Roller, K4IA

Club (SSB & CW)

WORLD - CQ Magazine
U.S.A. - Northern Ohio A.R.S. (N.O.A.R.S.)

**Donor is responsible for this trophy.*

Trophy and Plaque winners may win the same award *only once* within a **TWO** year period. This does not apply to any QRPp, Club, Expedition, or *CQ* Special Awards. A station winning a World Trophy will not be considered for a sub-area award. That Trophy will be awarded to the runner-up for that area if the returns justify the award.

XII. Club Competition: A trophy will be awarded each year to the club or group that has the highest aggregate score from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area. **(Exception: DXpeditions especially organized for operation in the contest and manned by members.)** Indicate your club affiliation. To be listed, a minimum of three logs must be received from a club.

XIII. Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Prefix multipliers should be entered only the FIRST TIME they are contacted.

3. Logs must be checked for duplicate contacts, correct points, and prefix multipliers. Duplicate contacts must be clearly shown. Computerized logs must be checked for typing accuracy. Original logs may be requested if further cross-checking is required.

4. An alphabetical/numerical check list of claimed PREFIX multipliers must be sent along with your contest log. (A prefix is counted one time only.)

5. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the contestant's name and mailing address in BLOCK LETTERS.

Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.

6. Official log and sample summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available, you can make your own with 40 contacts to the page.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSO's or multipliers will be deemed sufficient cause for disqualification. (Incorrectly logged calls will be counted as unverifiable contacts.) Actions and decisions of the **CQ WPX Contest Committee** are official and final.

XV. Deadline: All entries must be postmarked no later than **May 10, 1988** for the SSB section and **July 10, 1988** for the CW section. **Indicate SSB or CW on the envelope.** Extensions may be granted if requested.

All logs go to: **CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY 11801 U.S.A.**

Questions pertaining to the WPX Contest can be sent to: WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenview Dr., Beavercreek, OH 45431 U.S.A.

Please remember to send in early for the WPX Contest Logs and Summary Sheets. CQ

Plagued with noise on 160? You barely have enough land for a 220 MHz dipole? What do you do? AB0X has some ideas that may help you pull those weak ones up out of the noise.

Some Thoughts On 160 Meter Receiving Antennas For City Lots

BY MIKE CRABTREE*, AB0X

There's little doubt that beverage antennas are the best receiving antennas for serious 160 meter operation. Yet for the average amateur, especially the city dweller, such an antenna system is out of the question. If you have 4 or 5 acres of open land around your QTH, pursue a beverage antenna and read no further!

If you use a vertical or shunt feed your tower for 160 operation, the following ideas may be of some practical use. Verticals can be used as effective radiators on 160, but they are usually very noisy. Of course, the urban 160 operator gets a double dose of this problem when atmospheric noise and man-made noise combine to make his life really miserable.

My QTH, unfortunately, falls into this category and has caused considerable frustration the last 2 years I have been active on 160. My shunt-fed tower has been an excellent transmitting antenna, which my recent DXCC on 160 verifies, but it certainly leaves a lot to be desired on receive. As a result, I have experimented with several different receiving antennas in this time period.

My garage looks like a graveyard of discarded 160 antennas. Three small receiving loops (used with a quality preamp) along with a mass of tangled wire from numerous inverted-L's all received unceremonial burials in the "Wire Room." (This is what my wife calls our garage.) Even though all of the designs tried had received rave reports in one or more articles, none of them worked effectively at my QTH!

Fred, N0XA, a well-known 160 meter DXer and good friend, had some success with a full-size loop suspended 8 feet above the ground (a 525 foot square). Much like a quad element turned on its side, Fred fed it with a 1:1 balun. However, with an 80′ × 120′ lot I found it would not quite fit on my property.

I experimented briefly with a shortened version of about 300 feet in length with a loading coil inserted to make it resonant at 1.830. Only limited success was experienced, but I believe more research might be justified with this shortened version. Certainly, if you could get the full 525 foot loop in your yard, I would recommend that you try it. Keep it low to the ground. At heights above 10 feet the loop begins to pick up noise. In my experience the loop would probably rank second only to a beverage for receiving on 160.

Sneaky Snake

Because of the limited space at my QTH, I had to look for another solution. N0XA passed on another idea he heard about on the air. The antenna is called a "snake," because it just stretches out across your yard like a giant reptile.

To construct it, simply stretch as much coax as possible out in a straight line with the far end shorted together, but separate the braid of the coax from the coax plug in the shack. Pull the braid back an inch or so and make sure the shield does not come in contact with the PL-259.

My limited space would only allow a little more than 100 feet of coax to be stretched out in a line. Limited success was achieved with this antenna. It occasionally out-performed the vertical on receive, but only in the direction that the coax line was running. Although this was encouraging, it didn't quite seem to be the answer. I believe it would be more effective if a run of over 200 feet could be stretched in a straight line. Also, I didn't test running this antenna through a tuner. This offers another possibility with which readers can experiment.

Still looking for a better receiving antenna than my vertical, I measured wire for a half-wave dipole at 1.830 MHz. Again, I was faced with a space problem since each half of the dipole turned out to be 127 feet long. There was no way I could fit it on my city lot.

I could get over one half of it out in a straight line if I bent the ends of it a little. I supported the antenna above my chain-link fence along the property line at about 7 to 8 feet above ground for over half the length of the dipole. The end of the fence only runs to the front of the house, so the rest of the antenna had to be tacked to the side of the house. This dipole also was fed with a 1:1 balun.

The bent dipole I ended up with runs north and south, but it is folded back to the northwest. This does not seem to affect performance that much. I consistently hear JA's better with it than with the vertical. It beats the vertical on signals from Europe and South America about 60% of the time. When switching over from the vertical to the dipole, signal levels are about 1 to 2 S-units weaker on the low dipole, *but* the noise almost disappears. The noise level on the vertical usually averages about S-8 or 9, but drops to about S-2 or 3 on the low dipole.

Presently, only a manual coax switch is being used to go back and forth between the antennas. Of course, this could be accomplished with a relay, if so desired.

Occasionally, the vertical hears better than the dipole, but this happens sometimes even to beverage owners. I believe this is due to the angle of the incoming signals. My evaluation of the above-mentioned antennas has been mostly subjective. I've worked more DX in the last couple of months than during the combined two winters I've spent on the band. Don't be misled, however. The low dipole and loop are compromise antennas and don't come close to the performance of a full-size beverage system. But it sure beats the heck out of listening to S-9 noise levels on the vertical!

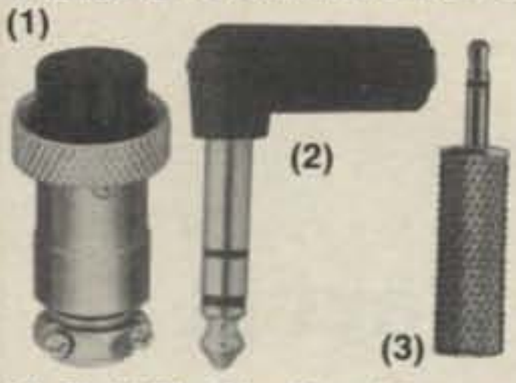
Hopefully, some of the ideas presented in this article will be helpful to the urban amateur. Many of the ideas need further experimentation and refinement. Also, remember that each QTH has its own unique set of conditions that can affect the noise levels and performances of low-band antennas. If this antenna doesn't work well for you, keep trying different designs until you find one that does. CQ

*7871 Webster, Kansas City, KS 66109

Radio Shack Parts Place™

Hams! Shop The Shack® for Parts and Accessories

Audio Connectors



(1) Eight-Pin Mike Plug. Fits many popular Ham rigs. #274-025 . . **2.19**
(2) Headphone Adapter. Right angle ⅛" jack-¼" plug. Mono. #274-371 . . . . . **2.99**
(3) HT Earphone. Mono ⅛" jack-$^{3}/_{32}$" submini plug. #274-327 . . **1.29**

Archer® Low-Loss Coax Cable

36¢ Per Foot

- **95% Shielding**
- **Made in USA by Radio Shack**

The really good stuff, in demand by Amateur radio operators! Low-loss, all-copper conductors and polyethylene dielectric. RG 8/AU, velocity factor 66%. Loss per 100 ft. at 100 MHz: 2.5 dB. #278-1323

Antenna "Fixin's"

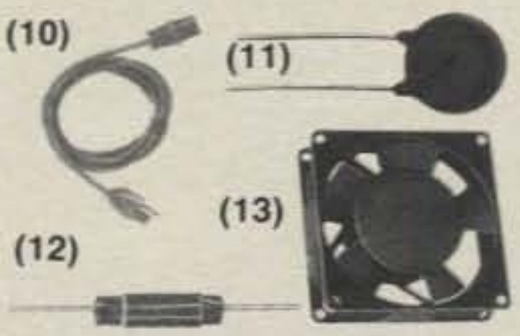
(4) Coax Cable Cutter. Blades cut clean—preserve cable impedance. #278-244 Reg. 4.95 . . . . **Sale 2.95**
(5) Coax Cable Stripper. Adjustable blades give perfect strips with RG6, 59, 58, 8M and 62 cables. #278-240 . . . . . **11.95**
(6) Heavy-Duty Antenna Wire. For Ham, SWL antennas. Bare copper. 65 feet. #278-1329 . . . . . **4.59**
(7) Insulators. For antenna center and end, or for guy wire installation. #278-1333 . . . . . **Pkg. of 2/69¢**
(8) RF Connector-Sealant Tape. Weatherproofs outdoor antenna connections. #278-1645 . . . . . **2.49**
(9) PL-259 Plug. #278-205 . . . . . **Pkg. of 2/1.99**

Spike Protector

Noise Filter Reduces RF Static

Protects electronic equipment from potentially damaging high-voltage spikes on AC line. Rated 15 amps. Six grounded-plug outlets, lighted on/off switch. Circuit breaker, 6-ft. cord. UL listed. #61-2780 . . . **29.95**

AC-Line Insurance



(10) AC Power Cord. CEE-type. UL listed. #278-1257 . . . . . **3.99**
(11) Heavy-Duty MOV. #276-568 . . **1.99**
(12) 100 µH RF Choke. #273-102 . . **99¢**
(13) Quiet 3" Fan. 7-13.8 VDC. #273-243 . . . . . **14.95**

Computer Connectors & RS-232 Tester

(14) RS-232 Inline Tester. Ends guesswork. #276-1401 . . . . . **14.95**
(15) RS-232 Transient Suppressor. #276-1402 . . . . . **16.95**
(16) Parallel Printer Connector. Centronics, 36-position. #276-1534 . . . . . **4.99**
(17) Shielded 25-Position Hood. Protects against EM/RFI. #276-1536 . . . **1.99**

Solder-Type "D" Submini Connectors

Fig.	Type	Positions	Cat. No.	Each
18	Male	9	276-1537	1.49
19	Female	9	276-1538	2.49
20	Hood	9	276-1539	1.99
—	Male	25	276-1547	1.99
—	Female	25	276-1548	2.99
—	Hood	25	276-1549	1.99

Novice Exam Kit

Learn How to Become a Ham

Prepares you for the new Voice Class FCC exam. Two cassette recordings for self-paced Morse code learning plus practice exam questions and answers to help you get ready for the test. #62-2402 . . . . . **19.95**

Amp/Speaker

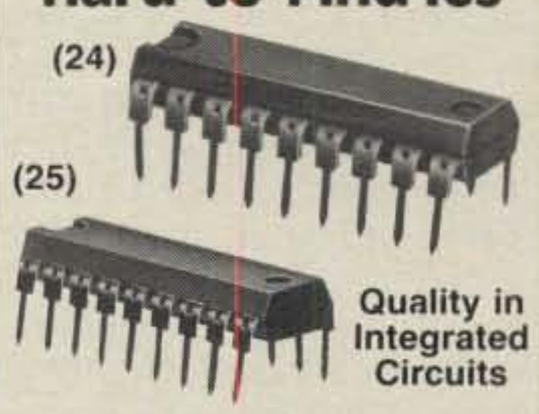
A Workbench "Must"

Makes the niftiest test amplifier! Also handy for computer voice synthesis, circuit tracers and dozens of other uses. High-gain IC design and 200-milliwatt output. Battery extra. #277-1008 . . . . . **11.95**

Shop "Helpers"

(21) Pocket Gas Torch. 5000° F for brazing or soldering. #64-2165 . . . . . **25.95**
(22) Hot Melt Glue Gun. Three glue sticks. UL listed AC. #64-2861 . . . . . **8.99**
(23) 6" Locking Forceps. Stainless steel, serrated tip. #64-1866 . . **4.95**

Hard-to-Find ICs



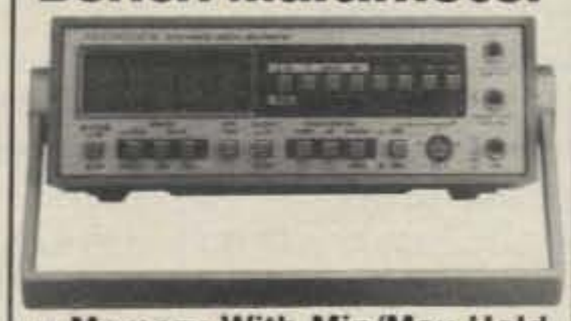
Quality in Integrated Circuits

(24) TDA7000, FM Receiver on a Chip. The heart of a repeater monitor. 70 KHz IF. #276-1304 . . . . **5.95**
(25) SSI202, Touch-Tone Decoder IC. DTMF receiver! Requires colorburst crystal. #276-1303 . . . . **12.95**

Dual-Track Supply

Delivers rock-steady voltage. Variable 0-15 VDC or in series up to 30 VDC. The two voltages can be adjusted simultaneously or separately. Switchable volt/amp meter for either output. UL listed AC. #22-121 . . . . . **69.95**

Bench Multimeter



- **Memory With Min/Max Hold**
- **Measures Transistor h_{FE}**

Our best! Features 31-segment analog bar-graph display, autoranging with manual override and buzzer continuity. Diode checker tests junctions. Measures AC/DC voltage/current and resistance. Batteries extra. #22-195 . . . . . **99.95**

Engineering Calc

37.95

- **110 Functions**
- **With Complex Numbers**

Accepts input and displays output using popular engineering symbols! Alphanumeric display with contrast control. Gamma functions, engineering keys. With functions for trig, statistics, base-number math/logic and fractions. #65-983 . . . . . **37.95**

"Hotline" Service

- **Fast Delivery**
- **No Postage Charges**

Your Radio Shack store manager can special-order a wide variety of items not in our catalog—tubes, ICs, crystals and more. No minimum!

Over 1000 items in stock: Binding Posts, Books, Breadboards, Buzzers, Capacitors, Chokes, Clips, Coax, Connectors, Fuses, Hardware, ICs, Jacks, Knobs, Lamps, Multitesters, PC Boards, Plugs, Rectifiers, Resistors, Switches, Tools, Transformers, Wire, Zeners, More!

Radio Shack®
A DIVISION OF TANDY CORPORATION
Prices apply at participating Radio Shack stores and dealers

CIRCLE 132 ON READER SERVICE CARD

In Part I, I took you into the world of Novice Enhancement and 10 meters. Here we will discuss antennas and other aspects of 10.

Novice Enhancement

The New World of 10 Meters—Part II

BY LEW McCOY*, W1ICP

I mentioned the simple dipole antenna shown in fig. 1 in Part I, but as you can see from the figure-8 pattern, it needs to be rotated for maximum performance. In fact, a simple but effective antenna is a rotatable dipole. One can be made up from electrical thin-wall tubing (only a few dollars per 10 foot length), and the antenna can be mounted on a convenient length of wood 2 by 2 to make a rotatable dipole.

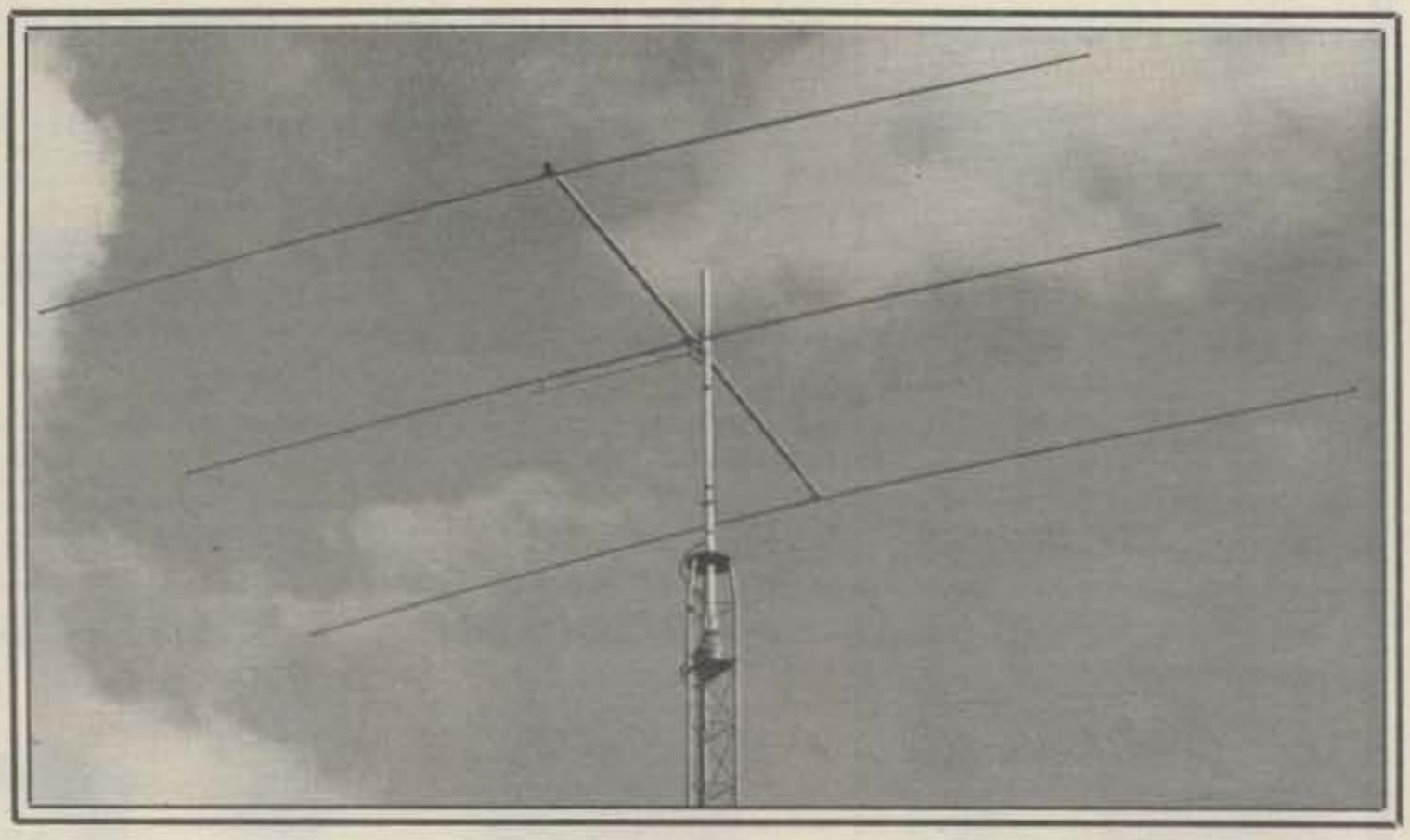
Ideally, the best antenna for 10 meters would be a rotatable beam of either 3 or 4 elements. If you plan to make a "career" out of 10 meters, then a beam is the thing you want.

The most popular type of beam is the Yagi. The name is derived from Dr. Yagi, who invented the antenna many years ago. Power is fed to what is called the driven element, usually a simple dipole. As mentioned above, the dipole has a figure-8 pattern with maximum radiation of the signal broadside to the plane of the dipole. The signal is much attenuated off the ends of the wire.

In a beam, additional elements are added parallel to the dipole and spaced certain distances from the driven element. If one of these elements is made longer than the driven element (usually 5 percent longer), it serves as a reflector. Normally, the spacing from the driven element is on the order of 0.15 or 0.2 of a wavelength—usually 0.2 for a reflector. Instead of a figure-8 pattern, we start to get directivity in mainly one direction. In other words, we "shape" the pattern. We don't lose or create power; we just "push" the power in one direction.

If we compare the dipole to our 2-element Yagi for gain, we find that the signal from our Yagi has about 4 dB gain in the forward direction as compared to the dipole, plus a very marked attenuation for the signals coming in from the back. This is known as the "front-to-back" ratio.

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



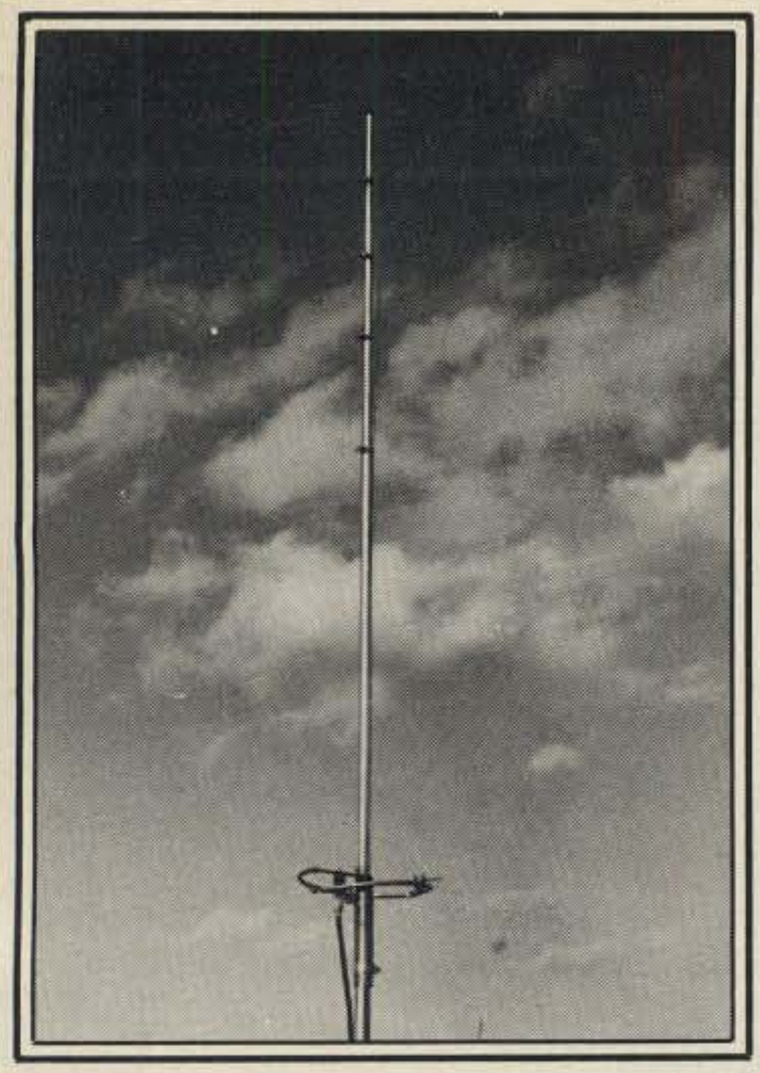
This is one of the beams described in the text. The center element is the driven element, and the beam has a reflector and director. Gain is over 7 dB with 20 dB front-to-back ratio. It is light enough to be turned by a TV rotator.

If we add a slightly shorter element in front of the driven element, we call this a "director." We enhance the directivity in the forward direction, and add even more gain. The gain of the beam—or "array" as we sometimes call it—now goes up to about 7 dB in the forward direction with a front-to-back signal discrimination of about 15 to 20 dB! Adding another director brings our gain up near 10 dB.

The figure of 10 dB is an easy one to remember, because that is an exact 10 times multiplier of your power. To simplify, your 100 watts going into your 4-element beam now is the equivalent of running 1000 watts (in the forward direction, of course). Don't misunderstand; your antenna doesn't become a "power amplifier," but it does shape your signal so that it concentrates the power in a desired direction. You rotate the beam and send your powerful signal in any direction desired! You can "hear" these effects when listening, too!

While this article is not a product review, I would like to take this opportunity to recommend an excellent four-element beam I have used with very good results. Cushcraft Corp. makes an extensive line of antennas, including multiband beams and verticals. I used 4-element 10 meter beam (Model 10-3CD) through one 10 meter "season"—a season lasting several years. According to my measurements, it has a more than honest 10 dB gain, plus a front-to-back ratio of a solid 30 dB. The boom length is 17 feet, which provides optimum spacing for Yagi design. Cushcraft loaned me a new beam, and that is what is shown in the photographs. Multiband beams are available also, but for having an outstanding signal, *and I assume that is what you are shooting for*, a monoband beam is the answer.

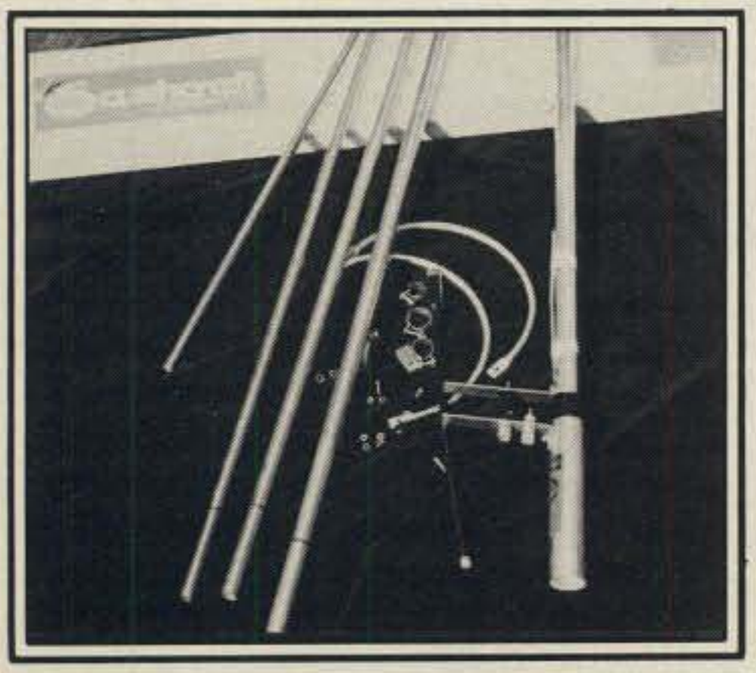
Nearly all new amateurs who get on 10 meters sooner or later have the desire to use a vertical. They look at handbooks and see the low angle radiation that a ver-



This is the completed Ringo Ranger ready for use. As discussed in the text, this is a half-wavelength omnidirectional antenna that requires no radials.

tical puts out and think that is the way to go. Verticals—normally—leave much to be desired in real-world performance. The type of verticals I mean are essentially quarter-wavelength units that must be used with radials. However, on 10 meters it is possible to think in terms of half-wavelength vertical antennas, which are much better performers. Again, Cushcraft makes a half-wavelength vertical called the Ringo Ranger. The antenna is also shown in the photos. Typically, the feed point can be adjusted so that impedance exactly matches a 50 ohm coaxial line. Perhaps one of the best things is that a half-wavelength design does not need radials.

The vertical antenna is essentially one that is omnidirectional, radiating equally well in a full circle around the antenna. Visualize a doughnut sitting on a flat surface with the vertical antenna at the center of the hole in the doughnut. The doughnut could represent the radiation pattern that goes all around the antenna. Gain is derived by designing the antenna so that the pattern is altered to provide more signal at lower angles (a flatter doughnut). The half-wavelength antenna fed at the bottom is a good performer in this sense.



The Cushcraft Ringo Ranger vertical is shown here as it comes from the factory. It only takes an hour or so to assemble it.

Propagation—Or What To Expect

One thing about the 10 meter band: it is predictable and it is not predictable. If that sounds a little crazy, it is. The condition of the ionosphere will govern the band as far as skywave signals are concerned. And, the condition of the ionosphere is directly related to solar or sunspot activity. The sunspot activity has been correlated by scientists into an index which is called the Solar Index, and this index is provided as a number.

As a general rule, the higher the number, the more openings on 10 meters worldwide. At the time of writing this article the Solar Index number is in the 60 to 70 range. An index of 70 puts us on the ragged edge, so to speak, of openings on 10 meters. Anyone coming on to 10 meters at this time is in for a real treat, because the numbers are rising and the next four or five years indicate very good propagation.

Earlier I mentioned a general-coverage receiver as being desirable. The U.S. Government maintains a radio station, WWV, that transmits continuously on 1.5, 5, 10, 15, and 20 MHz. This station transmits time and solar conditions (propagation information) and is a valuable tool to the amateur.

There are, however, openings and then there are *openings*. I should define an "opening." Ground-wave signals are the usual form of communication on 10 meters. This means line-of-sight operation when there are no skip signals to be heard. But a condition called sporadic-E-layer activity exists very frequently on 10 meters. What happens is the formation of ionized "clouds" form at the E-layer height. Usually this provides a short-skip signal path on the order of 1000 miles or so while these clouds last. This can be for just a few minutes or for hours, so they are unpredictable. (I am writing this on May 3rd, and I just checked the band and worked 6 or 7 Californians about 1000 miles away.)

The moral that can be applied to sporadic-E is to never think of 10 as being dead. Always put out a couple of long CQs. If you don't and the other guy who may be listening doesn't, *there is no way either one of you is going to know the band is open.*

When the sunspots really get going (and they will soon), the whole ball game changes. During the late fall and winter months and into early spring, the band will open around sunrise your time and stay open until evening hours. This will be primarily F1- and F2-layer propagation and will be for very long distances, around the world in fact. However, sporadic-E can happen at any time, day or night, winter or summer.

Recently, I wrote a two-part article on the subject of propagation which appeared in *CQ* (October and November 1987). I touched on a subject about which there has been much argument. Primarily, this refers to 10 meters because that is the band where the effect seems to be more evident. This effect is called "one-way skip." Simply, it is a condition where you can hear a signal come booming in, calling CQ for example, and when you call him, no answer. After 10 or 15 minutes of such calls to the same guy you end up thinking your signal must have some kind of RF bad breath. However, what has happened is that you have encountered one-way skip. Theoretically, it shouldn't happen because the path his signal takes should be exactly the reverse for you. More than likely, our old friend sporadic-E got in the way of one signal and not the other. Just be aware when it happens, because it will.

Operating and The Federal Government

I don't intend to say much about operating, because I am sure you will be preached at enough by other writers. For Technician class operators coming on to 10, this band has considerably different procedures than 2 meter repeater work. For example, "simplex" operation on 2 meters means working someone on the same frequency. However, on the low bands we nearly always work someone on the same frequency, but it is not called "simplex." In fact, we don't even apply a name to it. That seems to happen only on VHF and UHF and then only in repeater and remote base operation circles. You'll quickly learn the differences between the bands. What applies on 10 usually applies on the lower bands.

Having taught classes, I am familiar with the test questions. One asks about the use of correct or incorrect phonetics. I never agreed with this question simply because it is not an FCC rule (however, the question implies that it is a rule). The FCC rules (97.84 g,2) state that the FCC *encourages* the use of "a nationally or internationally" recognized phonetic alphabet (emphasis added). The problem here is that there are many different alphabets—no standard.

One thing you are going to find out, and very quickly, is that radio amateurs on the whole are rugged individualists who like to do their own thing. You will eventually find phonetics that work for you where

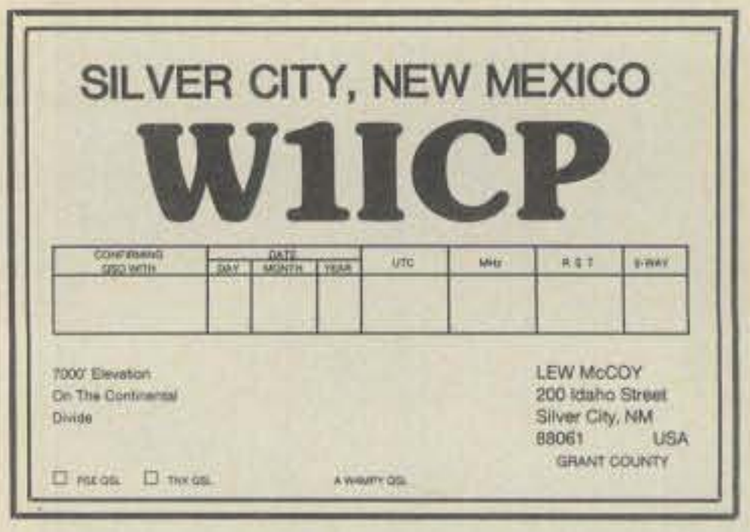
No - 29 - 30

the "recognized alphabets" won't. So don't be afraid to use them. And believe me, the FCC isn't worried about it. Take this from **W1 I**ce **C**old **P**op!

One piece of advice that I feel I should pass on: Don't operate too close to band edges. The monitoring wing of the FCC does do a lot of listening, and you can end up with a citation from the FCC. I know, I got a couple. If you do get one, for Pete's sake *respond to it*. If you respond with an apology or explanation, they let you off the hook usually. If you don't respond, they take your license away.

Log Keeping

At one time an amateur was required to keep an accurate log of his or her operation. This is no longer a rule. Nonetheless, for your own information *CQ* strongly recommends that you keep a log. Log keeping is important because the log becomes a written history of you and your station's operations. Be sure to list your equipment. Over the years it will change, and you may want to look back at what you were using. The log can also be a record of your QSLing (more about that in a moment). There are several types of log books sold commercially, but all you really need is a notebook. Many amateurs have computers and use logging programs with them. The "must" information in your log is: the call of the station you worked (or called), the date/time of the contact, the band and mode used, his/her name/location, the time the contact was started and finished, plus any other information you consider interesting.



Here is a sample QSL card. All the pertinent information is included.

QSLing

One of the traditional things in amateur radio is the exchange of QSL cards. From my own experience, I find that QSLing is not customary on VHF/UHF repeaters, although I have received a few cards. However, low bands are DX bands, DX being anything you wouldn't normally call on the land line (telephone). In most cases on the low bands, DX is thought of as foreign countries. And, whenever I work a foreign country I would like to have a QSL card from that country to verify the contact. To receive cards, you must send cards.

There are many awards (certificates) to be had. Nearly all these awards require confirmations—in the form of QSL cards. For example, a popular award is "Worked All States" (WAS) sponsored by the ARRL. To get this certificate requires working the 50 different states and getting QSL cards from each one.

There are many other awards including one of the most difficult, the one from *CQ*, the Worked All Zones award (WAZ). In any case, confirmations (QSL cards) are required. You'll find many ads for QSL cards in *CQ*. The fancier the card, the more it costs you.

When you have your cards printed be sure to have certain pertinent information on the card (this saves you writing it in). Your call and name, of course, are a must. You need blanks for time (which should be UTC), date, your address which includes street, town, zip and county (*CQ* zone, not time zone). You need a blank area for the type of contact—SSB, CW, etc. In other words, make sure that any information you can think of putting on the card is on it. I have shown a copy of my QSL card which is a basic, simple card.

As I said at the outset, 10 meters is a "fun" band and it is always an adventure working 10, because one never knows what to expect. Anyone for Worked All Zones? CQ

Wide Dynamic Range and Low Distortion — The Key to Superior HF Data Communications

- Dynamic Range > 75 dB
- 400 to 4000 Hz
- BW Matched to Baud Rate
- BER < 1 X 10^{-5} for S / N = 0 dB
- 10 to 1200 Baud
- Linear Phase Filters

ST-8000 HF Modem

Real HF radio teleprinter signals exhibit heavy fading and distortion, requirements that cannot be measured by standard constant amplitude BER and distortion test procedures. In designing the ST-8000, HAL has gone the extra step beyond traditional test and design. Our noise floor is at -65 dBm, not at -30 dBm as on other units, an extra 35 dB gain margin to handle fading. Filters in the ST-8000 are all of linear-phase design to give minimum pulse distortion, not sharp-skirted filters with high phase distortion. All signal processing is done at the input tone frequency; heterodyning is NOT used. This avoids distortion due to frequency conversion or introduced by abnormally high or low filter Q's. Bandwidths of the input, Mark/Space channels, and post-detection filters are all computed and set for the baud rate you select, from 10 to 1200 baud. Other standard features of the ST-8000 include:

- 8 Programmable Memories
- Set frequencies in 1 Hz steps
- Adjustable Print Squelch
- Phase-continuous TX Tones
- Split or Transceive TX/RX
- CRT Tuning Indicator
- RS-232C, MIL-188C, or TTL Data
- 8, 600, or 10K Audio Input
- Signal Regeneration
- Variable Threshold Diversity
- RS-232 Remote Control I/O
- 100-130/200-250 VAC, 44-440 Hz
- AM or FM Signal Processing
- 32 steps of M/S filter BW
- Mark or Space-Only Detection
- Digital Multipath Correction
- FDX or HDX with Echo
- Spectra-Tune and X-Y Display
- Transmitter PTT Relay
- 8 or 600 Ohm Audio Output
- Code and Speed Conversion
- Signal Amplitude Squelch
- Receive Clock Recovery
- 3.5" High Rack Mounting

Write or call for complete ST-8000 specifications.

HAL Communications Corp.
Government Products Division
Post Office Box 365
Urbana, Illinois 61801
(217) 367-7373 TWX 910-245-0784

CIRCLE 24 ON READER SERVICE CARD

Subatomic technology makes it possible to accurately date artifacts. Here's a look at the equipment necessary to carry out this magic. Bet you can't build one from your junk box.

The Shroud of Turin
Inside The Tandem Accelerator

BY W. EDMUND HOOD*, W2FEZ

Last March we ran "How Old Is The Shroud of Turin" by Bill Hood, W2FEZ. Originally it was designed to be Part II of a two-part article on the dating procedures and methods. Bill is employed at the University of Rochester, one of the groups involved in the new dating process. Part I is a discussion of the "hardware" involved in the dating, and follows below. While this "rig" runs a bit more power than we can, and is a "bit more" complicated than amateur gear, it makes fascinating reading. So, sit back and put your feet up and enjoy reading about the kind of work Bill does. —K2EEK

The first time I ever saw a nuclear accelerator, I was bewildered. The control room is about 50 feet square, and more than half of its wall area is covered with electronics. That's only the beginning.

*126 Wadsworth Ave., Avon, NY 14414

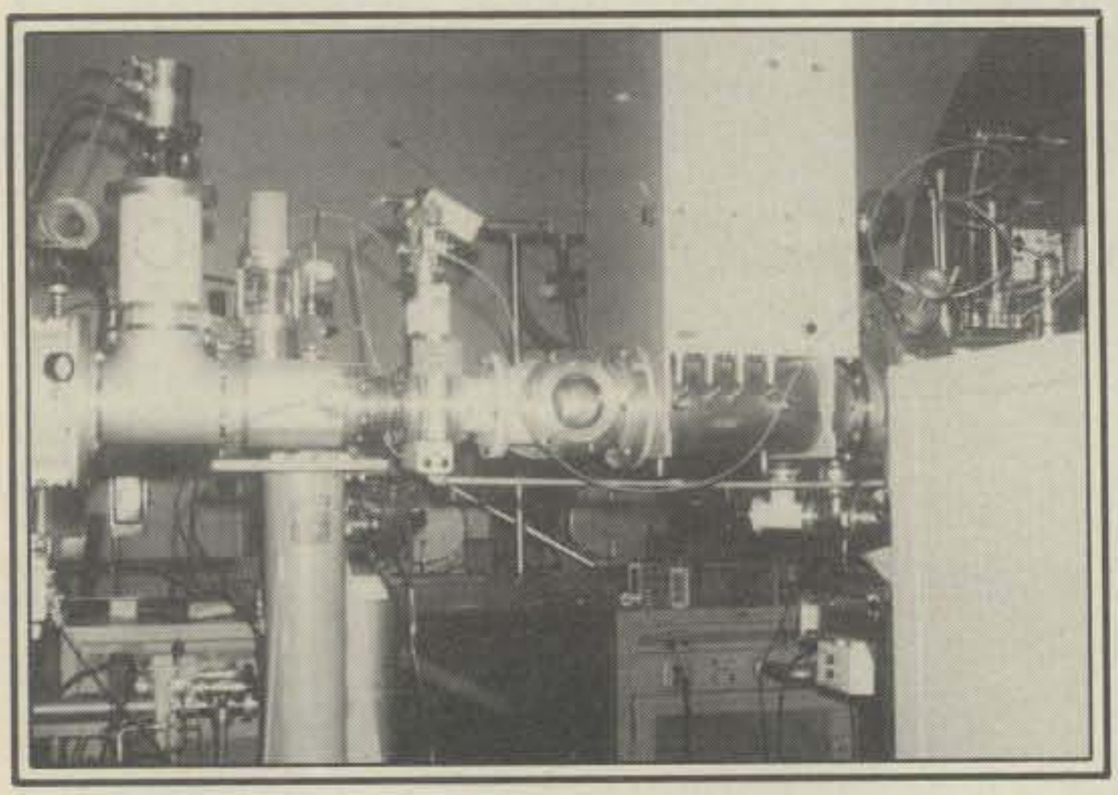
It begins with the injector, a 15- by 30-foot metal cage in which you see gobs of electronics and all kinds of nondescript devices sitting high on a metal platform. The cage isolates it for a good reason. That platform is about *150 thousand volts* negative away from ground.

A metal tube, almost completely hidden by supportive equipment, extends from the injector to a huge, orange-colored tank about the size of a railroad car. Inside that tank is a high-voltage terminal that can reach upwards of *eighteen million volts*. The tube continues another 30 feet or so beyond the wall, then through several rooms all filled with every imaginable kind of scientific equipment, both electronic and otherwise. An incessant, howling roar of machinery gives the whole scene a science-fiction atmosphere. You wonder, what's it all for?

The name is self defining. A nuclear accelerator is a device that accelerates a beam of nuclear particles—protons, neutrons, deuterons, or even whole atoms. With so high an accelerating voltage, the beam has enough energy to smash atoms or alter their internal structure. It is used in any of a large variety of experiments, ranging from the testing of exotic, short-lived isotopes to dating archeological samples.

There are several different kinds of accelerators. The one I am most familiar with is the Van DeGraaf linear electrostatic tandem accelerator. Its internal operation is similar to that within the neck of a TV picture tube, but on a much larger scale. First of all, a TV picture tube accelerates only electrons, but an accelerator can work with many kinds of particles. Second, a TV picture tube uses an accelerating electrode voltage of around 20,000 volts; the University of Rochester accelerator can produce a terminal voltage as high as eighteen million volts.

The high terminal voltage is reached by means of a Van DeGraaff generator (fig. 1). This consists of a high-voltage power supply (on the order of 150,000



The beam line. The cylindrical object extending out of the picture at the extreme left contains a series of electrostatic lenses and apertures to focus the beam. The tank containing the high-voltage system is just out of the picture on the right.

Inside the high-voltage tank. It's an eerie place. The high-voltage terminal in the foreground is about as large as a small automobile. The column rings, which obscure the pelletron chains and the beam tube, ensure a uniform voltage gradient throughout the acceleration process. (Photo courtesy Univ. of Rochester Nuclear Structure Research Lab)

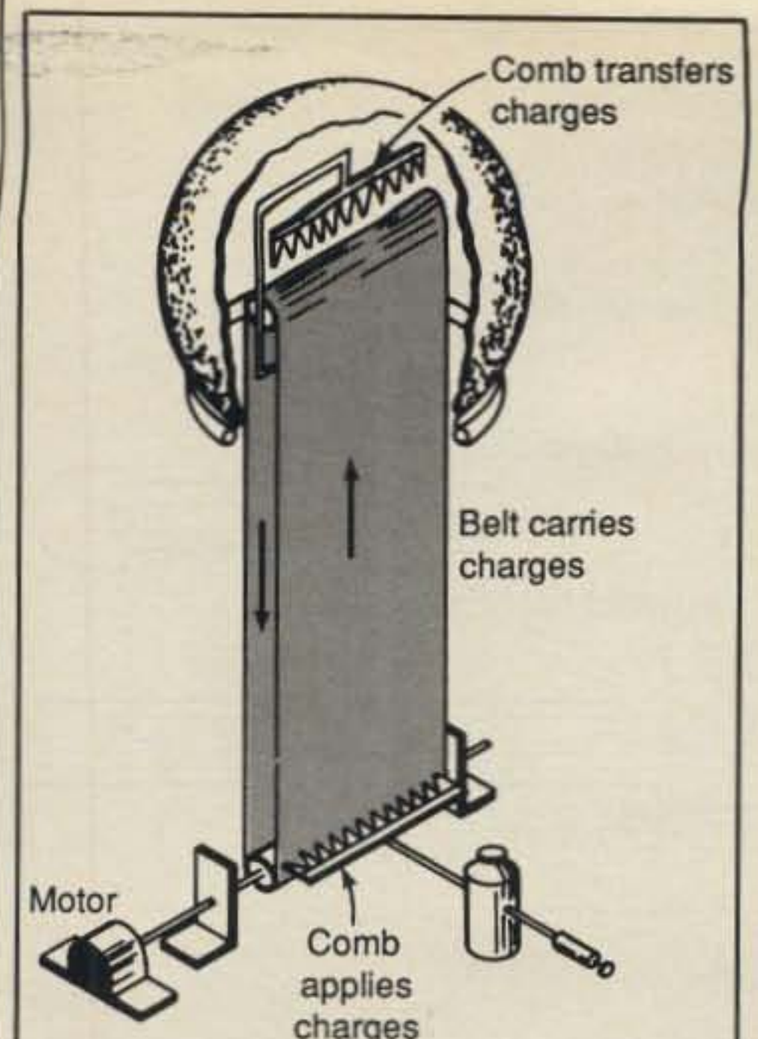
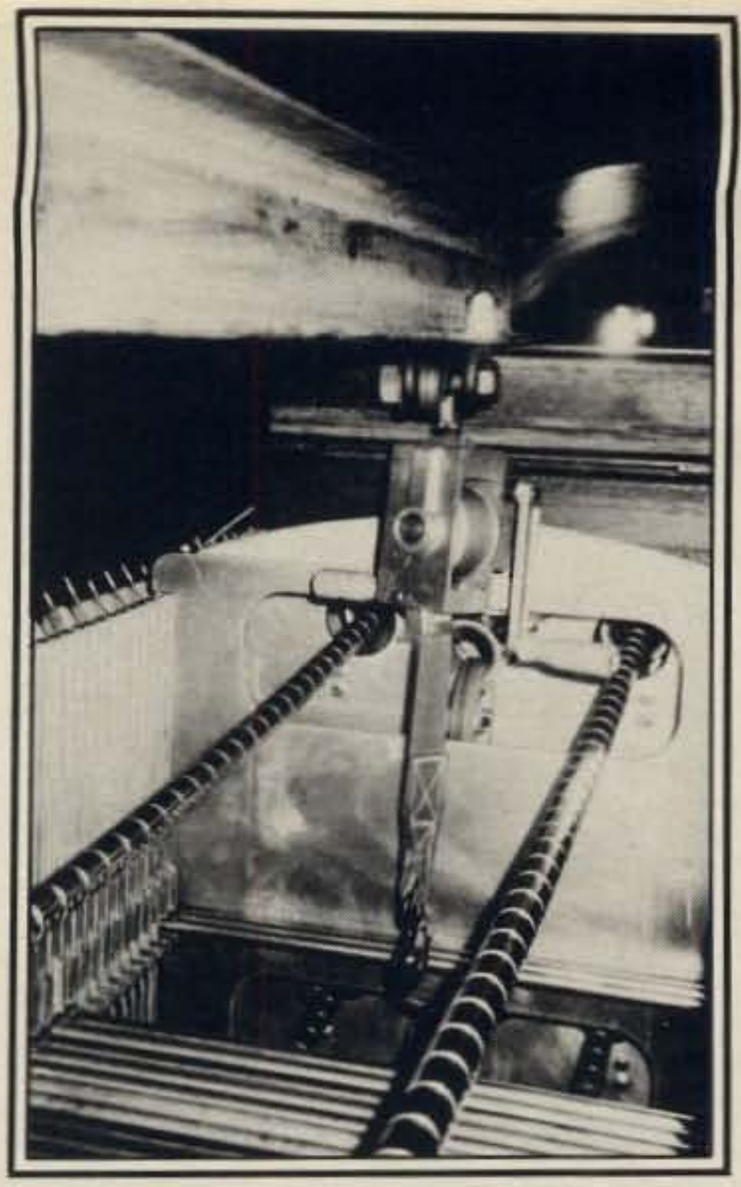


Fig. 1– A Van DeGraaf generator. With this device a relatively low voltage supply feeding the lower end of the belt can develop enormous voltages on the hollow, ball-like terminal at the top. Charges from the low-end supply are transferred to the belt by means of a series of metallic points resembling a comb. Another comb at the high end transfers the charges to the terminal.



Pelletron chains. The individual metal links are insulated from one another by plastic links. The I-beam and the hoist were being used to install the beam tubes. As in the preceding picture, the chains are normally concealed by the column rings. (Photo courtesy Univ. of Rochester Nuclear Structure Research Lab)

volts). The charge is transferred to a moving belt or to a chain of metal pellets insulated from each other. At the other end they are transferred to a hollow metal sphere about 8 feet in diameter (fig. 2).

In the University of Rochester accelerator there are two sets of chains called pelletrons, which feed the terminal from either end. The high-voltage system is housed inside a huge, orange tank. The tank is filled with a very dense gas, sulfur hexafluoride, which is the best known material to insulate against the extremely high voltage.

The column, from the input to the terminal, is about 35 feet long, and is surrounded by large rings about 6 feet wide. These rings are connected electrically into a network of specially-built resistors (about 1300 in all) which are in series from the terminal to the power input ends. They ensure a uniform voltage gradient throughout the length of the column.

The particle beam is produced in the injector. This consists of a vacuum chamber containing a cesium gun from which cesium atoms are focused onto a selected material to produce the desired particles to be accelerated. Then a massive electromagnet separates the desired particles from the assortment of particles loosened by the cesium gun.

These devices and their supporting equipment rest on a table that is charged to −150,000 volts. As the particles leave the injector, they are negatively charged. The terminal, charged to +18,000,000 volts, is about 50 feet ahead of them. A positive charge attracts a negative charge, so the particles are attracted toward the terminal.

The beam passes through an opening in the terminal. Inertia of the particles carries them on through to the other side of the terminal. On the way, the beam passes through a "stripper," a device which strips electrons off the particles. With the electrons removed, the particles are now positively charged. By now they have passed through the terminal, and, being positively charged, are repelled by the positive terminal, which is behind them. They continue going in the same direction, reaching speeds that are a sizeable fraction of the speed of light. At these speeds, the particles are capable of smashing atoms. This tandem action of first attracting then repelling the particles is the reason for calling it a tandem accelerator.

The accelerated beam of particles still must be focused and aimed in the right direction. Powerful electromagnets, clustered around the beam line, help perform

this task in the same manner as the yoke of a TV picture tube. Of course, much more power is needed here than in a TV tube. Numerous slits and electrostatic lenses are also used.

After passing the steering magnets, the beam line passes through the field of another electromagnet, much bigger than the steering magnets. Using current in the hundreds of amperes, this magnet bends the path of the beam 90 degrees. This is a very important function that purifies the beam. Each kind of nuclear particle, at a given energy level, takes a different level of magnetism to bend it exactly 90 degrees. Therefore, only the desired particles make an exact 90 degree turn. Unwanted particles, requiring a different level of energy to make the turn, will change direction by either a greater or lesser angle and be lost.

The beam line then passes into still another electromagnet called the switching magnet. This magnet directs the beam along any one of a half dozen or so lines into the target area that is set up for the particular experiment in progress.

Complicated as this description may seem, it is close to an oversimplification of the entire process. For one thing, the injector, where the electrical devices are referenced to a point that is −150,000 volts away from the real world ground, requires a lot of supportive equipment, and that same requirement continues along the entire beam line. Within the tank, eighteen million volts is not easy to insulate. The tank is filled with dense sulfur hexafluoride gas, which must be kept at the right pressure, constantly recirculated and cleaned. Sulfur hexafluoride, by the way, is hazardous. It is not only

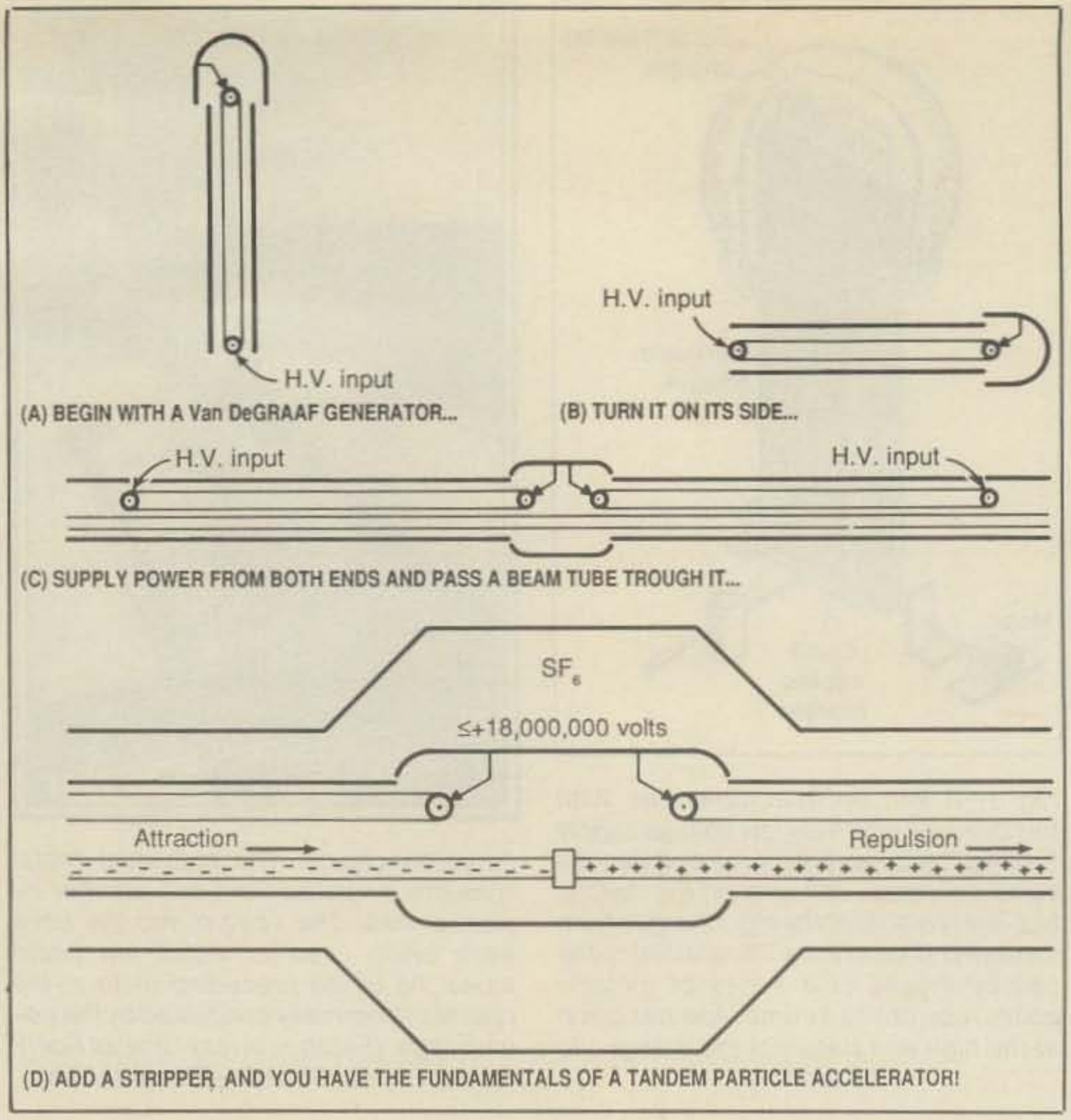
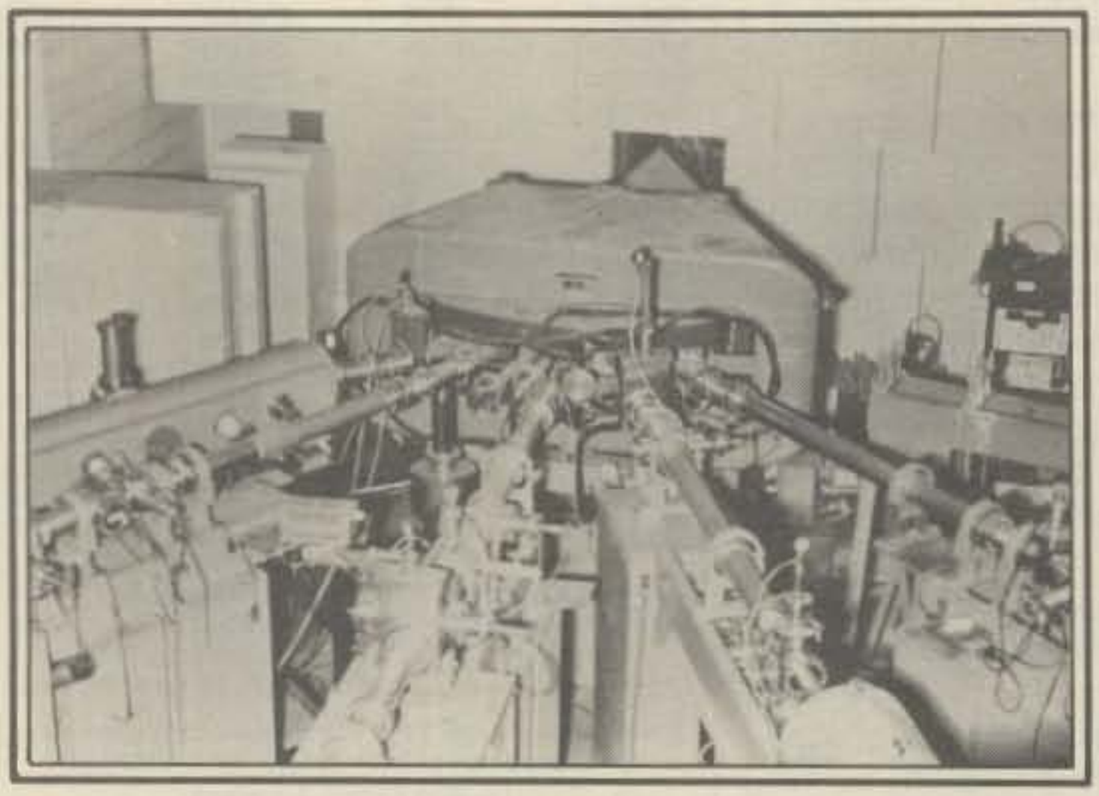
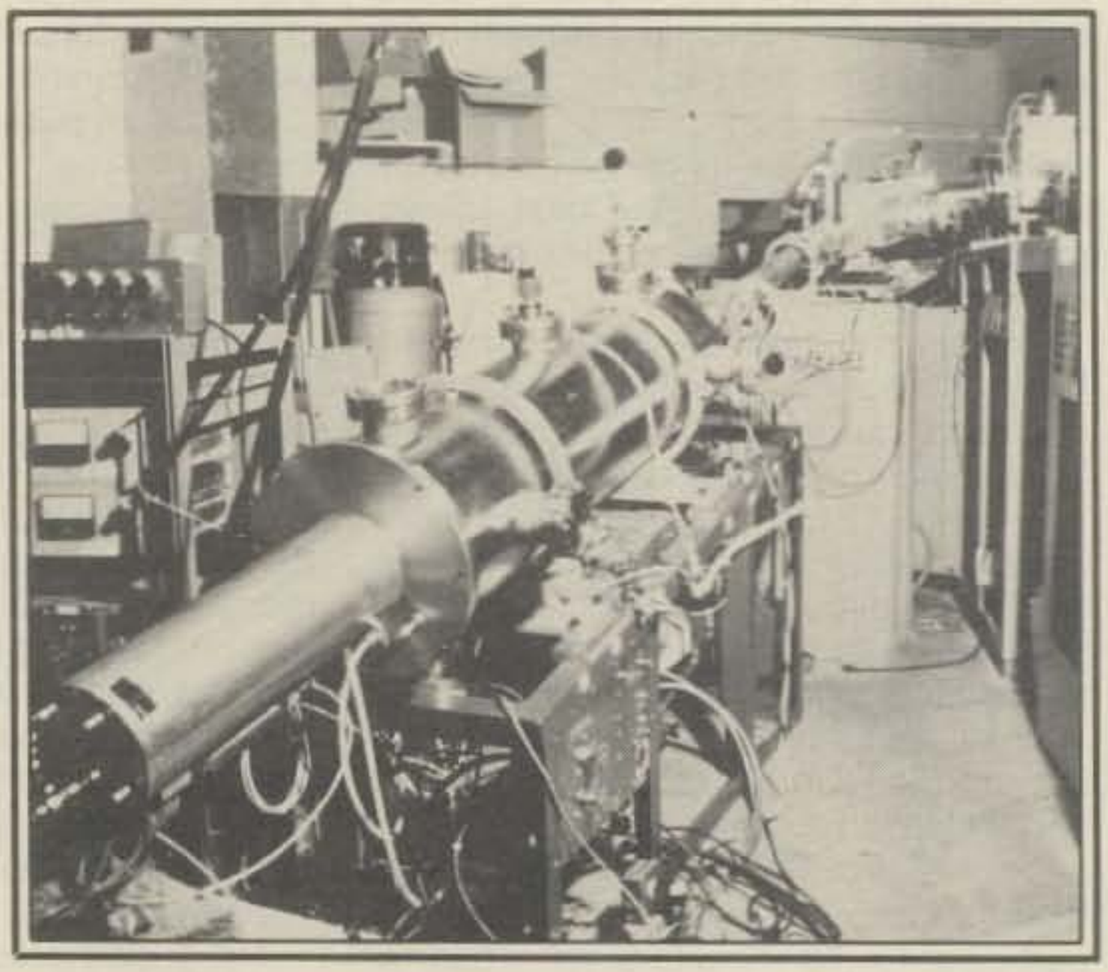


Fig. 2– The making of an accelerator. The internal arrangement of the tandem accelerator consists basically of a Van DeGraaf generator positioned horizontally. The one at the University of Rochester has two pair of pelletron chains, rather than a belt, one pair of chains feeding the terminal from either side. A foil stripper, placed in the beam line in the area of the terminal, is responsible for the tandem, attract-then-repel operation. Hence the name "tandem accelerator."



Switching magnet. Each of the five beam lines goes to a separate target room. Several unused, capped beam lines are also visible. A video camera, used to remotely monitor some of the operation, is visible in the left center of the picture. The wall in the background is about 2 feet thick to help screen out radiation generated in the accelerator room. (Photo courtesy Univ. of Rochester Nuclear Structure Research Lab)



The reckoning. This is the detector where the carbon 14 would be counted when and if the Shroud of Turin is carbon dated. (Photo courtesy Univ. of Rochester Nuclear Structure Research Lab)

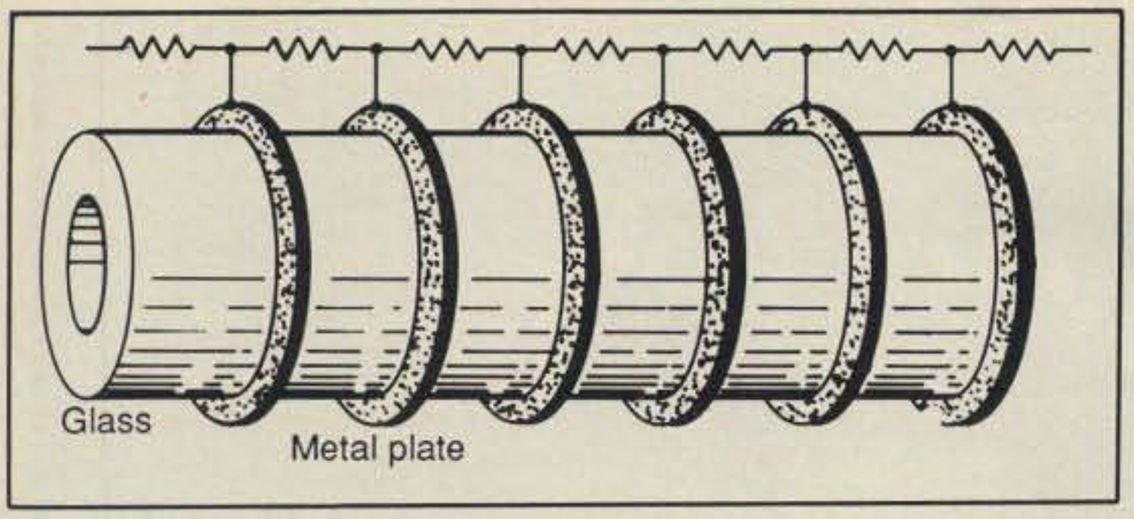
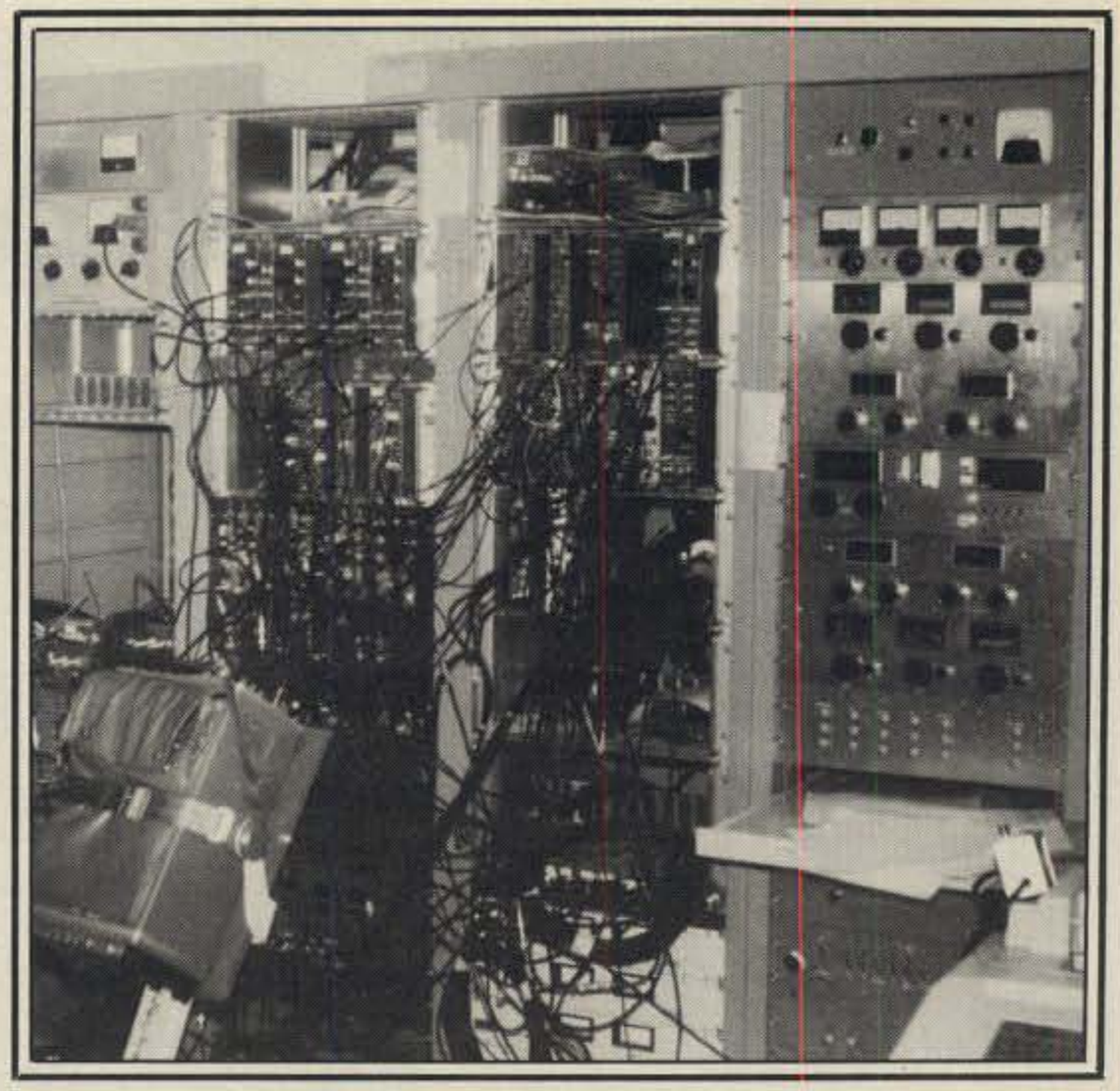


Fig. 3– Beam-tube construction. The sections of the beam tube within the accelerator tank are made of segments of glass rings with metal sandwiched in between. Resistors connected between the metal segments ensure a uniform voltage gradient. The entire assembly must contain a very high vacuum.



Ready for a run. Instrumentation modules are almost obscured by the nightmarish maze of interconnecting cables. This is where the output from the target-room detectors is processed. Output from this location is fed to the lab computer where the data is interpreted.

dangerous to life in a similar manner as carbon monoxide, but it is also very corrosive. Special equipment is needed just to handle the gas.

The portion of the beam line that runs through the Van DeGraaf generator is specially made of glass rings separated by metal (fig. 3). The metal pieces are connected together through the same network of resistors as are the rings that surround the column, and for the same reason—to ensure a uniform voltage gradient.

Part of the process of conditioning the sulfur hexafluoride can involve the use of radioactive isotopes. Personnel must be protected from this radioactivity as well as from radiation generated by the effects of the beam itself. (Some beams are quite benign, generating little or no radioactivity, while others can be pretty hot.) An elaborate, computer-controlled interlock system shuts down the accelerator if anybody enters a hazardous area without taking the proper precautions. Equipment in the high-voltage injector and in the target areas can be operated by remote control. Some of it is monitored by closed-circuit television.

The part of the building containing the accelerator lies beneath a large earth mound. Between the accelerator chambers and the outside, there are about 6 feet of concrete and 30 feet or so of dirt. That's what it takes to stop fast neutrons. The protection is so effective that while the machine is running full blast with the nastiest of beams one could lean on the fence all day and not receive any more radiation than that amount which exists normally in the atmosphere.

The accelerator is controlled from a console about 100 feet away from the injector. The control room is separated from the accelerator room by thick walls of concrete and soil. Radiation travels in a straight line. For that reason, corridors to the accelerator and target rooms have several bends. Any radiation that gets into the corridors cannot get around the bends, and consequently never reaches the control room.

The walls of the control room are packed with equipment racks. In truth, not all of it is in use at any one time. A number of racks are reserved for each target line, and only one target line is in use at any one time. Raw data from the target areas is processed in the equipment racks and sent on to the computer where it is interpreted.

The equipment racks can be described almost as a massive breadboard arrangement. All the devices that must process the raw output from the target rooms are in the form of plug-in modules which are cabled together for the individual experiment in progress. No two arrangements are identical. The arrangement of devices in the racks is a fluid one, in a constant state of change.

There are less than two dozen accelerators of this type in the world. The one in Rochester has one of the three highest DC terminal voltages. Even with that impressive status, further upgrading is already being planned as the frontiers of knowledge are constantly being pushed further and further back. CQ

CUSHCRAFT ENHANCERS FOR THE NEW NOVICE BANDS

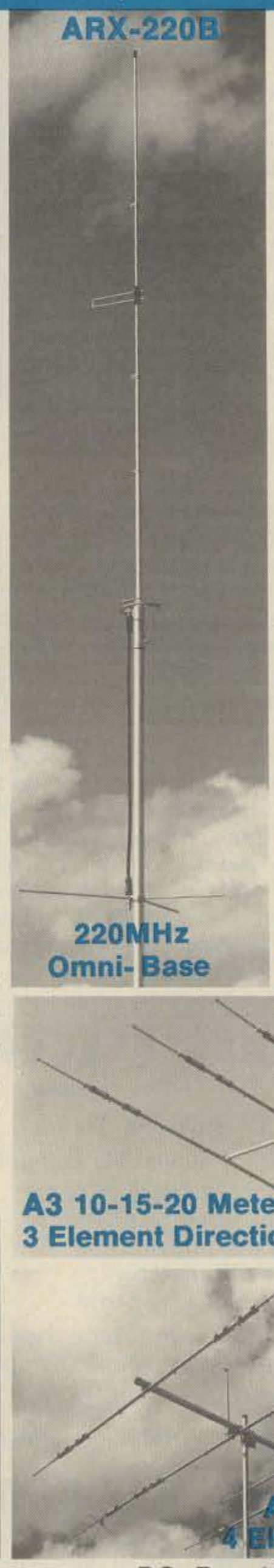
A220-7 220MHz
7 Element Directional

A220-11 220 MHz
11 Element Directional

Make the most of your new privileges.

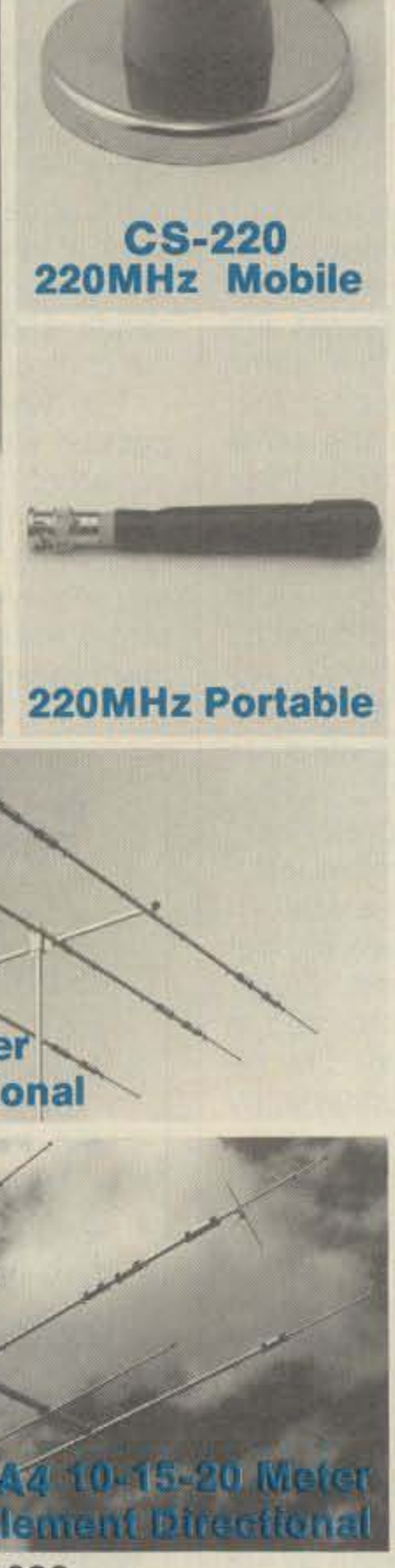
For the best performing station, select Cushcraft fixed, mobile, and portable antennas. They are the popular choice because of their performance, durability, and ease of assembly. More hams choose Cushcraft than any other brand of amateur antennas.

10-3CD 10 Meter
3 Element Directional



ARX-220B

220MHz
Omni- Base



CS-220
220MHz Mobile

220MHz Portable

A3 10-15-20 Meter
3 Element Directional

A4 10-15-20 Meter
4 Element Directional

ALL BAND VERTICAL

AP8

cushcraft CORPORATION

P.O. Box 4680
Manchester, N.H. 03108 USA
Telex: 4949472 CUSHSIG MAN
AVAILABLE THROUGH
DISTRIBUTORS WORLDWIDE

CIRCLE 23 ON READER SERVICE CARD

DX THAT STANDS OUT FROM THE CROWD

A3

10, 15, 20,*40 meters

Whether busting pileups, rag chewing or hunting rare DX, the A3 stands out from the crowd with the perfect combination of easy assembly, the right size, rugged durability and great performance.

***40 METERS WITH THE A743 ADD ON KIT, STAINLESS STEEL HARDWARE KIT AVAILABLE**

OUTSTANDING A3 FEATURES

- Gain 8dBd, F/B Ratio 25 dB
- Typical SWR 1.2:1
- Average Band width 500 KHz
- Power Rating 2,000 Watt PEP
- Boom Length 14ft, Weight 27 lbs
- Longest Element 27ft
- Wind Surface Area 4.36ft
- Turning Radius 15.5ft

With the Cushcraft A3 you too will stand out from the crowd.

THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

Just recently got the beam in the air and it works great! . . . F.H. Huyette W7ALZ

Works absolutely great! . . . Bob N1EKP

Thanks for a fantastic antenna . . . Jeff KA8TKC

The antenna went together quickly without missing or left over parts. Nice job of packing! . . . Ray KE7RO

A fine antenna! . . . Joe KA3MMJ

The beam performed very well under rugged conditions. Over 13,000 contacts were made and 142 countries . . . Navassa Expedition 6Y5NR

cushcraft

P.O. Box 4680, 48 Perimeter Road
Manchester, NH 03108 USA/603-627-7877
Telex 4949472 CUSHSIG MAN

AVAILABLE THROUGH DISTRIBUTORS WORLDWIDE.

CIRCLE 121 ON READER SERVICE CARD

Get out your woodworking tools and plan a quick trip to the lumber yard, for WA2JHD has come up with another of his plywood projects. This one will go a long way toward neatening up your shack and making the XYL happy.

The Rig Rack

BY BILL GREENE*, WA2JHD

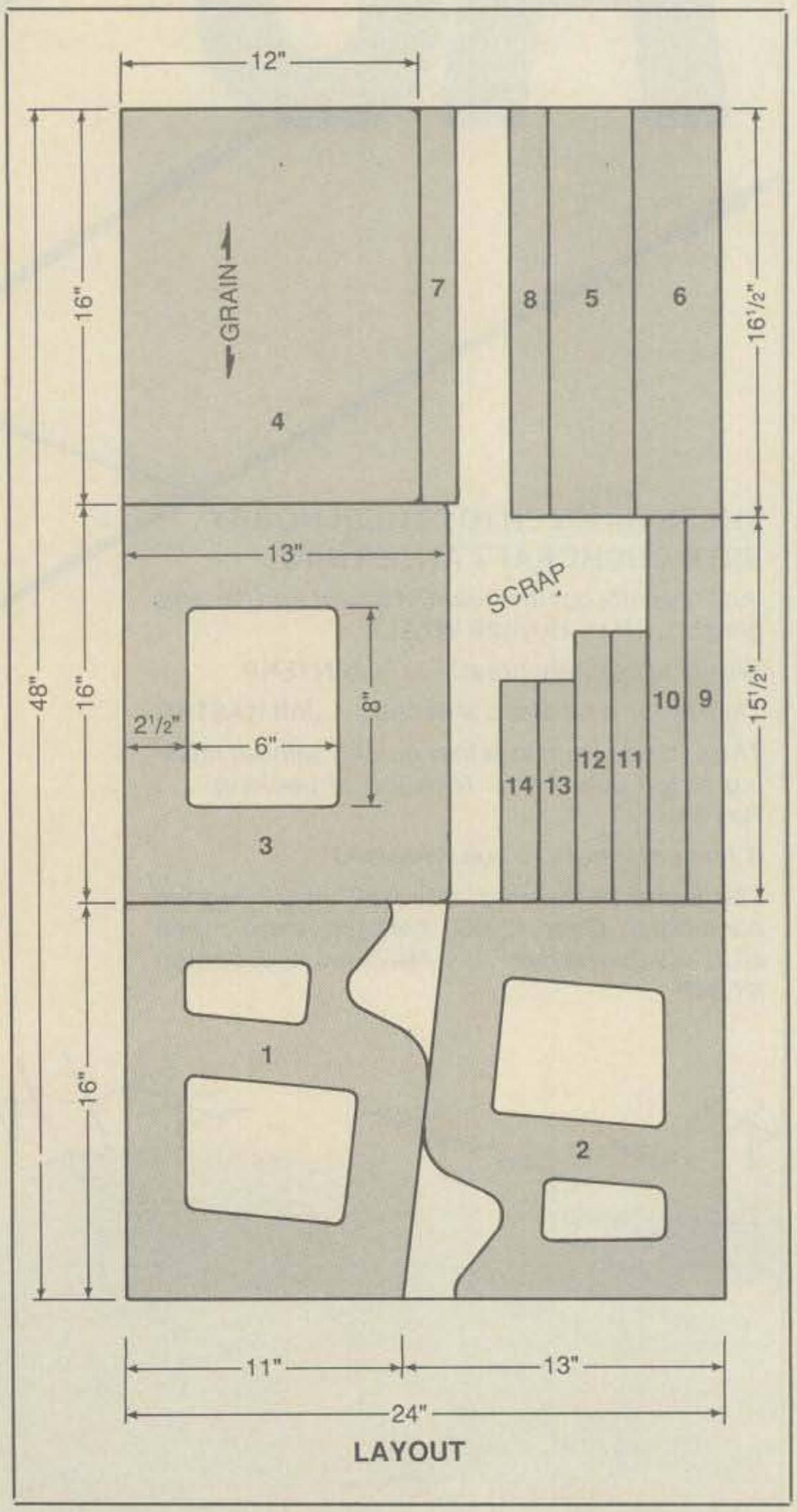
Each May, *CQ* sets up shop at the Rochester Hamfest, and each year I get a chance to report on what's new at the "Muppet Labs" of "the plywood tower man" (*CQ*, August '84). This year's project is the genuine WA2JHD plywood rig rack.

Anyone of you who is also the harborer of those furry critters known as cats (in New York State they are neither wild nor domestic) can testify that one of their favorite resting places is on top of a nice warm rig. This can cause problems. Although they may appear clean and well groomed, they shed hair constantly, and if they have just come in from a muddy field, well . . .

There seems to be just enough residual static electricity inside a rig to attract all that stray hair. I have seen my critters back into an 800 volt antenna lead without batting an eye (here the hair must be insulating), but let one hair get between the pins of a tube, and you could be off the air. After years of taking a ribbing about being off the air due to a "cat's whisker," I decided to do something about the situation. This one-evening project solved my problem. At the same time more cooling air can reach the rig, or you can leave the cover off during a long-term service job.

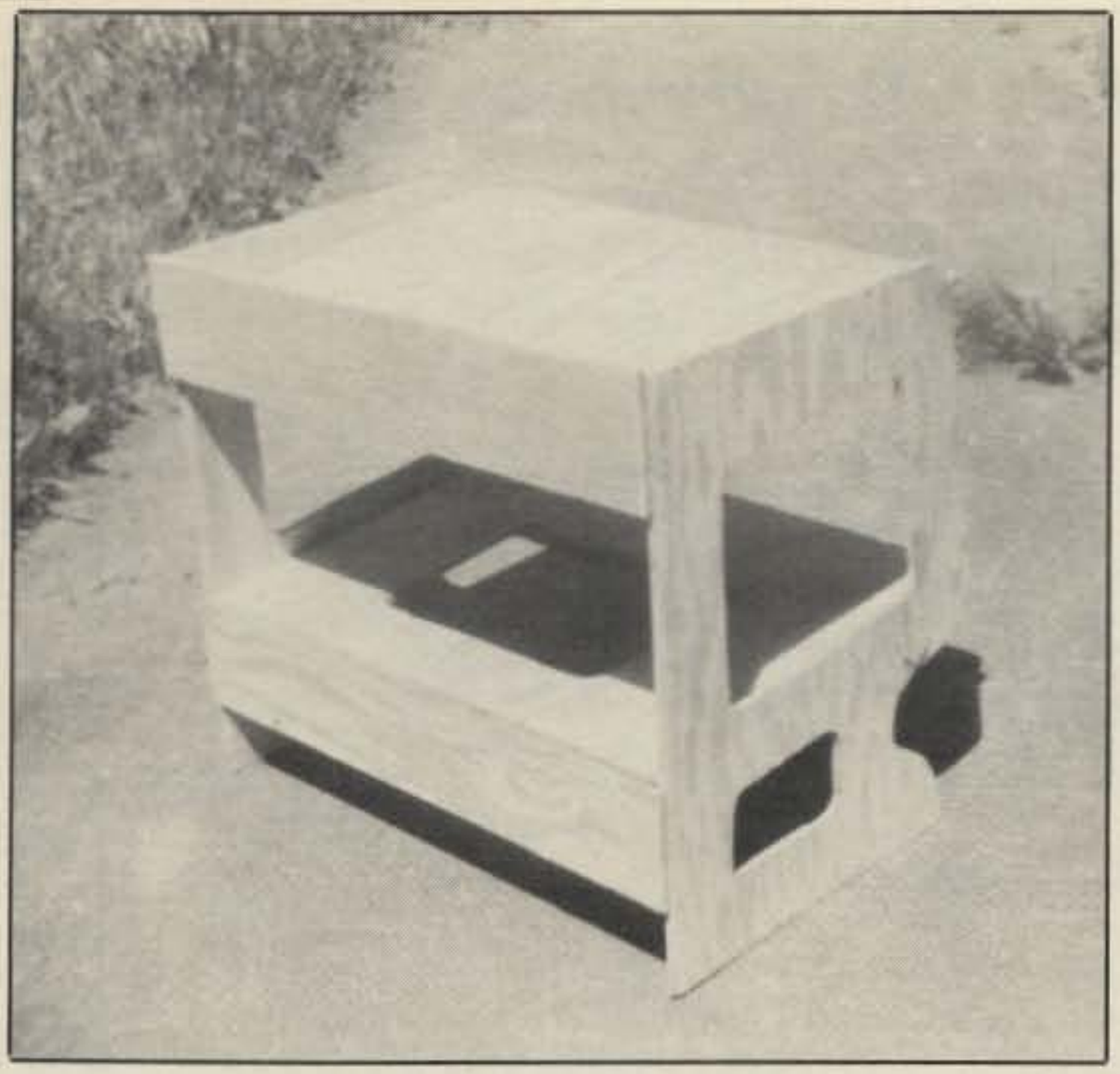
*20 Willets Ave., Belmont, NY 14813

The completed rig rack. This view shows the locations of holes placed in the sides and bottom shelves.



LAYOUT

Fig. 1–The overall layout for the rig rack. It uses a quarter sheet of plywood, with almost no waste.



The back view shows the cross-pieces. The top of the bottom cross-piece is flush with the bottom shelf. This allows for easy access to your rig's rear connectors.

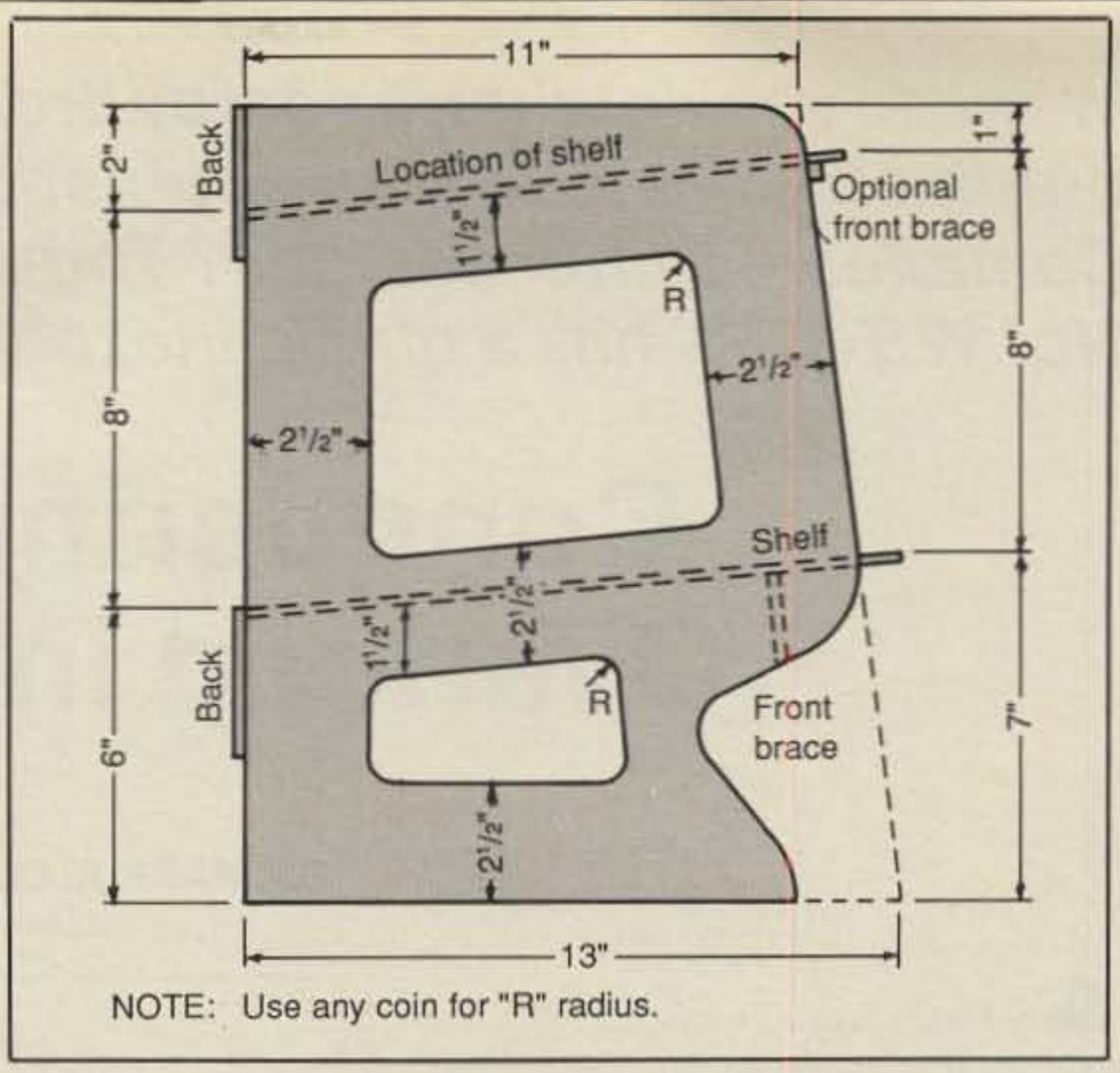


Fig. 2– Details for side piece construction. Two are required. Remember, the cleats or the routed grooves belong on the inside.

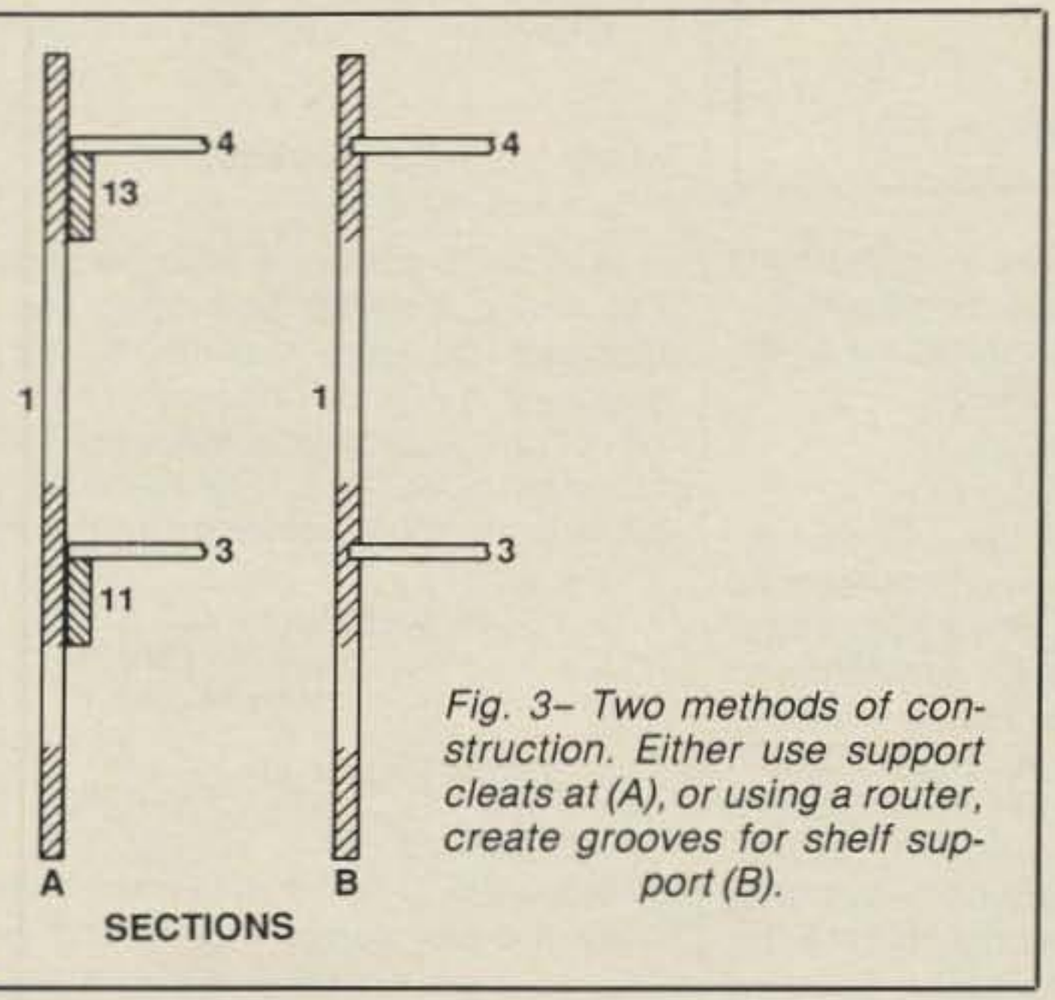


Fig. 3– Two methods of construction. Either use support cleats at (A), or using a router, create grooves for shelf support (B).

The bottom view of the rig rack show the cleats and front cross-pieces.

In its simplest form all you will need is a quarter sheet of plywood, some glue, and a saber saw. With a fancier model, a table saw, router, and dowling jig could be used.

Step one is to lay out the parts on the plywood. While ¼ inch thickness will work, experience has shown that ⅜ or ½ inch plywood is better and will require fewer parts. With ⅜ inch or thicker plywood it is possible to rabbit grooves, eliminating the necessity for cleats. One other thing to keep in mind during the layout is the direction of the grain of the surface ply. It is not critical, but it will look nicer if it runs vertically in the side pieces. It is quite important for it to run from side to side in the shelves. If the top shelf is unsupported in the front, it may warp if the grain runs from front to back. Poorer grades of plywood may have knot holes in the center ply that show up when the sheet is cut.

The second step is to cut and sand. Rabbit the grooves if you are going that route. The first step in the assembly is to glue the cleats to the sides and back. If there are no cleats, glue the top and bottom shelves in the grooves of the sides. If you have slow-drying glue, you may want to wait overnight before adding the back and the front brace under the bottom shelf. The front cross-piece under the top shelf is optional. It will help to keep the shelf from warping, but it will mean that the space will have to be that much higher.

You can put it to work as is, or you can finish it natural-wood or paint it to match the shack. This rack was designed primarily to fit my rig, a Heathkit 101. The top is for meters, clocks, lamps, etc. I do my logging off to the side, and the cocoa and sandwiches go underneath. You can adjust the dimensions to fit your particular station setup. The cat? Oh, he's moved to the extra chair. CQ

What do you do when a nearby broadcast station wipes out the front end of your sophisticated transceiver? Complicated filter designs? Thousands of dollars? No! WB4CSK has a quick, inexpensive cure.

Conquering Front-End Overload in the TS-940S

BY MARK A. CLARK*, WB4CSK

After installing my best ground system ever back in Texas just before we moved, my TS-940S became overwhelmed by intermodulation products from a local AM broadcast station. A check of all the amateur bands from 160 through 10 meters revealed an almost constant S9 "noise" level. Ten dB of attenuation was dialed in on the radio, and the problem disappeared. However, that attenuated the desired signals, too!

My next check was to tune the AM broadcast band and determine the "culprit." Table I details the S-meter readings obtained for the stronger stations.

Frequency	Signal Strength Over S9
570 kHz	+ 25 dB
660 kHz	+ 30 dB
820 kHz	+ 40 dB
970 kHz	+ 20 dB
1040 kHz	+ 40 dB
1080 kHz	+ 60 dB
1150 kHz	+ 35 dB
1190 kHz	+ 30 dB
1310 kHz	+ 40 dB
1600 kHz	+ 30 dB

Table I– S-meter readings obtained for the stronger stations.

Apparently, the station at 1080 kHz was the source of the problem. This was easily verified by checking its second, third, and fourth harmonics, all of which were +60 dB! My problem was simple front-end overload. The TS-940S seems to have no trouble as long as a signal doesn't "peg" its S-meter!

The standard solution for my situation was a high-pass filter designed to give around 60 dB or so of attenuation over the entire broadcast band. However, that appeared to be a bit of overkill both technically and economically, since such a filter would need 8 to 10 poles. I decided to attempt a cheap solution before investing much time, effort, and/or money. Fig. 1 shows what ultimately became my cheap solution.

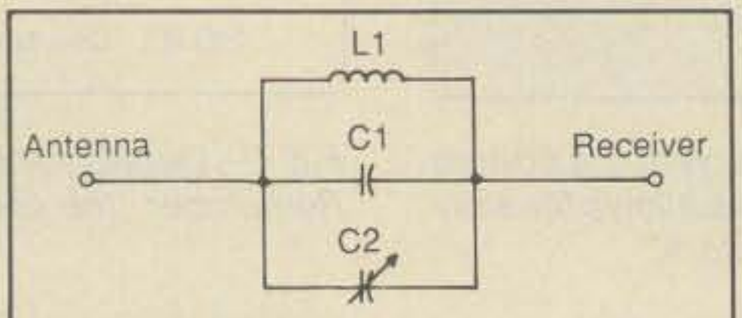


Fig. 1– Basic filter circuit for preventing front-end overload. Components of different values may be substituted on an experimental basis.

The circuit has a frequency response as shown in fig. 2. Of course, this is a theoretical response. In reality, anything fairly close is usually fine for amateur radio applications! My components were selected from the now famous W5AH junk box and were strictly what was available at the time.

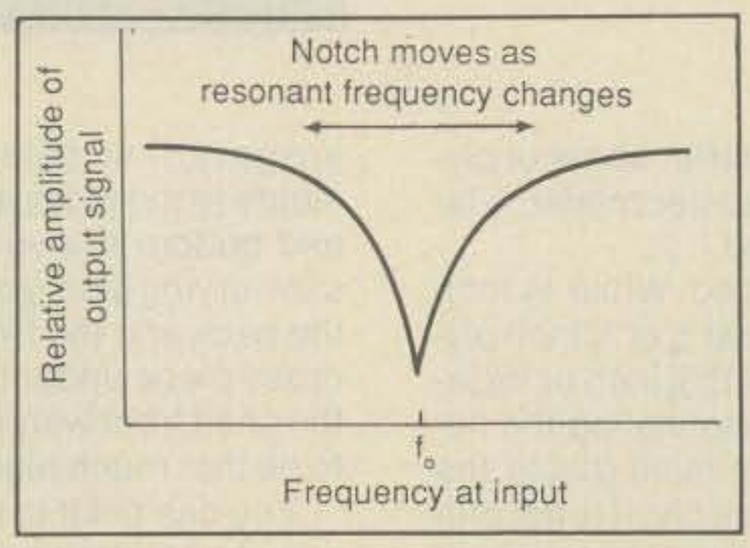


Fig. 2– The effect of the high impedance at resonance for a parallel tuned circuit is shown above. By adjusting the variable capacitor, the notch can be moved higher or lower in frequency for best results.

The formula at work here is:

$$\text{resonant frequency} = f_o = \frac{1}{2\pi\sqrt{LC}}$$

where L is in Henries and
C is in Farads

In order to calculate what component values are required, first determine the resonant frequency desired (i.e., the frequency you want to "trap out") and then select an appropriate value of inductance or capacitance. The rest is as simple as punching in values on a calculator.

$$\text{Given: } f_o \text{ and } L,\ C = \frac{1}{(2\pi f_o)^2 L}$$

$$\text{Given: } f_o \text{ and } C,\ L = \frac{1}{(2\pi f_o)^2 C}$$

Since a high "Q" is desired (in order to have a deep, narrow notch) and since "Q" is relatively easy to get in capacitors, it is probably best to use a small value of inductance and a lot of capacitance. For example, my first attempt at this circuit used a 1 mH inductor. This produced all of about 3 dB of null at the resonant frequency! I stumbled onto the 33 μH shown, which proved to be sufficient. Doubtless, more time and effort could produce the "ultimate" circuit with optimum "Q," etc. However, in my case there was no reason to go further. The filter shown attenuated the 1080 kHz station down to +25 dB. This signal strength is easily handled, and the simple filter completely solved my problem.

Connecting the circuit to my TS-940S was the easiest part of all! The transverter connector on the back of the radio is the point of insertion. Fig. 3 shows how to connect the circuit to the radio.

*1031 Flowers Avenue, Auburn, AL 36830

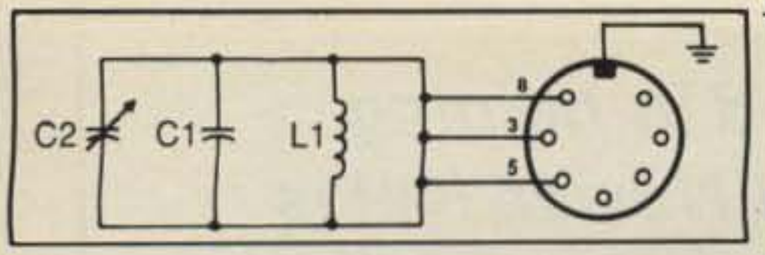


Fig. 3– Diagram of the circuit as wired for the transverter socket on the TS-940S rear panel.

Optimally, the filter should be mounted in a shielded enclosure, and input and output leads should be miniature coaxial cable. (Maybe I shouldn't confess that mine works just fine without either!) If you are not satisfied with the depth of the notch, try these measures.

A brief scan of this article is enough to show that the circuit being promulgated is nothing new or exciting from a technical standpoint. My only reason for writing is a gentle reminder that sometimes a simple approach is all that is required. (I have avoided diagramming the other implementation of the components into a series resonant circuit to keep the article as uncluttered as possible.) I guess this simple approach to things is what QRPers have been saying for years! It really works! I find a bit of irony in the fact that a $1 circuit cured the problem in my $2000 radio!

Thanks to W5AH and N5TP for their help along the way.

Interested in Novice Enhancement? Interested in helping it along? Well, here's what the Rochester 601 Novice Net is doing with it and what you might do to help it along, whether you're a Novice or a Quarter Century Extra.

Early SSB Novice Net Experiences

BY LARRY W. LOEN*, N0HOQ

At 28.306 on 0001 UTC 21 March the Rochester (Minnesota) 601 Novice Net had its first meeting at 6:01 local time. Someone else will claim they had the first Novice SSB call or even the first 10 meter Novice net, but we'll argue with anyone over that designation!

We've been running the net weekly since the big day, even though we've now moved it to 0100 UTC on Friday. In my short amateur radio career I've participated in many nets—weather nets, 2 meter nets, HF nets, just about any kind of voice net there is one way or another. Most of them are pretty professional, meeting high standards of operating quality.

While this net is pretty well run, the nicest thing about it is it isn't excessively professional. By that, I mean that perfect technique isn't needed or asked for. Another important aspect is some unique features we've devised for this net.

Unique Features

The bottom-line purpose of our net is to provide a friendly, comfortable place for Novices and Techs to come and get familiar with SSB (most Techs) and voice in general (Novices today, and tomorrow, too). So we've added a few touches.

First, and very important, net control is often a Novice or a Tech. Our most regular net control is a Novice teenager who mows my lawn (that's another story). My ears still ring with Russ Martin's "KA0RTZ Net Control" after most of his exchanges. The pride and joy in his voice would shame any of you out there who thought Novice Enhancement was a bad idea.

Another unique feature is our check-in procedure. We always start with Novices and then proceed to Techs, then Generals, and so forth. Not a big deal, but it does deliver the message: In our net, Novices are Number One.

*3117 11½ Ave. NW, Rochester, MN 55901

Our preamble (see box) also makes this clear and explains what we're about—a place to practice, to ask questions, even to make a few mistakes.

An interesting and unplanned feature is that the operators often outnumber the radios! Ours is a family net, where OMs, XYLs, and Harmonics all join in. We have a good time kidding about some of the armchair copy on our net and whether the audio bands are legal for cross-band QSOs.

Perhaps the last comment reveals the most important thing overall. The net is casual, full of humor. Of course, we'd be delighted to work any DX or out-of-state station that comes along and checks in. And, we've had our share of out-of-state check-ins in this net's short history.

Novice News and Views

Still, 10 comes and goes, so for many weeks it's just us local folks. The result resembles a 2 meter rag chew. You get the local news—who worked what lately and so forth. We have a well-established public service net on 2 meters, so this net can be strictly social. Some items taking our time include:

- A Saturday morning breakfast emerged from our net's activities. It seems to need weekly reorganizing. The 6:30 AM start time has led to interesting discussion and some slanderous comments about pajamas in public.
- On-the-air code practice (which I formerly ran on 2 meters, yet another story) will probably happen when I get a relay hooked up between my computer and rig. Some say, however, that they aren't holding their breath.
- Should we "go Ten-Ten or not"? We want our Novices to feel as popular as possible. We haven't really decided. Some don't mind it being mostly locals. Some would like to see more out-of-staters. Anyway, you're always welcome!
- News about VEC exams, hamfests, etc. We take this stuff for granted as Techs and above. Now the info is routinely available to Novices. The ability for Novices to hear the local news probably justifies Novice Enhancement all by itself. We Techs and above forget too easily how cut off Novices often are. Few bother to buy a VHF scanner, so they have no idea how much they miss by not listening in on 2 meters. This isolation has been a big minus for us up until now.
- Help in getting or staying on the air. All of our Novices want to be good operators. However, antennas and tuning up are new experiences. We've helped a few get over the gap between knowing the theory and actually getting a rig on the air.

One result I can definitely report on is that Novice Enhancement does provide an incentive to upgrade. Some feared Novices would stay Novices. However, after a General comes on our net and bubbles about his 40 meter WAS and an Extra talks about 6 meter E-skip to Flori-

Preamble To The 601 Novice Net

CQ the Rochester 601 Novice Net
CQ the Rochester 601 Novice Net

Good Evening. The Rochester 601 Novice Net meets weekly at 0100 UTC on Fridays at 28.306 for the purpose of Novice communications. This net is a directed net and all operations take place under the discretion of net control. Your net control for tonight's activities is ———. The net provides an informal place for Novices and other amateurs to gather and ask questions and, hopefully, get answers.

The outline of net operations is as follows: Net control will call for check-ins in the following order. Anyone with announcements, followed by Novices, Technicians, General, Advanced, and then Extra. To check in, give your call when your license class is asked for. For example, "[NCS] and the group, here is KA0AAA." Another amateur may check in after the previous amateur completes.

After check-in, Net Control will pass control to members on the list for their comments.

da, suddenly Novices start talking about and doing something about upgrading. Our hobby is infective, if we all provide a place to infect them!

A Place To Learn

Since this is a place to learn, the operating technique isn't perfect. The main problem is what most of us take for granted—zero beating net control. We've had folks with antennas with poor SWR; we've even had a few stations come in on LSB instead of USB—in short, all the ordinary mistakes that get made when starting out in the hobby. Unlike a more professional net, we don't necessarily rush right in with "help." Coming in on LSB is just about the only thing we work on right away.

For things like coming in off frequency, a gentle suggestion of "you're a little high" will be all you get. One thing our Novices do get is lots of encouragement, and frank admissions from the older hands that they did it, too, when they started out. After all, we're on 10 meters, the band isn't crowded on the band edge, and people (including Novice Net Controls) need a place to learn, to be in charge, to discover good technique on their own in good time.

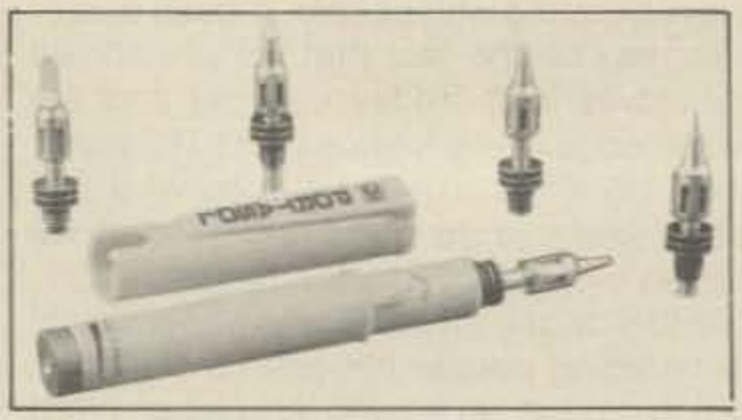
What the typical mike-frightened Novice doesn't need is to be reminded curtly of all the finer points while he is still wondering if anyone can hear him in the first place. Even as "forgiving" as we are, our leading problem appears to be mike fright. Please remember that as you check in.

Our main downside is that we're not always bursting with people. A good part of this may be the fact that we've saddled ourselves with Friday evening and the lower edge of the Novice band. However, we also know a few Novices who just can't seem to do that first PTT. But we haven't given up on them. Gary Turk, N0HBS, is one member who has a way of persuading people not just to check in, but to run the net as well. And we do burst with people quite often as a result.

Summing Up

On balance, I'm very pleased with our net. It's friendly, easy, and fun, but it has a serious, instructional side, too. I've already seen some local Novices and Techs get on the air regularly and gain in skill and confidence. I enjoy chatting with them. Above all, our net helps put the thrill of amateur radio within their grasp. I like CW, but let's face it. It's hard to socialize there, especially at 7 wpm. How we survived with Novices so isolated from the rest of us will shortly turn out to be one of the great all-time mysteries of this hobby. They're loving it; the "higher classes" are enjoying it. Upgrades are coming out of it. If you want the pleasure of really infecting someone with the amateur radio bug, start your own "601 Novice Net." You'll be glad you did. CQ

CQ Showcase



Butane Soldering Iron

Bentley Electronics has introduced the first truly self-contained portable soldering iron called the Portasol. Only slightly larger than a fountain pen, it is ideal for field repairs where normal electrical power is inaccessible. Each butane cartridge gives an average of 60 minutes use. With the built in catalytic converter, there is no open flame. It heats in less than 30 seconds and provides from 10 - 60 watts of power. For more information, contact Bentley Electronics, Inc., PO Box 996, Hauppauge, NY 11788 or check number 102 on the reader service card.

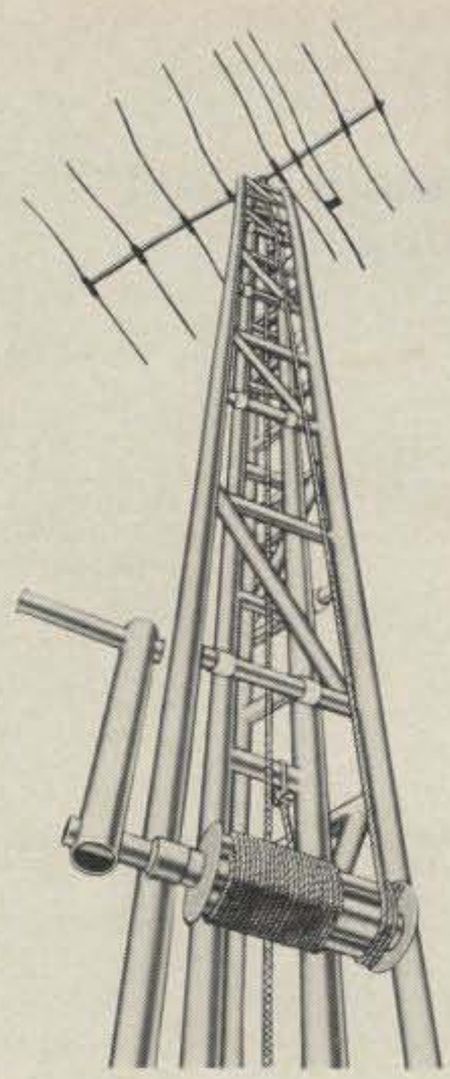
Commodore Trouble Shooting Chart

The "Diagnostician' was developed last year in Australia and quickly became an invaluable tool for computer owners desiring to diagnose and replace faulty chips on the Commodore 64. The chart appears on two sides of a laminated 8-1/2 x 11 cardboard. Priced under $10, the "Commodore Diagnostician' will pay for itself the first time you use it. For more information, contact KASARA Microsystems, Inc., 33 Murray Hill Drive, Spring Valley, NY 10977 or check number 103 on the reader service card.

MFJ Artificial Ground

Although the NFL brought artificial turf to football over twenty years ago, it took MFJ to bring artificial ground to amateur radio. Anyone who has ever operated HF from an apartment knows that RF ground is hard to come by in such circumstances. The cold water pipe may protect you from 60 Hertz shock, but it usually doesn't keep RF from nipping your lips when you touch the microphone.

The MFJ-931 solves that problem and others. You can create an artificial RF ground with a random length of wire thrown along the floor. The unit can also electrically place a far away ground directly at your rig, no matter how far away it is. For more information, contact MFJ Enterprises, Inc., PO Box 494, Mississippi State, MS 39762 or check number 104 on the reader service card.



Light-Weight Tower

Aluma Tower Company has improved their Model T-140 crank-up tilt-over aluminum tower. Constructed entirely of aluminum and special alloys, it weighs only 56 lbs. For more information on this tower and the complete line, write Aluma Tower Company, Inc., PO Box 2806NR, Vero Beach, FL 32961-2806 or check box 107 on the reader service card.

New Line of PAs

Antenna Specialists has added a line of RF power amplifiers to complement its line of antennas. Three VHF models cover 144-174 MHz and four cover 432-512 MHz. Other models are designed for export. State-of-the-art micro-strip matching and filtering, relay T/R switch for minimal insertion loss and full protection against DC polarity reversal and high VSWR are characteristic of the line. For more information, write The Antenna Specialist Company, 30500 Bruce Industrial Pkwy, Cleveland, OH 44139-3996 or check number 108 on the reader service card.

New MFJ-1274 lets you work VHF and HF packet with built-in tuning indicator for $169.95 . . .

. . . you get MFJ's latest clone of TAPR's TNC-2, TAPR's VHF/HF modem and built-in tuning indicator that features 20 LEDs for easy precise tuning

MFJ-1274
$169.95

MFJ-1270
$139.95

Now you can join the exciting world of packet radio on both VHF and HF bands with a precision tuning indicator . . . for an incredible $169.95!

You get MFJ's top quality clone of the highly acclaimed industry standard TAPR TNC-2. We've made TAPR's modem selectable for both VHF and HF operation, added their precision 20 segment LED tuning indicator, a TTL serial port, an easily replaceable lithium battery for memory back-up and put it all in a new cabinet.

If you don't need the tuning indicator or the convenience of a switchable VHF/HF modem, choose the affordable MFJ-1270 for $139.95.

All you need to operate packet radio is MFJ-1274 or MFJ-1270, your rig, and any home computer with an RS-232 serial port and terminal program.

If you have a Commodore 64, 128, or VIC 20 you can use MFJ's optional Starter Pack to get on the air immediately. The Starter Pack includes interfacing cable, terminal software on disk or tape and complete instructions . . .everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), $19.95.

Unlike machine specific TNCs you never have to worry about your MFJ-1274 or MFJ-1270 becoming obsolete because you change computers or because packet radio standards change. You can use any computer with an RS-232 serial port with an apropriate terminal program. If packet radio standards change, software updates will be made available as TAPR releases them.

Also speeds in excess of 56K bauds are possible with a suitable external modem! Try that with a machine specific TNC or one without hardware HDLC as higher speeds come into widespread use.

You can also use the MFJ-1274 or MFJ-1270 as an excellent but inexpensive digipeater to link other packet stations.

Both feature AX.25 Level 2 Version 2 software, hardware HDLC for full duplex, true Data Carrier Detect for HF, multiple connects, 256K EPROM, 16K RAM (expandable to 32K with optional EPROM), simple operation, socketed ICs plus much more.

You get an easy-to-read manual, a cable to connect your transceiver (you have to add a connector for your particular radio), a connector for the TTL serial port and a power supply for 110 VAC operation (you can use 12 VDC for portable, remote or mobile operation).

Help make history! Join the packet radio revolution now and help spread this exciting network throughout the world. Order the top quality and affordable MFJ-1274 or MFJ-1270 today.

MFJ-1273, $49.95

Now you can tune in HF, OSCAR and other non-FM packet stations fast! This MFJ clone of the TAPR tuning indicator makes tuning natural and easy - - it shows you which direction to tune. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz. 20 LEDs give high resolution and wide frequency coverage.

The MFJ-1273 tuning indicator plugs into the MFJ-1270 and all TNC-1s, TNC-2s and clones that have the TAPR tuning indicator connector.

Order any product from MFJ and try it – no obligation. If not satisfied return within 30 days for prompt refund (less shipping).
• One year unconditional guarantee • Add $5.00 each shipping/handling • Call or write for free catalog, over 100 products.

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762

To Order or for Your Nearest Dealer
800-647-1800
Call 601-323-5869 in Miss. and outside continental USA.
Telex 53-4590 MFJ STKV

MasterCard VISA

CIRCLE 2 ON READER SERVICE CARD

MFJ TUNERS

This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs-only 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP—the power rating you won't outgrow (250pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

MFJ989B **$349.95**

Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

6 position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ's Fastest Selling TUNER

MFJ-941D **$99.95**

MFJ's fastest selling tuner packs in plenty of new features. New styling! Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter**! More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **$229.95**

Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10¾ × 4½ × 14⅞ inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **$19.95**

MFJ-1702. $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.

MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**

MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-16010 **$39.95**

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **$79.95**

Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for $5.00.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).
• One year **unconditional** guarantee • Made in USA
• Add $5.00 each shipping/handling • Call or write for free catalog, over 100 products.

MFJ

MFJ ENTERPRISES, INC.
Box 494, Mississippi State, MS 39762

TO ORDER OR FOR YOUR NEAREST DEALER, CALL TOLL-FREE

800-647-1800

Call 601-323-5869 in Miss. and outside continental USA Telex 53-4590 MFJ STKV

VISA® MasterCard

CIRCLE 8 ON READER SERVICE CARD

We sometimes take talking on the air for granted. Here's the story behind that simple act we do every day.

How Radio Acquired Its Voice

BY PHILLIP S. DUNCAN*, KD7EB/9

In terms of excitement, wonder, and sheer unlikelihood, the events of the early days of radio make a tale that's hard to beat. On many thunder and lightning filled evening (my antennas grounded out and useless) I've spent hours happily absorbed in ancient *QST*'s or old moldy *Radio* magazines, sometimes coming across a surprising new piece of the story. Like any story, some of the characters have giant reputations and easily recognized names: Maxwell, Hertz, Lodge, Marconi, deForest, Armstrong, and the lot. Others never received the fame that was their due. What about Frank Conrad? He was the amateur whose pre-Radio Act broadcasts of music evolved into the first full-blown commercial radio station—KDKA in Pittsburgh. Or, take the story of Art Collins. Everyone knows of the excellent equipment that has worn his name, but few today know that as a teenage ham he homebrewed such a superior rig that he was the sole contact with Robert Byrd's Antarctic expedition. (Byrd was so impressed that he paid Collins a visit and commissioned the youngster to build the radio gear for his next expedition!) One little-known piece of the story concerns the man who spanned the gap between spark transmitters and modern radio, who invented the terms *continuous wave* and *heterodyne*, who made the first two-way transatlantic radiotelegraph exchange, and who, in fact, was the first to succeed in modulating a transmitter with the human voice. He was the quarrelsome, tempermental Canadian genius, Reginald Aubrey Fessenden.

Fessenden grew up in the exhilarating atmosphere of the latter half of the nineteenth century, a period characterized by rapid technological advances, and the heyday of the serious amateur scientist. He was fortunate to have been the favorite nephew of a broad-minded physics teacher who encouraged the boy to follow his interests in the electrical sciences. Fessenden received an adequate education, but only began to build his reputation as an intuitive electrical genius after he went to work for Thomas Edison at Menlo Park. There he gained a solid background in practical electrical theory, a subject not taught in many schools of the day. He later parlayed these credentials into various teaching and consulting positions that left him time for his own experiments, which produced an impressive string of patents but not much income. What he was investigating (and what Edison and others considered a foolish endeavor) was the possibility of using Hertzian radiation to convey the human voice.

Fessenden was, of course, not the only experimenter working in the field of radio communication. In 1892 Sir William Crookes, English chemist and physicist, published a paper exhorting his fellow scientists to work on the task of perfecting wireless signaling. Crookes' paper on the promise of wireless telegraphy was read by many, including young Guglielmo Marconi, who, with the help of his family's considerable fortune, found plenty of time and money to devote to this research. By the late 1890s he was working a vertical radiator against ground, the "Marconi antenna," and steadily improving the range of his equipment.

With the aid of Britain's preeminent physicist, Sir Oliver Lodge, the young Italian formed the British Marconi Company, which nailed down several contracts with various governments to install ship-to-shore wireless installations. Soon he was making plans for the famous transatlantic wireless tests between Newfoundland and England, and though most scientists were skeptical, interest in the experiment ran high. Marconi's rapid-fire successes were not lost on Reginald Fessenden; the scant attention his own work received was usually derisive. Lodge went so far as to dismiss Fessenden's speculations on wireless telephony as nonsense, and though Fessenden would later stand him on his academic ear for this rashness, Lodge's word was law at the time.

To fully understand what a radical departure Fessenden's work represented, it is necessary to first understand the established wisdom as promulgated by the Lodge-Marconi camp. Physicists then commonly held that electromagnetic radiation was generated by some severe disturbance, such as a high-power electric arc, which caused waves to be set up in a mysterious, invisible, all-pervading fluid called the "ether." To detect these ethereal disturbances, a device such as the Branley Coherer was used, which actuated an ordinary land-line telegraph sounder.[1] Fessenden, however, believed that Hertzian radiation could be generated as continuous waves. He thought, in fact, that RF emissions were nothing more than alternating electric currents of extremely high frequency and were propagated because of their inherent high-frequency energy and not because of the so-called "whipcrack" effect of an electric arc in the mysterious ether.

This was an imaginative leap of tremendous significance, and though it would finally require both Einstein and quantum mechanics to "dispel the ether" from physics textbooks, Fessenden's intuition was right on track. His early experiments with wireless telephony had used spark transmitters, and though he actually achieved a recognizable but highly distorted transmission of human speech as early as 1900, he could not improve the quality.

It's not hard to understand why: a spark transmitter is a horrendously noisy device. It generates a rough, raw, broadband signal that hopelessly drowns the subtle variations of the audio waveform. Audible vibrations lie in the frequency spectrum from perhaps 20 to 20,000 Hz

*P.O. Box 1207, Carbondale, IL 62903

and will not radiate efficiently even when converted by a microphone to electrical vibrations. Fessenden guessed correctly that he must generate Hertzian waves at some frequency much higher than 20,000 cycles per second for his signals to radiate efficiently and for there to be sufficient spectral room to allow the audio signal to be tacked onto this carrier wave. Thoroughly disgusted, Fessenden gave up trying to modulate the raspy spark transmitter and began seeking a way to generate a clean, sine-wave (single frequency) RF oscillation to act as a quiet carrier for the audio. With the help of an electrical engineer, Ernst Alexanderson, he found it.

Alexanderson had been working on experimental high-frequency AC generators, and the task fell to him to fill Fessenden's order for a machine capable of generating alternating current at the unheard of frequency of 100,000 Hz. An alternator was finally produced at General Electric that would run at 50,000 Hz without either flying apart or melting its bearings, as its predecessors had done. Initial tests vindicated Fessenden's theory that Hertzian radiation was simply high-frequency AC electricity. The tests also suggested that the alternator was capable of producing a quiet, narrow-band carrier for his audio experiments. That the alternator transmitter attracted little commercial interest bothered Fessenden hardly at all, but his financial backers were growing a bit uneasy.

Fessenden, not having Marconi's private means, had acquired the support of a pair of millionaires and formed the National Electric Signalling Company (N.E.S.C.). With the success of Marconi's one-way transatlantic radiotelegraphy tests in 1901, the British Marconi Company had expanded into a multinational corporation with a stranglehold on the lucrative maritime radio market, and thus most shipboard installations used Marconi spark equipment. Fessenden was able to secure only one commercial wireless contract, this with the United Fruit Company to equip some of its Caribbean fleet with Fessenden apparatus. N.E.S.C. had constructed a pair of experimental facilities for Fessenden (with 400 foot vertical antennas)—one at Brant Rock on the coast of Massachusetts and one at Machrihanish on the western shore of Scotland—to run against Marconi in the transatlantic race. On January 10, 1905 Fessenden's team made the first two-way transatlantic radiotelegraph exchange.

Fessenden's company still wasn't selling much equipment, but his research was doing much better than his finances. Preliminary test results with the Alexanderson alternator as a speech transmitter exceeded even Fessenden's high expectations: the received audio was clear and relatively undistorted. Fessenden was jubilant in late 1906 when he was advised by the Scottish station that the Brant Rock to Plymouth, Massachusetts, *radiotelephony* tests had been received in Scotland with perfect clarity and comprehension! The receiving operator had recognized the voice of Chief Engineer Stein, and though understandably shaken, the operator managed to copy a verbatim transcript of the test and sent along a copy for proof. An eager Fessenden prepared a press release and scheduled a public transatlantic demonstration, but it was not to be. In early December 1906 the Scottish station was destroyed by a freakish storm. He brooded for a few days, but brightened when an alternate plan came to mind: he signaled from Brant Rock to his shipboard operators in the Caribbean that they should pay special attention to a transmission on Christmas Eve, and should they have no luck then, to a repeat transmission on New Year's Eve.

On Christmas Eve 1906 Fessenden himself began the first broadcast, speaking into a water-cooled, asbestos-covered microphone.[2] He read verse and Scripture. He played an Edison phonograph. His wife sang. He accompanied his wife on the violin. His chief engineer tried to sing, but developed radio's first case of mike fright. Finally, Fessenden asked that anyone hearing the transmission write to him at Brant Rock with reports. He was overwhelmed by mail from stunned shipboard operators from the North Atlantic to the Caribbean. They were amazed.

Unfortunately, this triumph brought Fessenden little notariety and even less money. Quite soon after his successful broadcasts Fessenden fell out with his backers, who then confiscated his notes and equipment, turned him out of Brant Rock, and declared that they owned the rights to his patents.

During the first three decades of the twentieth century the story of radio seems like a never-ending succession of legal dogfights, with cries of fraud and infringement on every hand. Fessenden fought more than his share of these, subsisting on small engineering contracts with every spare cent going to finance the fight to regain control of his patents. He finally won. In 1912 he was awarded the largest court settlement in history (to that date) for a patent infringement claim—$400,000. However, he was only able to collect in 1928, after the defunct N.E.S.C. had been acquired by Westinghouse. In 1932 he was honored by the Institute of Radio Engineers for his many valuable contributions to the art, and that same year he died—quietly and obscurely—in New York.

Though he is practically unknown today, most (if not all) modern communication technique descends directly from Fessenden's innovative work on continuous-wave radiation and from his obsession with wireless telephony. The development of Armstrong's regenerative triode amplifier made the reception of the weaker, narrow-band CW signals easy, and when it was discovered later that vacuum tubes could also be used to generate RF signals, the use of spark transmitters waned until, finally, they were legislated out of existence when the crowded radio spectrum could no longer tolerate their wide-band interference. When regular broadcasts of news, music, and special-events programs began in the 1920s, Fessenden's greatest contribution to radio was finally put to use.

Though he does not have a unit of measurement named for him, like Hertz, or a name synonymous with radio, like Marconi, perhaps he has an even more fitting memorial—all these old amateur transmitters marked "PHONE-CW." It's hard to believe that more amateurs don't know of the stubborn Canadian who, for all practical purposes, invented both modes. After all, where are Marconi's spark transmitters? Gathering dust in museums. And Tesla's induction coils? Mostly firing spark plugs these days. But every time we tune up, be it on CW, AM, SSB, or FM for that matter, we are enjoying the legacy of Reginald Aubrey Fessenden.

Footnotes

1 One of Fessenden's greatest achievments was the invention of the electrolytic detector (or "liquid barretter"), a device which permitted the receiving operator to actually hear the transmitting station in an ordinary telephone headset. But because his own company would not manufacture or license the detector, it became a hot item on the black market. Even the U.S. Navy used the illicit devices.

2. It remains unclear exactly how the alternator was modulated, though reports describe would-be announcers burning their lips on the microphones. The only reasonable speculation is that he had a carbon mike in series with the alternator and the antenna! If so, this was "high-level AM" with a vengeance!

Recommended Reading

Archer, Gleason L., *History of Radio*, The American Historical Society, New York, 1938.

Herron, Edward A., *Miracle of the Air Waves*, Julian Messner, New York, 1969.

Raby, Ormond, *Radio's First Voice*, Macmillan of Canada, Toronto, 1970.

Aitken, H.G.J., *Syntony and Spark—The Origins of Radio*, John Wiley and Sons, New York, 1976.

Whitmore, F.D., "In The Beginning," Part I, *CQ*, Feb. 1959, p. 28.

Superior Communications Accessories

Advanced Multi-Torque Antenna Rotator

The rotator frame can house up to 4 motors to increase torque and load capacity.

MR-750 PE

Wind Surface Load Area*

	MR-750E/PE
1 Unit	16.1 Sq Ft
2 Units	21.5 Sq Ft
3 Units	26.4 Sq Ft
4 Units	30.0 Sq Ft

Each motor is equipped with a Super Wedge and Clutch brake system (Slip clutch type) that works independently from the main frame gear train and protects the rotator mechanism from excessive torque.

Low voltage (24VAC) motors…low-cost 6-wire control cable…can be installed on the same base as a TEXEX unit.

Specifications

■ **Rotator Unit**

		MR-750E/PE
Rotation time	60 Hz	58 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)
Output torque Brake power*	1 motor	610 inch/lbs 5,200 inch/lbs
	2 motor	1,200 inch/lbs 9,600 inch/lbs
	3 motor	1,800 inch/lbs 13,900 inch/lbs
	4 motor	2,400 inch/lbs 18,300 inch/lbs
Rotation angle		375 degrees
Permissible mast size		1½ ~ 2½ inch (38 ~ 63 mm) < diameter >
Control cable		6-wire cable 0.5sq—1.25sq (AWG16/18/20 etc.)
Continuous operation		5 minutes Max. permissible
Dimensions		15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)
Unit weight		16.5 lbs (7.5 kg) < with 1 motor unit fitted >

■ **Controller Units**

Models	CR-4 (for MR-750E)	CR-4P (for MR-750PE)
Operation	Manual	Manual/Pre-set
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Operating voltage	24 V AC	
Dimensions	4.9" x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	

* When estimating your antenna load and rotator torque and brake power requirements, include a 25–50% safety factor.

COAXIAL SWITCHES

PAT. No. 59-000803

CS-201

CS-401

	CS-201 2position	CS-201G 2position	CS-401 4position	CS-401G 4position	CS-4 4position
Frequency:	600 MHz	1300 MHz	800 MHz	1300 MHz	1500 MHz
Connectors:	SO-239	N type	SO-239	N type	BNC type
VSWR:	Below 1:12				
Insertion Loss:	Less than 0.2 dB				

POWER SUPPLIES

PS-51XM

Model	IMAX/ICONT	Variable Output VDC
PS-51XM	5.6A/5A	9-15
PS-120M	12A/10A	3-15
PS-30XMII	30A/24A	1-15

ANTENNA TUNERS

CNW-419

	CNW-419
Frequency Range:	1.8-30 MHz (17 Bands)
Power Rating:	200 W CW (3.5-30 MHz) 100 W CW (1.8-3.4 MHz)
Output Impedance:	10-250 ohm

LA-2155H

POWER AMPLIFIERS

(Pre-Amp Gain 15dB)

	LA-2035R	LA-2065R	LA-2080H	LA-2155H
Input Power:	0.5-3 W	0.5-14 W	0.5-5 W	1.5-50 W
Output Power:	30 W	70 W	80 W	150W

DK-210

ELECTRONIC KEYER

Sharpen your "fist" with Daiwa precision!

Cross Needle SWR/Power Meters for All Bands

NS-660PA

Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-720B	1.8-150 MHz	20/200 W/2 kW	SO-239
NS-660A/PA*	1.8-150 MHz	30/300 W/3 kW	SO-239
NS-663A/AN*	140-525 MHz	3/30/300 W	SO-239/N type
NS-668*	900-1300 MHz	1.5/15/60 W	N type
NS-669*	1200-2500 MHz	1.5/15/60 W	N type

*Back lit with remote sensors available. NS-660/PA-Peak Power Reading. NS-663/AN-N type connector

CN-460M

MOBILE/BASE CROSS NEEDLE SWR/POWER METERS

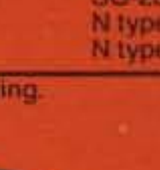
CN-520

Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-410M*	3.5-150 MHz	15/150 W	SO-239
CN-460M*	140-450 MHz	15/150 W	SO-239
CN-465M*	140-450 MHz	15/75 W	SO-239
CN-520M**	1.8-60 MHz	200 W/2 Kw	SO-239

*Back lit with mobile bracket
**Optional mobile bracket available

ACCESSORY ITEMS

Model RX-100DX Preamplifier: 144-148 MHz/15 dB Gain/300 W Max
Model CP-10 Heavy Duty Cigarette Lighter Plug
Model SP-100 5 W Monitor Speaker



SP-100

AUDIO FILTERS

AF-606K

Four stages of filtering…variable bandwidth over broad range…razor sharp CW reception…built-in speaker…PLL Tone Decoder circuitry.

AF-606K

DAIWA®
Electronics Corporation
1908A Del Amo Blvd. ▪ Torrance, CA 90501
(213) 212-6057 ▪ (213) 212-6058 ▪ **FAX: (213) 212-0872**

Specifications subject to change without notice. ▪ All models and types not represented.

CIRCLE 133 ON READER SERVICE CARD

DO YOU NEED TOP QUALITY?

Quality is the most important feature of Competitive Computer Solutions, Inc. new HR8810 IBM XT compatible computer.

Including everything needed to get you into the digital communications arena, the HR8810 is fully IBM compatible. Not only can only use it for on-air amateur radio functions, but for record keeping, logging, programming of many new synthesized radios and for using countless MS-DOS based commercial programs.

The HR8810 also includes interface cables specially designed for us to cut RFI to a bare minimum. These cables, combined with our FCC certification, quality components, 60-day money-back guarantee, and 1 year parts and labor warranty are your assurance of a quality product. We test each one before shipment.

ACT NOW!!! The special introductory price for the HR8810 of $900.00 ends January 31, 1988. After that date the regular price will be $1,050.00.

HR8810 consists of a 4.77/10 MHz motherboard, 640K RA, 2 floppy drives, monochrome monitor and graphics, multi-I/O, with 2 serial ports, 1 parallel port, 1 game port and clock calendar, AT enhanced style keyboard and an AT jr. style case. Also includes special RFI reducing interface cables and a five outlet command center with RFI, EMI, surge and spike protection.

Also available for the amateur operator are the following two programs: Expertedge, providing coordinated switching of terminal and radio between transmit and receive, mode selection, frequency and antenna steering advice plus much more. $90.00.

HAM. COM, a low-cost alternative with some very useful features for the amateur and into today's high-tech digital radio communications. $34.95

Call, write, or use the reader service card to get more information on the HR8810 as well as a catalog of everything Competitive Computer Solutions, Inc., has to offer.

USE THE READER SERVICE CARD OR CALL TODAY FOR MORE INFORMATION ON THE HR8810!!!

IBM and AT Jr. are registered trademarks of International Business Machines Corp.
MS-DOS is a registered trademark of Microsoft, Inc.

COMPETITIVE COMPUTER SOLUTIONS INC
SPECIALIZING IN IBM COMPATIBLE MICRO-COMPUTERS AND ACCESSORIES

Competitive Computer Solutions, Inc.
5721 Bayside Rd., Suite A
Virginia Beach, VA 23455

Phone: Voice - (804) 460-XTAT
Modem - (804) 363-BAUD

CQ BOOK SHOP

Ameco Amateur Radio FCC Test Manuals
Each book contains the latest FCC VEC test questions, plus ARRL multiple-choice answers followed by a complete, simplified discussion of each question written in an easy-to-understand style.
Novice Class, 96 pages, paperback, $4.95. Order #H221.
General Class, 128 pages, paperback, $4.95. Order #H034.
Advanced Class, 128 pp., paperback, $4.95. Order #H035.
Extra Class, 128 pages, paperback, $4.95. Order #H220.

The Joy of QRP
by Adrian Weiss, K8EEG/WØRSP
For QRP enthusiasts, this new book by QRP expert Ade Weiss covers everything from the basics through the fine points in 8 chapters. Includes approximately 50 tables, photos, and drawings. 151 pages, paperback, $10.95. Order #H222.

The Radio Publications Group—The "Bill Orr Series"
These easy reading classics belong in the library of any active ham. Loaded with practical how-to information, with tables, charts, and formulas arranged for handy reference.
Beam Antenna Handbook, 200 pages, paperback, $9.95. Order #H143.
Wire Antennas, 192 pp., paperback, $7.95. Order #H144.
Antenna Handbook, 192 pp. paperback, $9.95. Order H145.
Cubical Quad Antennas, 112 pages, paperback, $7.95. Order #R146.
Vertical Antennas, 192 pages, paperback, $10.95. Order #H303.
VHF Handbook, 336 pp. paperback, $11.95. Order #H147.
Interference Handbook, 247 pages, paperback, $9.95. Order #H172.

World Radio TV Handbook 1987
The world's only complete directory of international broadcasting and TV stations—the established, authoritative guide endorsed by the world's leading broadcasting organizations. A comprehensive country-by-country listing of short-, medium-, and long-wave stations revised and updated to reflect actual conditions. Also includes special features on The Future Regulation of High-Frequency Broadcasting, Solar Activity in 1985, Technical Innovations at Radio Nederland's New Transmitting Station, and more. 600 pages, paperback, $19.50. Order #H097.

Radio Handbook, 22nd ed.
by Bill Orr, W6SAI
A state-of-the-art, single-source reference on radio communications and theory for hams, professional ops, techs, and engineers. New coverage includes solid-state devices, Yagis and quads, and h.f. amplifier designs. A hands-on instruction manual, as well. 1168 pages, hardcover, $39.95. Order #S197.

World Press Services Frequencies
by Thomas Harrington
A comprehensive manual covering the field of radioteletype news monitoring—antennas, receivers, terminal units, monitors, and more. Contains 3 master lists of times of transmission, frequencies, plus ITU list of over 50 news services worldwide. 72 pages, paperback, $8.95. Order #H173.

Computer Programs for Amateur Radio
by Wayne Overbeck and James A. Steffen
A comprehensive collection of BASIC programs for radio amateurs that can be used on the Apple, TRS-80, and Commodore 64, with conversions for the IBM PC. Includes contest logging, VHF operation, antenna design improvement, grayline calculations, and more. 224 pages, paperback, $16.95. Order #H218.

The Shortwave Propagation Handbook, 2nd ed.
by George Jacobs, W3ASK, and Theodore J. Cohen, N4XX
A new, revised edition of the popular guide to all your propagation needs. Contains up-to-the-minute information and charts, and guides you through producing your own propagation data. 154 pages, paperback, $8.95. Order #H137.

Ameco Novice Code and Theory Package
A complete training package containing the 128-page Novice theory course and a 60-minute code cassette, which teaches how to send and receive code up to 8 words per minute, and a 32-page book. Also included are FCC-type code and theory examinations to help even a rank beginner get a ticket fast! $8.95. Order #H024.

RTTY Today
by Dave Ingram, K4TWJ
A brand new, completely up-to-date handbook on RTTY, covering the latest developments and techniques, plus use of the home computer for RTTY. Illustrated with photos, diagrams, station setups, and RTTY gear. 112 pages, paperback, $8.95. Order #H211.

Vertical Antenna Handbook, 2nd ed.
by Paul H. Lee, N6PL
Out of print for several years, this classic has been reprinted with updates, including an addendum on antenna design for 160 meters. Other sections include feeding and matching, short verticals, ground effects, and much more. 139 pages, paperback, $9.95. Order #H208.

The Complete DX'er
by Bob Locher, W9KNI
Covers every significant aspect of DXing from how to really listen to how to snatch the rare ones out of the pileups. Also includes advice on siting, equipment selection, and antennas. 187 pages, paperback, $10.95. Order #H209.

CQ BOOK SHOP 76 North Broadway, Hicksville, NY 11801

QTY.	ORDER #	TITLE	PRICE	TOTAL

Book Total
Shipping Charge
Grand Total

Shipping charges $2.00 per order. Shipping charges waived on orders of $50.00 or more. Books shipped best way. All orders are processed the day they are received, but please allow 30 days for delivery within North America.

Name _____
Address _____
City _____
State _____ **Zip** _____

☐ **Check** ☐ **MasterCard** ☐ **VISA**

Card No. _____ **Expires** _____

X _____

Signature required on all charge orders:

Running Back for More Is a Snap

ege inc™

DISCOUNTS FOR AMATEURS

EGE VIRGINIA
14803 Build America Drive, Bldg. B
Woodbridge, Virginia 22191
Information: (703) 643-1063
Service Dept: (703) 494-8750
Store Hours: M-F: 10—6
Sat: 10—4
Order Hours: M-F 9—7
Sat: 10-4

EGE NEW ENGLAND
8 Stiles Road
Salem, New Hampshire 03079
New Hampshire Orders,*
Info & Service: (603) 898-3750
Store Hours: MTuWF: 10—5
Th: 12—8
Sat: 10—4
*Order & we'll credit you $1 for the call.

LACOMBE DISTRIBUTORS
Our associate store
Davis & Jackson Road, P.O. Box 293
Lacombe, Louisiana 70445
Info & Service: (504) 882-5355

VISA MasterCard DISCOVER

Terms: *No personal checks accepted. Prices do not include shipping. UPS COD fee: $2.35 per package. Prices are subject to change without notice or obligation. Products are not sold for evaluation. Authorized returns are subject to a 15% restocking and handling fee and credit will be issued for use on your next purchase. EGE supports the manufacturers' warranties. To get a copy of a warranty prior to purchase, call customer service at 703-643-1063 and it will be furnished at no cost.*

ege inc™

Winter Buyer's Guide/Catalog Available - Send $1.

YAESU

FT 23/33/73
Mini HTs for 2m, 220/440 MHz

FT 727R
2m/440 MHz Dual Band HT

FT 767GX
All Mode Transceiver with CAT System

NEW FT 757GX Mark II
HF Transceiver with General Coverage Receiver

FRG 9600
Scanning Receiver for 60-905 MHz FM/AM/SSB

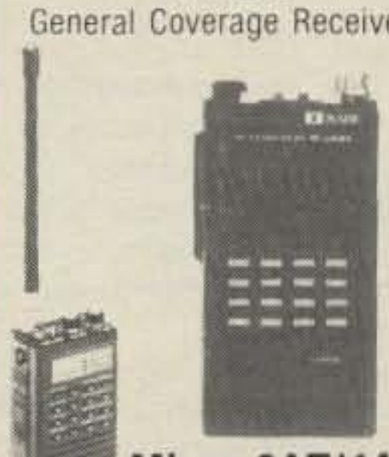
ICOM

IC 751A
HF Transceiver with General Coverage Receiver

IC 3200
Dual 2m/440 MHz Mobile

IC 275A
All-mode Transceiver

R 7000
General Coverage Receiver



Micro 2AT/4AT
Mini Handhelds for 2m or 440 MHz

IC 02AT/03AT/04AT
Handhelds for 2m/220/440

KENWOOD

TS-140S
HF Transceiver with General Coverage Receiver

TS-940S
HF Transciver with General Coverage Receiver

TM 221A/321)A421A
2m/220/440 MHz Mobiles

New Improved TH 215AT
2m Handheld

TH-25AT/45AT
Tiny HTs for 2m/440 MHz

R 5000
General Coverage Receiver

Now Available Heathkit®

Selected Products at Discount Prices
Call for More Info

TEN-TEC

Corsair II Model 561
HF Transceiver

Paragon
Amateur Transceiver with General Coverage Receiver

ALINCO ELECTRONICS

ALR-22T
Compact 2m Mobile

ALD-24T
Compact Dual-band Mobile for 2m & 440 MHz

Antennas

Amateur HF Bands
Cushcraft, Butternut, KLM, Mosley, Hy-Gain, B&W, Van Gorden, Hustler, Larsen, Antenna Specialists, Centurion, Smiley

Antennas in Stock
for Mobiles, Base Stations, and Handhelds

Everything from mini rubber duckies to huge monobanders

ASK FOR PACKAGE DEALS ON ANTENNAS AND ACCESSORIES

Also . . .
Antennas for Scanners, CBs, Marine, Commercial, and Short Wave Listening

Towers

UNARCO-ROHN
TRI-EX
HY-GAIN
Ask for package quotes on complete tower assemblies including Phillystran, guy wire, antennas, rotators, etc.

ROTATORS
Kenpro, Alliance, Daiwa, Telex Hy-Gain

Computer Stuff

Packet Controllers
Kantronics and MFJ

Amateur Software
Ham Data Software for Commodore Computers
Ask for Descriptions

RTTY/Morse/Amtor
Hardware and Software and packages by Kantronics, Microlog, HAL, MFJ, & more

Accessories

AMPLIFIERS
Vocom, Daiwa, TE Systems, Amp Supply, Mirage, Alinco, Ameritron, Tokyo Hy-Power, RF Concepts

ANTENNA TUNERS
Amp Supply, Ameritron, MFJ

Switches, Couplers, Filters, Connectors, Mikes, Keyers, Paddles, Headsets, Clocks, Books, Power Supplies

More Radios

SONY
Receivers

REGENCY BEARCAT
Scanners

CB RADIOS
Midland, Cobra, Uniden

For Orders & Quotes Call Toll Free: 800-336-4799
In New England (except NH): 800-237-0047 In Virginia: 800-572-4201

ege inc™

CIRCLE 135 ON READER SERVICE CARD

Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

More General-Purpose Software

This month our columnist continues his examination of some general-purpose software useful in the hamshack. As with November's column, if you use your PC for purposes other than hamshack computing, this one's for you.
—K2EEK

Flipping back to November's column, you'll see that we began a discussion to hopefully broaden our "hamshack software horizons." There we featured two inexpensive but good-performing general-purpose software products for the IBM-PC—ones that, while not designed expressly for hamshack use, should be of interest to almost anyone who owns an IBM-PC or compatible computer. This time we will bring to light two other general-purpose programs we've found useful within and without the hamshack. Both of them are databases of sorts: Tornado Notes™ and KeyNotes™, both for the IBM-PC. Let's begin this month's column with a look at these two products.

Two for the IBM-PC

Tornado Notes. This is a truly "free-form" database, similar in many respects to SquareNote, which we looked at last November. If you'll recall our discussion, SquareNote is also a free-form database which allows you to flexibly access your data without predefining fields or knowing in advance how long your entries will be. Rather than using records as do most other databases, you use text based "notes," and you can search these notes on up to 100 keywords or subjects. Whenever you want to examine a note or "stack" them, you ask the program to gather the notes into an electronic stack by subject.

Tornado Notes is similar in many respects to SquareNote. However, unlike SquareNote it is RAM-resident and thus is available to you even while running other programs. Tornado Notes is an information handler that allows you to keep tabs on up to 500 instantly available electronic notes. The program lets you enter text into "logical modules" of information without extra keystrokes, prior planning, or the use of filenames. You can gradually change, reorganize, and code your information until you get the organization you want. You can edit, link, and search through the notes you've created, and rank them in order of importance. The program also allows you to lift material from the "foreground" application program you're running and splice it into a note—and vice-versa.

Tornado Notes lets you search for any set of related notes based on any word, phrase, or combination that appears anywhere in any note module in about one second flat—hence, the product's catchy name. A neat "progressive-resolution" search feature minimizes keystrokes. For example, typing "ham" may be enough to pull down the notes describing hams, hamshack, ham radio, etc., if you've created such notes. A novel windowing system automatically positions several note windows at once in an intelligent way that reduces overlap of the notes.

Chuck Joseph, N5JED, is not the type to quit when things get a little tough. After seeing an advertisement for the MFJ 1621 portable antenna, he decided to give it a workout. Using a Kenwood TS440S and the antenna shown above, he managed to work all states and 30 countries, which include Tahiti, Saipan, Australia, South Africa, Easter Island, and even the Antarctic peninsula. The MFJ doesn't take up much space. The whip extends to a whopping 54 inches and is mounted on a self-standing 6" × 3" × 6" aluminum cabinet. It will operate on 40, 30, 20, 15, and 10 meters.

What is all this fast-retrieval capability good for? Well, the program's real usefulness lies in the areas in which most of us have trouble: that of finding and recalling information fast. Basically, it allows you to enter mountains of "nice to have later" information in a totally unstructured way, yet be able to rapidly retrieve parts or all of the information you entered later on.

In the hamshack Tornado Notes could be a very useful tool, especially if you keep your computer turned on whenever you're in the hamshack. For example, you could key in net schedules, QSL status, beam-heading information, an FCC band and operating mode chart, callsigns worked, an activity calendar, equipment operating settings and technical notes, and the like. This information can slumber in the background while you run other software, such as a logging or propagation-prediction program, yet be called up on keystroke command. The possibilities seem almost unlimited for a sort of "garbage in, structure out" situation, thus reversing the old saw that you can't get anything better out of a computer than that which you put into it.

There are a few negatives. For example, some users have reported conflicts in using early versions of Tornado Notes with other RAM-resident programs, though these problems seem to have been cured with the version I tried. *(Editor's Note: This is a very common problem in MS-DOS based Terminate Stay Resident (TSR) programs. Even this version may conflict with other TSR programs available. User beware.)* Also, I found the on-screen menus rather cryptic and uninformative; the only one that was really intuitive to me was the trashcan icon. And, while the program's 128-page user's manual was comprehensive and thoroughly indexed, its small size (5¼" × 5¼") and tiny print made for somewhat laborious reading.

All things considered, at $49.95 Tornado Notes is a slick little package, with its unique ability to juggle bits and pieces of unstructured data and convert it to structured information that you can use. It runs on the IBM-PC and compatibles with PC/MS-DOS 2.0 or higher. It's sold on a 30-day money-back basis from Micro Logic Corp., P.O. Box 174, 100 2nd St., Hackensack, NJ 07602.

Fig. 1 shows a simulated Tornado Notes screen, while fig. 2 shows the opening screen of the included "Intro File," which provides a guided tour of the program's operation.

KeyNotes. A more structured special-purpose database is KeyNotes from Digital Learning Systems. This program, billed by its manufacturer as "a memory-resident support system for the IBM-PC," is thus RAM-resident like Tornado Notes, but it's more structured. While KeyNotes can be used for a variety of purposes, the main thrust of the program is to allow you to set up an instant on-screen help system. You can key in essential reference data, user manuals, "cheat sheets," dialing codes, operating procedures, and other text-based material to eliminate the need to consult hardcopy documentation when using your computer. As the company states, the program combines the features of an information retrieval system, an on-line help program, and a documentation system.

By using the KeyNotes editor, you can create your own custom information files that you can recall later when you need to look something up or need help in performing a task. If you like, you can arrange information in an orderly, hierarchical manner using up to five menu levels, to allow you to retrieve the information that you need by merely selecting options from menus. On the other hand, if your preference is to work in a more "random" way, you can also just key data into KeyNotes as it occurs to you, and use the key word/key phrase search feature to find the information you're after. Either way, you can retrieve information on keystroke command without having to exit the application program you're currently using.

The KeyNotes program is priced at $100. At that price it's perhaps a little steep for casual hamshack use, although at the time I reviewed it the program was on special by the manufac-

317 Poplar Drive, Millbrook, AL 36054

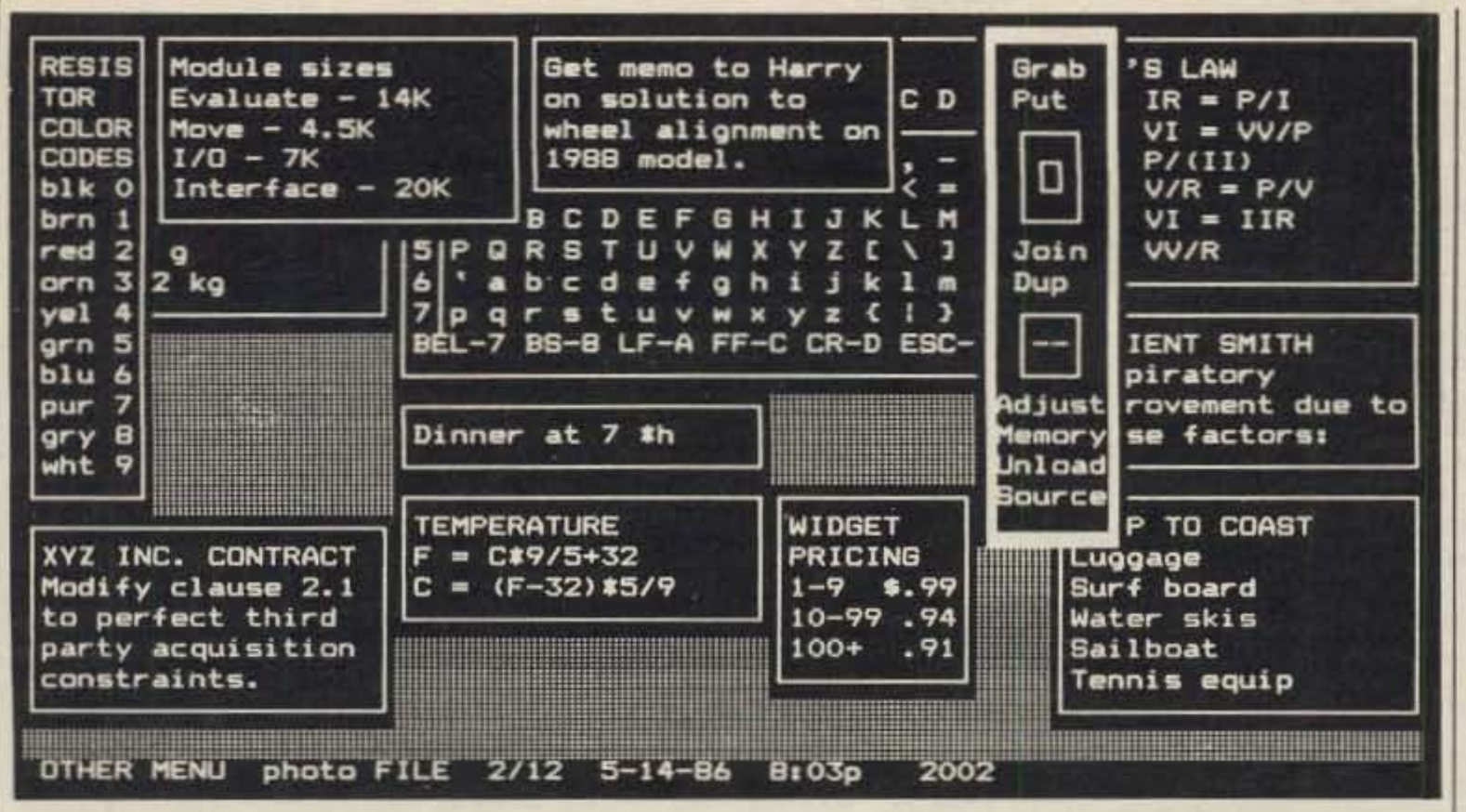


Fig. 1–The simulated Tornado Notes screen photo furnished by the manufacturer illustrates the program's intelligent windowing capability, mentioned in the text. Note the minimal overlap of one window by another.

turer at $75. Nevertheless, its ability to hierarchically structure information would be good for, say, taking the important portions of a transceiver's or packet controller's operating manual and making it available in the form of organized on-screen help to be called up via a simple set of keystrokes.

KeyNotes takes up 35K of your computer's free memory and runs under PC/MS-DOS 2.0 or higher on most compatibles. It can also be used in conjunction with a RAM disk for very fast access, and the program allows you to redefine the "hot key" sequence that brings up the program from your computer's memory. For more information, contact Digital Learning Systems, 4 Century Drive, Parsippany, NJ 07054.

We Get Letters

Do we ever! With the press of so much material in recent columns, we've backlogged a thick stack of letters over the past several months for public reply. We'd like to share a few of these with you.

Atari Notes de KB2AVO. Some time ago Lindsay Infante, KB2AVO, sent me a letter describing an Atari Morse code program that he had written in connection with his studying for his Novice ticket. According to Lindsay, he purchased an Atari computer before he became interested in amateur radio. While studying for his ticket, he discovered that most amateur software favored Commodore computers. After looking in vain for a Morse code tutorial program for his Atari, he decided to write one himself.

What emerged was a very simple yet helpful code practice program. It prompts you to hit the return key to begin, at which time it sounds a letter or number randomly in Morse. After the character is sounded, the program prompts with a "?" at which time you respond with whatever character you believe was sounded by the program. After you indicate what you believe to be the proper character, the computer tells you if you were right or wrong, and it continues with another character when you depress the return key again.

Lindsay didn't say for what Atari computer his program was designed, but it appears to be for an 8-bit machine. He gave us permission to publish his program in the column, but unfortunately the listing he sent was too faint to reproduce well. So if you want to trade Atari notes, drop a line to Lindsay at 6827 Baldhill Rd., Springwater, NY 14560.

F2MUF/BAS de VE4AS. Allan A. Simpson, VE4AS, has been experimenting with propagation-prediction programs for the TRS-80 Model III for several years. About a year ago he began corresponding with us on his efforts. Writes Allan:

"I started with the MINIMUF program and kept adding to it as a learning experience in basic programming until I got it to provide the information I needed for DX work . . . . The program calculates the LUF [lowest usable frequency] as well as the MUF [maximum usable frequency] and provides three times scales, UTC plus local time at both ends of the path. It also handles both standard and daylight savings time and plots the sun at zenith in relation to each end of the path.

"Since one must check with WWV for the solar flux reading, it seemed logical to also enter the A-index and the K-index and provide information on propagation conditions. It has been my experience that the average operator has no idea of what the A and K indices mean, or what valuable information they can produce. So, my program uses the A-index to indicate current conditions, and the "K in relation to the A" [indices] to produce a forecast. The A and K [indices] are also used in conjunction with the diurnal sun angle to calculate the LUF."

In later correspondence with Allan he told me that he modified the program to also include FOT (frequency of optimum transmission or traffic) as an output, as well as on-screen display of information regarding the availability of the MUF and the effects of operating too far below the MUF/FOT.

Allan also advised that following on-the-air testing of the program by local DXers, he was trying to decide on how best to market his program. This may be resolved now, so Model III owners may want to check this out with him. Contact Allan A. Simpson, VE4AS, 17 Barberry Rd., Winnipeg MB R2J 2G8, Canada.

Commodore Notes de N9FHO. An update received from Harv Nelson, N9FHO, followed our mention in last May's column of his involvement with AMTOR and over-the-air transfer of programs for the Commodore 64 via AMTOR. As we mentioned then, the transfer process he uses involves converting the program to be transmitted to a hexadecimal image file, putting the image file in a message buffer, and only then transmitting it. On the other end of the link, the received hex file is converted back to an executable program file. His original conversion program has gone through several iterations in the past few months.

Harv also advises that he's working on another AMTOR program which, if successful, will make possible the transfer of "bit map" data in a much condensed form. He wants to use a variation of the run length encoding process to do this. This process has the potential of making hi-resolution, monochrome bit maps interchangeable between various models of computers, regardless of on what machine the bit map was originally developed. Harv also hopes to be able to send detailed drawings including schematics over an AMTOR link when propagation conditions would rule out transmission by means such as SSTV (slow-scan television).

Harv also has available a new disk of all the

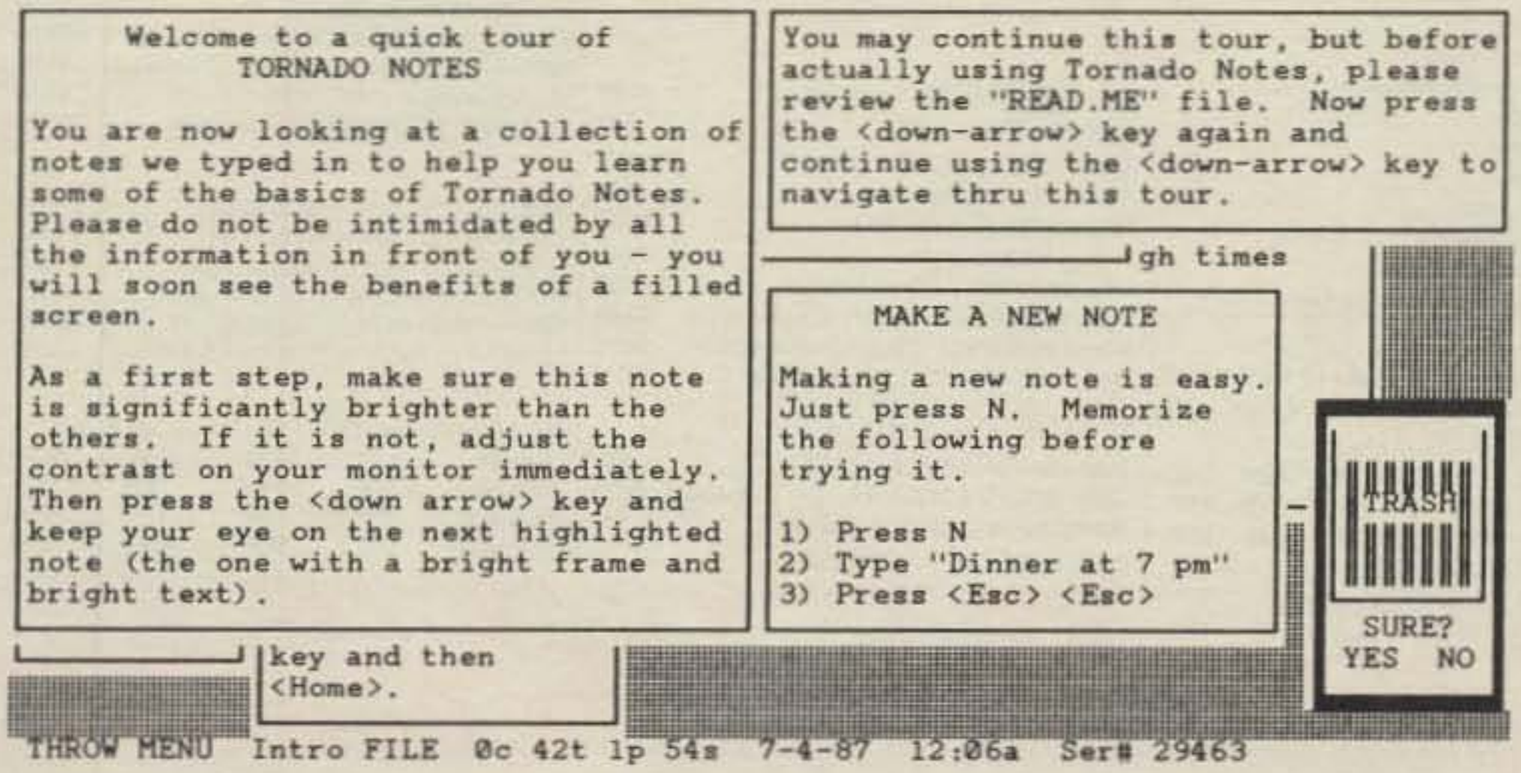
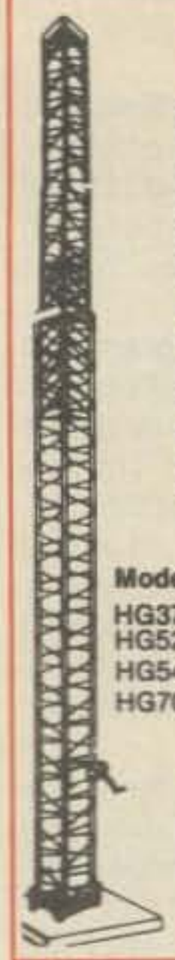


Fig. 2– The above screen shows the "Info File" which is included with the Tornado Notes program to assist the user in learning its operation. We're in the "Throw Menu" at this point. Note the trashcan icon at the bottom right of the screen.

ANTENNA/TOWER SALE!



hy-gain

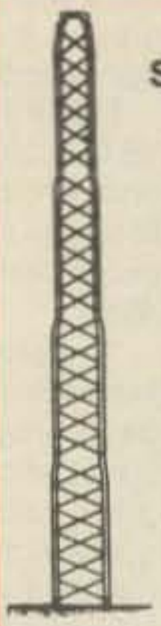
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- 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	$379
HBX48	48 ft	10 sq ft	303	$489
HBX56	56 ft	10 sq ft	385	$569
HDBX40	40 ft	18 sq ft	281	$459
HDBX48	48 ft	18 sq ft	363	$559

***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**
- **Rugged high wind survival-provides safe installation**
- **Multi purpose towers satisfy a wide range of needs**
- **Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.**

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices 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'	$ 699	$1239	$1529
60'	769	1399	1719
70'	829	1539	1879
80'	989	1719	2079
90'	1069	1999	2249
100'	1149	2179	2439
110'	1359	2329	2839
120'	1429	2499	3039

US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock-

CALL FOR SALE PRICES!

Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	$ 549
MA550 mast	22'	50'	10 sq ft	899
TX438	22'	38'	18 sq ft	829
TX455	22'	55'	18 sq ft	1249
TX472	23'	72'	18 sq ft	2099
HDX566	22'	55'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

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

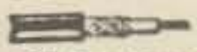
***Note-towers rated at 50 mph to EIA specifications**

RG-213U

$.29/ft $279/1000 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



$.19/ft $179/1000 ft

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

9086

$.39/ft $379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft.
⅞" LDF4-50 Andrew Heliax®	$1.79/ft
1¼" LDF5-50 Andrew Heliax®	$3.99/ft

select connectors below.

Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
⅞" Heliax®	$25	$25	$25	$25
1¼" Heliax®	$49	$49	$49	$49

COAX CONNECTORS

Amphenol Silver PL259	$1.25
UG21B N Male	$2.95
9086/9913 N Male Connector	$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga	$.10/ft.
¼ mile 18ga copper-clad steel wire	$30
Dog bone end insulator	$.79 ea.

Van Gordon

1:1 Balun	$11	Center Insulator	$6
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

CUSHCRAFT

A3 3-el Tribander	$229
A4 4-el Tribander Beam	$299
A743 & A744, 30/40 mtr KIT for the A3 & A4 ea	$79
AP8 80-10 mtr Vertical	$139
AV5 80-10mtr Vertical	$109
D40 40mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$299
A50-5 5-el 6 mtr Beam	$85
215 WB NEW 15-el 2 mtr Beam	$85
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$105
3219 19-el 2 mtr Beam	$99
220B 17-el 220MHz Beam	$99
424B 24-el 432MHz Beam	$85
ARX2B 2 mtr Vertical	$39

hy-gain

CALL FOR SPECIAL PRICES!

- Discoverer 2-el 40-mtr Beam
- Discoverer 3-el Conversion Kit
- EXPLORER-14 SUPER-SPECIAL
- QK710 30/40 mtr. Add-On-Kit
- V2S 2-mtr Base Vertical
- V4S 440MHz Base Vertical
- TH5MK2S Broad Band 5-el Triband Beam
- TH7DXS 7-el Triband Beam
- TH3JRS 3-el Triband Beam
- 205BAS 5-el 20-mtr Beam
- 155BAS 5-el 15-mtr Beam
- 105BAS 5-el 10-mtr Beam
- 204BAS 4-el 20-mtr Beam
- 64BS 4-el 6-mtr Beam
- 12 AVQ 20-10 mtr vertical
- 14 AVQ 40-10 mtr vertical
- 18 AVT/WB 80-10mtr Vertical
- 18HTS 80-10 mtr Hy-Tower Vertical
- 23BS 3-el 2 mtr Beam
- 25BS 5-el 2 mtr Beam
- 28BS 8-el 2 mtr Beam
- 214BS 14-el 2-mtr Beam
- 2BDQ 80/40 mtr Trap Dipole
- 5BDQ 80-10 mtr Trap Dipole
- BN86 80-10 mtr KW Balun W/Coax Seal

HUSTLER

6BTV 80-10 mtr Vert	$129	5BTV 80-10 mtr Vert	$109
4BTV 40-10 mtr Vert	$89	G7-144 2-mtr Base	$119
G6-144B 2-mtr Base	$89		

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

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

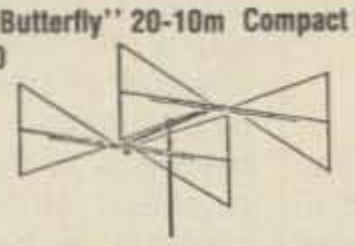
Accessories:

RMK II Roof Mtg. Kit	$49
STR II Stub-Tuned Radials	$29
TBR160 160m Coil Kit	$49
30m Add-on Kit	$29
20m Add-on Kit	$39
17/12m Add-on Kit	$27

HF6V HF2V

FREE UPS on ACCESSORIES when purchased w/antenna

HF5B "Butterfly" 20-10m Compact Beam $199.00



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

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam	$399.95
KT34XA 6-el Broad Band Triband Beam	$589.95

ROTORS

Daiwa MR 750 PE (16.1 sq ft rating)	$289
Additional Motor Units	$89
Alliance HD73 (10.7 sq ft rating)	$119.95
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (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
Kenpro KR500 Heavy Duty Elevator Rotator	$189
Kenpro KR5400 AZ/EL Rotor Package	$319

ROTOR CABLE

Standard 8 cord cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	$48.00	45G	$133.00
25G	$56.00	55G	$165.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Lead*	Price
FK2548	48 ft.	15.4 sq. ft.	$1049.
FK2558	58 ft.	13.3 sq. ft.	1099.
FK2568	68 ft.	11.7 sq. ft.	1149.
FK4544	44 ft.	34.8 sq. ft.	1389.
FK4554	54 ft.	29.1 sq. ft.	1469.
FK4564	64 ft.	28.4 sq. ft.	1579.

25G Double Guy Kit	$279.
45G Double Guy Kit	$299.

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

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 × 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
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle)	$10.95
1/2 × 12EE (1/2"12" Eye & Eye Turnbuckle)	$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$14.95
500 D Guy insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$8.95
9902LD Cable End (for 6700 cable)	$9.95
Socketfast Potting Compound (does 6-8 ends)	$14.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

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

ORDER TOLL FREE 1-800-272-3467

Texas, Alaska & for information 1 (214) 422-7306

TEXAS TOWERS

Mon-Fri: 9am - 5 pm
Sat: 9am - 1 pm

Div. of Texas RF Distributors Inc. 1108 Summit Ave., Suite 4 • Plano, Texas 75074

(Prices & Availability Subject To Change Without Notice)

(Antenna/tower product prices do not include shipping unless noted otherwise)

CIRCLE 64 ON READER SERVICE CARD

KENWOOD

TS-940S LIST $2349
NEW Top-of-the-Line HF Transceiver
- **100% Duty Cycle**
- **40 Memory Channels**

CALL FOR SPECIAL PRICES!!

TS-440S NEW! LIST $1299
CALL FOR SPECIAL SALE PRICE

TS-140S LIST PRICE $899
CALL FOR SPECIAL SALE PRICE!

TW4100A LIST $669
CALL FOR SPECIAL PRICE

TR-751A LIST $629
All Mode 2m Mobile

COMPACT 2M FM MOBILE

TM 2570A (70W)	LIST $589
TM 2550A (45W)	LIST $489
TM 2530A (25W)	LIST $459
TM 3530A (25W)	LIST $479

CALL FOR SPECIAL PRICE

TH 205 AT
High Tech 2M HT XCVR

TH215AT
2m HT XCVR
TH21BT, TH31BT
TH41AT Also In Stock-
CALL FOR SALE PRICES!

YAESU

FT 767 GX HF/VHF/UHF
LIST $1895 CALL FOR SALE PRICE

FT-757GX/II LIST PRICE $1,049
CALL FOR SPECIAL SALE PRICE!

FT2700RH NEW 2M/70cm Dual Band Transceiver
Full Duplex-Cross Band Operation LIST $599
CALL FOR PRICE-SAVE $$!

NEW FT290R 2m Portable LIST $579.95
NEW FT690R 6m Portable LIST $569.95
CALL FOR SALE PRICES!

FT 209/709 RH NEW HIGH Tech HT's 5W Output

New! FT727 RH 2m/70 cmHT
- **5w Output**
- **10 memories**
- **Battery saver**

Call For Sale Prices

FT 23R 2m HT LIST $299.95
FT 73R 70 cm HT LIST $314.95
- **compact size**
- **10 memories**
- **up to 5W output W/FNB-11**

CALL FOR SALE PRICES!

ASTRON POWER SUPPLIES

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

Model	'Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	195
RS50M	37	50	229

ICOM

IC-761 New HF XCVR
- **Built-in AC Power Supply**
- **Built-in Automatic Tuner**
- **PBT Plus IF Shift**
- **QSK Up To 60 WPM**

LIST PRICE $2499
CALL TODAY FOR SALE PRICE

IC735 NEW General Coverage Ultra Compact - LIST PRICE $999
CALL FOR SPECIAL PRICE!

IC-27A LIST $429	IC-27H LIST $459
IC-28A LIST $429	IC-28H LIST $459
IC-37A LIST $499	IC-47A LIST $549
IC-38A LIST $459	IC-48A LIST $459

CALL TODAY FOR SPECIAL ICOM PRICES!

IC02AT - 2mtr
IC03AT - 220 MHz
IC04AT - 70cm
High Tech HT XCVRS

NEW IC-μ2AT 2m HT

- **micro design covers 140-163 MHz**
- **10 mem. w/scan**
- **LCD Readout**

CALL FOR SALE PRICE!

TEN-TEC

PARAGON
General Coverage HF Transceiver
Microprocessor Controlled Multi-Scan, 62 Memories

	LIST
561 Corsair II	$1,595.00
960 Power Supply	$239.00
229 2KW Tuner	$349.00
425 Titan Amplifier	$2,685.00

MIRAGE

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	$289
B23A	2M	Yes	2W	30W	$129
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$259
B3016	2M	Yes	30W	160W	$229
D1010N	440	No	10W	100W	$319

rfconcepts

rfc 2-317 2M
30W in = 170W out
LIST $299.00

Model	Band	In-Out	List Price
2-23	2M	2-30W	$112.00
2-217	2M	2-170W	$299.00
2-117	2M	10-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
3-312	220	30-120W	$264.00

Call For Sale Prices

AMERITRON

AL80A

AL80A	$985.00	ATR10	$325.00
AL84	479.00	ATR15	380.00
AL1200	1825.00	RCS4	134.50
AL1500	2370.00	RCS8V	134.50

CALL FOR SALE PRICES!

AMP SUPPLY

Model	List	Model	List
LK-450	$899	LA 1000 NT	$ 579
LK500ZC	$1395	LK 500 NT	$1595
LK 800 A	$2695	LK 800 NT	$2995
LK550	$1895	AT 3000	$ 499

CALL AND SAVE $$$$$

AEA

PK-232 Packet Controller	$299.95
144 MHz Isopole	$49.95
440 MHz Isopole	$59.95

Other AEA products also in stock call!!!

ALINCO

ELH-230G	69.95	ALR-22T	CALL
ELH-230D	89.95	ALR-22HT	
ELH-260D	129.95	ALR-72T	
		ALD-24T	

Other items in stock - call!

Kantronics

NEW All Mode KAM $289.95

KPC II Packet Controller	$159.95
KPC 4 Node Controller	$299.95
UTU-XT/P Terminal	$269.95

MFJ

1270B/1274 TNC Units	$129.95/ 159.95
1224/1229 Interface	$89.95/$159.95
202/204 Antenna Bridges	$59.95/$79.95
250 Oil Load	$39.95
260/262 Dry Loads	$29.95/$59.95
407/422 Elect. Keyers	$89.95/$119.95
901/941D Tuners	$59.95/$99.95
949C/989 Tuners	$139.95/$299.95

NYE VIKING

MBV-A 3KW Tuner
LIST $625.00
- **Low Pass Pi-Network Tuning**
- **Built-in Antenna Switch/Balun**

New-RF Power Monitor System $249.95
CALL TODAY TO SAVE $

NEL TECH LABS

DVK-100 Digital Voice Keyer
- **Built-in Auto Repeat Function**
- **Essential For Contesting**
- **Fully Compatible With All Xcvrs**

SPECIAL INTRODUCTORY PRICE $279.95

FREE SHIPPING-UPS SURFACE (continental USA) (most items, except towers/antennas)

ORDER TOLL FREE 1-800-272-3467

Texas, Alaska & for information call 1-(214)-422-7306

TEXAS TOWERS

Div. of Texas RF Distributors Inc. 1108 Summit Ave., Suite 4 • Plano, Texas 75074

Mon-Fri: 9am - 5 pm
Sat: 9am - 1 pm

VISA MasterCard

(Prices & Availability Subject To Change Without Notice)

CIRCLE 8 ON READER SERVICE CARD

current C-64 amateur radio programs he's working on. I don't have the price or exchange basis for the new disk, so for more information drop a line to Harvey A. Nelson, N9FHO, Stevens Point, WI 54481.

Antenna Equipment of Note

Mission Consulting and Communications. In a fat packet of literature from Charles F. Frost, K5LBU, president of Mission Consulting, Inc. and Mission Communications, he dropped the word that his firms were expanding their scope of activities to include the distribution of amateur communications equipment and systems, in addition to providing consulting services such as site surveys, installations, and equipment service.

The "communications end" of the business features products from most of the major antenna manufacturers, such as Larsen, AEA, Cushcraft, Valor, Butternut, Spi-Ro, and others. The latest flyer features several custom-made HF antennas, including an 80 through 10 meter G5RV multibander as well as wideband "double bazooka" monoband antennas for 10, 40, and 80 meters.

For a flyer, contact Mission Consulting, Inc./Mission Communications, 11903 Alief-Clodine, Suite 500, Houston, TX 77082.

On-Glass Antennas from Larsen. Windshield-mounted VHF and UHF mobile antennas have always offered a great deal in terms of convenience, although in the past they have not bee., without problems for the mobile operator. Some of them tended to fall off under extremes of temperature, and rumor has it one manufacturer of windshield-mount antennas just about went under as a result of windshield cracking caused by his antenna.

Your ole columnist hard at work (?) preparing this month's column for CQ.

A new line of on-glass antennas should eliminate such problems, considering Larsen's reputation for quality. The Larsen KG series is designed to perform well in any on-glass application where the signal must be coupled from the inside of the vehicle through the windshield to the radiating element outside the vehicle.

The key to high performance in this type of antenna lies in placing the antenna tuning assembly on the outside of the glass, with no tuning components inside the vehicle; this allows a low-impedance power transfer through the glass. According to Larsen's technical information, their KG series design is minimally affected by proximity to vehicle body and heating wires in the window, and the design is said to minimize radiation inside the vehicle. In addition, moisture on the glass is said to have no effect on performance. An external tuning network allows the use of full-length radiating elements (either ⅝ or ½ wave) for peak performance.

According to Larsen, the KG series antennas are fully adjustable to vertical for practically any window angle, allowing the antennas to achieve low VSWR and a low radiation angle without a ground plane.

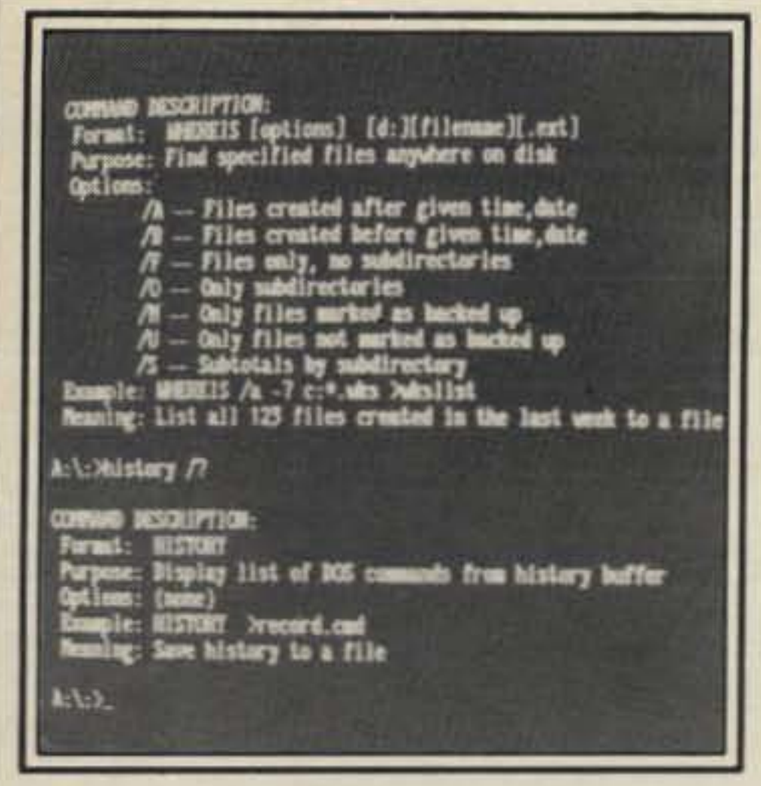
The KG series are sold as complete kits including dual-shielded coax and connectors, and they are available to cover the 144–148, 220–225, 440–450, and 902–928 MHz ranges. The latter antenna is of ⅝-wave design, whereas the others are ½-wave in length.

An interesting point is that the antennas are covered by Larsen's excellent "no-nonsense" warranty. According to the company antennas are covered for failure for up to six months, and the company will repair or replace any failed antenna.

More on Software

Solar Morse Code Program. Robert E. Solfest advised us of an "affordable and flexible" Morse code tutor program that he developed for the C-64 and C-128 computers. Some of the program's features include random character generation, with numbers and punctuation marks mixed, or with the alphabet alone, numbers alone, or numbers and punctuation marks alone; availability or preprogrammed code; display of the Morse character on the monitor screen as the character is heard; adjustable code speed with variable spacing between characters; and user-programmable code practice. The program also has the capability to stop and check the hand-copied code for mistakes, with the transmitted code remaining on the screen until you're ready to clear it off.

According to Robert, he offers several pricing "deals," with the program costing as little as $8 for either the C-64 or C-128 version. In



This month we focused on general-purpose software for the IBM-PC. Next month we'll pull down some books from the bookshelf, and in following columns we'll round up some of the best PC utility programs. Here's a screen display from one of them, TopDOS™, an excellent DOS enhancement and file management utility. (W8FX photo)

addition, radio clubs can obtain the program at a discount. For more details, write to Solar, P.O. Box 1734, Eau Claire, WI 54702-1734.

N7CTY Ham program. Bob Riggle, N7CTY, wrote to tell us of a novel multifunction Commodore 64/128 program for the DXer who needs direct access to prefix, beam-heading, and QSL information on the air.

The N7CTY Ham Program offers options such as accessing, adding to, changing, or reading QSL file information, including the DX station's address or QSL manager; obtaining a beam heading for any DX prefix, state, or other location; and finding countries by prefix allocation, continent, ITU zone, or *CQ* zone, among other features.

Bob says he has three versions of the program, all of which operate similarly and use the same data. One version is for a C-64 using one 1541 disk drive, which uses both sides of a single "flippy" disk. A second version is for a C-64 with two 1541 disk drives, while a third version is for the C-128 and a single 1571 disk drive. Bob has included over 6400 calls with their corresponding QSL information on the disks.

Bob also advises that he plans to update the QSL information biweekly and will have updates available every six months. He explains that the reason for this schedule is to allow him to make available at least 100 new "bits" of information before releasing an update. However, if there are any updates to the main program, he will also include the program update with the QSL update information.

The program and updates are reasonably priced: under $20 for the program and about one-quarter of that for QSL updates. For more information, write to Bob Riggle, N7CTY, P.O. Box 738, Cornelius, OR 97113.

CompDes. Bob Blackburn, WA8KZD, wrote to advise us of his program, CompDes (or "Computer-Aided Circuit Design Program") for the IBM-PC family and compatibles. CompDes was designed to be educational as well as a useful and low-cost circuit design tool for students and engineers.

According to Bob, the program offers individual designs and calculations across a broad range of electrical-engineering topics. Although it is described as a computer-aided design program, in fact it consists of several more-or-less independent functions. These include a calculator for basic electrical quantities; a list of definitions and nongraphic electronic symbols; a calculator for handling various types of attenuator circuits; a communications calculator for handling calculations such as VSWR and decibels; a designer for passive and active filter networks; a multifunction electronic circuit calculator; and a circuit designer for several solid-state circuit types. All CompDes functions are selected through the program's various menus.

Although we did not give CompDes a hands-on try ourselves, we see that it was reviewed in last May's issue of *Radio-Electronics*, where although the program was found to have some limitations on the range of calculations that could be entered, the magazine considered it to work well and be worth the price of $49.95.

For more information, contact Bob Blackburn, WA8KZD, at Esoft Software, 444 Colton Road, Columbus, OH 43207.

Short Bursts

C-64/C-128 Power Supplies. Those of us who have been "into" Commodore computers for awhile know all too well how many problems their external power supplies are responsible for, especially the earlier C-64 power supplies. These power supplies were mostly of a potted design and thus were practically unrepairable, even if the actual malfunctioning part was trivial. To make things worse, the supplies typically did not "die" all at once, but started acting erratically over a period of time, so that power-supply problems were often misdiagnosed as internal computer problems. Many C-64 owners, including yours truly, have long since replaced their original light-duty C-64 supplies with heavier-duty, repairable units.

A flyer I received from Nichols Electronics lists several heavy-duty replacement supplies for the C-64 and C-128 that are priced quite reasonably. These include a repairable C-64 supply for as little as $24.97. There are also several deluxe units such as the CPS-10 and CPS-30 for the 64 and the CPS-128 for the 128; these list from about $40 to $80.

For more information and a price schedule, contact Nichols Electronics, 274 Wahconah St., Pittsfield, MA 01201.

Wrapping It Up

That's it for this month, gang. This time we've continued our examination of some useful general-purpose software by discussing Tornado Notes and KeyNotes. We caught up with some letters from the mailbag, described some new antenna products, and highlighted some new hamshack software we think you'll be interested in. We also had just enough room for a "short burst" on replacement Commodore power supplies.

Overheard: The difference between open-mindedness and emptyheadedness is the way you get filled in!

Next month more antennas and accessories subjects of current topical interest. See you then.

73, Karl, W8FX

DAYTON **Hamvention**®

April 29, 30, May 1, 1988

Early Reservation Information

• Giant 3 day flea market • Exhibits
• License exams • Free bus service
• CW proficiency test • Door prizes

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.

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.

License Exams
Novice thru Extra exams scheduled Saturday and Sunday by appointment only. Send FCC form 610 (Aug. 1985 or later) - with requested elements indicated at top of form, copy of present license and check for $4.35 (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton, OH 45458

Hamvention Video
VHS video presentation about the HAMVENTION is available for loan. Contact Dick Miller, 2853 La Cresta, Beavercreek, OH 45324

1988 Deadlines
Award Nominations: March 15
Lodging: April 2
License Exams: March 26
Advance Registration and banquet:
USA - April 4 Canada - March 31
Flea Market Space:
Orders will not be processed **before** January 1

Information
General Information: (513) 433-7720
or, Box 2205, Dayton, OH 45401
Flea Market Information: (513) 898-8871
Lodging Information: (513) 223-2612
(No Reservations By Phone)

Lodging
Reservations received after Housing Bureau room blocks are filled will be returned along with a list of hotel/motels located in the surrounding areas of Dayton. The reservation will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Lodging Reservation Form

Dayton Hamvention - April 29, 30, May 1, 1988
Reservation Deadline - April 2, 1988

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Arrival Date _____
{ } Before 6 pm { } After 6 pm
Departure Date _____

Rooms: { } Single { } Double (1 bed, 2 persons)
{ } Double Double (2 beds, 2 persons)

Deposit required - Room deposit must be paid directly to the hotel or motel by date shown on the confirmation form sent to you. Use canceled check for confirmation.

Mail to - Lodging,Dayton Hamvention, 1880 Kettering Tower, Dayton, OH 45423-1880

(PLEASE SEPARATE)

Advance Registration Form

Dayton Hamvention 1988
Reservation Deadline - USA-April 4, Canada-March 31

Name _____

Address _____

City _____ State _____ Zip _____

	How Many		
Admission (valid all 3 days)	_____	@ $8.00*	$_____
Grand Banquet	_____	@ $16.00**	$_____
Women's Luncheon			
(Saturday)	_____	@ $6.75	$_____
(Sunday)	_____	@ $6.75	$_____
Flea Market	_____	$23/1 space	
(Max. 3 spaces)		$50/2 adjacent	
Admission ticket must		$150/3 adjacent	$_____
be ordered with flea market tickets		**Total**	$_____

* $10.00 at door ** $18.00 at door, if available

Make checks payable and mail S.A.S.E. to -
Dayton Hamvention, Box 2205, Dayton, OH 45401

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

The Interference Survival Guide

Last time our intrepid VHFer clued us in on maintaining civil relations with our neighbors while enjoying our hobby to the fullest. This time Steve delves into his bag of technical tricks to solve those problems that can't be talked away.

—K2EEK

Take every measure possible to reduce or eliminate undesired radiation—i.e., radiation from sources other than your antenna itself. Be certain your transmitter, amplifier, interconnect cables, and feedlines are well shielded. Remove dirt and oxidation from all contacting surfaces intended to shield your transmitter and amplifier by polishing with 3M "Scotchbrite" cloths or equivalent. Replace and tighten all mounting hardware. If your transmitter was never too well shielded to begin with, install additional shielding. Be sure that in the process you don't interrupt air flow to heat-generating stages.

Check coaxial connectors, both in the shack and at the antenna, for oxidation. Any visible oxidation indicates the presence of unwanted moisture. Use of type "N" connectors, with their rubber gaskets properly installed, protected by several overlapping layers of *high-quality* vinyl tape, will help assure nearly permanent moisture resistance.

In addition, make every effort to install your 6 meter (or any) antennas as high as possible above the ground. This helps reduce TVI in two ways. First, it maximizes the separation between your beam(s) and your neighbors' TV antennas and receivers. It places your transmitting antenna(s) on a different horizontal plane than those TV antennas and receivers, dramatically reducing the field intensity of your transmitted signals in your neighbors' homes.

Adjust your transmitting antenna(s) for the lowest possible VSWR. Remember to make this measurement with the bridge connected very close to the antenna, not the transmitter. A 1.0:1 ratio should be obtainable for at least one small subband, like 50.100–50.150 MHz. If you cannot achieve zero reflected power with your antenna(s), consider replacing it or at least redesigning the matching system.

153 Rodman Court, Eatontown, NJ 07724

To help reduce feedline radiation, try making an RF choke out of the feedline itself. Wind about one-half wavelength of cable (10 feet at 50 MHz) in a small-diameter coil as close as possible to the antenna feedpoint. Then dress the cable down the antenna boom and support structure. In calculating this one-half wavelength it is not necessary to consider the transmission line's velocity factor. It is the physical length of the outer conductor only with which we are concerned.

Also, you might consider using a pair of stacked antennas instead of a single larger one. Remember the overall gain of any antenna system is related to total aperture (expressed in square wavelengths). Thus, two antennas having a one-wavelength boom each will have about the same gain as a single antenna with a two-wavelength boom. The advantage of using stacked antennas is compression of the vertical radiation pattern.

An even greater possible reduction in TVI may be accomplished by the use of a four-bay antenna array, with four antennas stacked two high and two wide ("H-frame"). Such an array offers radiation compression in both planes.

Remember that your effective radiated power is your transmitter output power, minus feedline loss, plus antenna gain. A 100 watt transmitter feeding a 6-element, one-wavelength long Yagi will generate an ERP of about 1000 watts, but this power is radiated in *one primary direction.* Narrowing the frontal lobe, in both vertical and horizontal planes, increases station effectiveness while reducing the radiated power in other directions.

Filters

Next, consider using a low-pass filter following your transmitter or amplifier. A really excellent filter which will accept power levels to about 300 watts continuous (600 watts PEP) is the R.L. Drake Model TV-5200-LP. It has a cutoff frequency of 54 MHz and is usable to at least 52 MHz. This filter is a well-shielded, cascaded m-derived T-section. It has three poles of infinite attenuation offering more than 70 dB rejection at 63 MHz.

Barker & Williamson offers a similar filter, Model FL6/1500, which they rate at 1000 watts. I'm uncertain of the B&W circuit, but I see they are currently advertising this unit. The advantage of these low-pass filters is that they will enhance the spectral purity of nearly any 6 meter transmitter. This almost assures compliance with FCC Part 97 regulations. However, commercially available low-pass filters do not cut off sharply enough to be of much help in reducing interference to TV Channel 2. Remember that these filters must be terminated with a pure 50 ohm load, and interconnected with well-shielded 50 ohm coaxial cables, to be of any real value.

Those who are willing to pay a high price for upgraded spectral purity may be interested in buying or building a bandpass cavity filter tuned to the frequency of interest, e.g. 50 MHz. Be advised that the construction of such a filter is no small task. To be effective at this frequency, such a filter needs to be about 10 inches in diameter by 81 inches long. It will probably weigh 25 pounds. Furthermore, it requires very close machine tolerances. A bandpass cavity will introduce some transmission loss if it is to offer a high enough "Q" to be effective in reducing noise and sidebands falling within TV Channel 2 while passing energy at 50.1 MHz.

An example of such a commercially

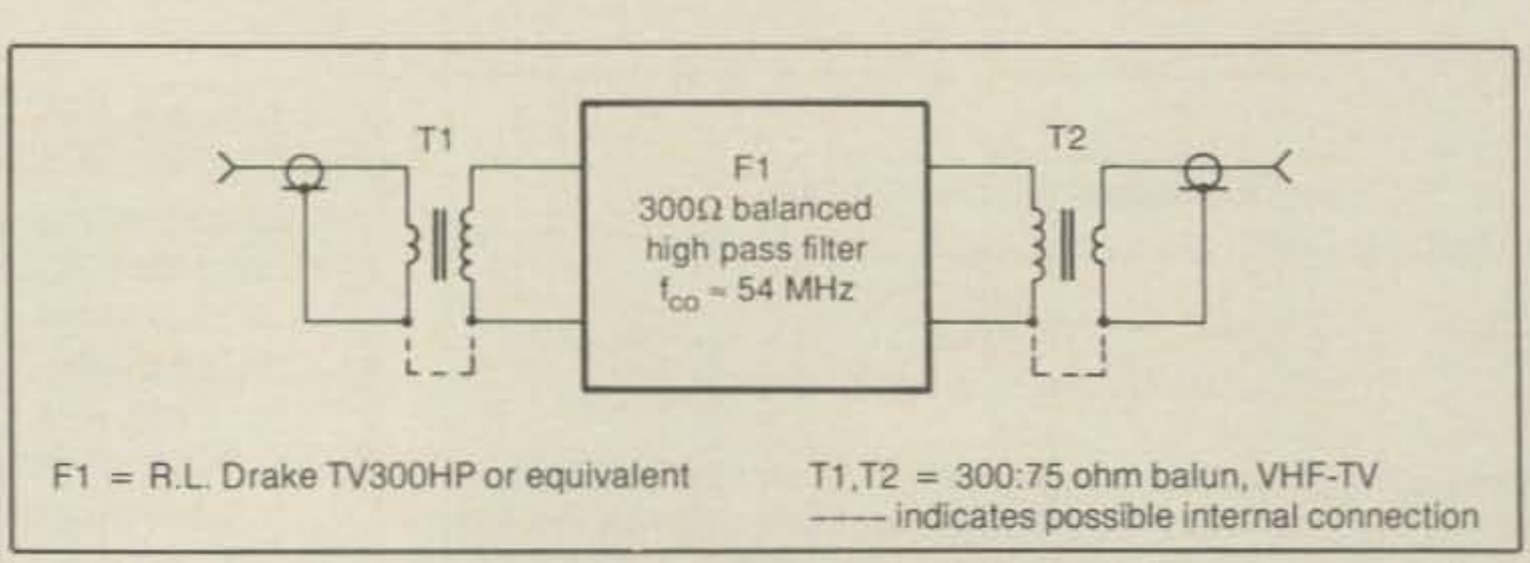


Fig. 1–A balun/filter combination to eliminate interference.

manufactured unit is the Telewave, Inc. Model TWPC-0410. It is tunable through the low end of 6 meters and has adjustable coupling loops. This allows one to trade off selectivity and insertion loss. Set to 50 MHz and 0.5 dB insertion loss (not too bad), this cavity filter will reduce the energy at 52 MHz by 30 dB. It offers far better performance than a conventional low-pass filter. With the coupling loops set for 1.0 dB insertion loss, energy offset 4 MHz will be reduced by more than 40 dB. "Wonderful," you might say, until you hear the price of such a filter: $450 list. It would cost only a little less to homebrew such a unit, unless you have ready access to all the materials and tools required.

Groundless Fears

One more easily taken step for the station operator is to connect the best possible ground system to all station equipment. Unfortunately, a good DC ground is often anything but that in the VHF region. But you might try knocking a few 8 foot ground rods as far into the earth as possible. Connect them in parallel along with your cold-water entry pipe, well head pipe, and anything else you know is grounded. Attach this system to your station equipment with the lowest loss (largest-diameter) copper conductor possible.

I generally use a #8 copper conductor for short runs, progressing to #0 stranded copper or 1 inch wide copper braid for longer runs. No matter what you use, you may not be able to achieve a decent ground at 50 MHz, but it's worth a try.

A task of considerably greater difficulty might also be worth a try. Clean all antenna connections, tower section splice points, guy turnbuckles, and all other metal-to-metal interfaces that may even remotely be connected to your transmitting antenna system. This can really be a lot of work and may be only considered as a last-ditch effort to reduce radiated interference. But I've seen a couple of cases where oxidized guywire connections appeared to be generating and radiating a broad spectrum of signals when excited by high-level RF nearby. Apparently, this is not at all uncommon in the broadcast services where QRO is the norm and regular maintenance includes cleaning these connections.

Taking the Mountain To . . .

Assume you've done everything possible to assure your transmitted signal is squeaky-clean and you still have TVI problems. It is time to work on whatever is receiving the interference. The easiest possible "fixes" include the installation of high-pass filters and/or resonant stub "traps" at television-set tuners.

The best high-pass filter I've come across is the R.L. Drake TV-300-HP (for 300 ohm balanced lines). It is installed in series with the transmission line as close to the TV (or FM radio) tuner as possible. Although there was (and possibly still is) a Model TV-75-HP also available for 75 ohm coaxial systems, I never found this model as effective as the 300 ohm unit. In fact, I've often found the installation of a pair of 75 to 300 ohm baluns and a TV-300-HP to work better than any commercially manufactured 75 ohm high-pass filter. Possibly this is because the balun/filter combination eliminates common-mode interference conducted by the shield of the coaxial cable. A diagram of the circuit I've found to work very well is shown in fig. 1. This circuit often solves annoying VCRI (interference to videotape recorders) *when nothing else seems to work.*

Assuming the high-pass filter has been installed and didn't help, another easy trick worth trying is the installation of a quarter-wave stub "trap" across the receiver's antenna terminals. In calculating the length of such a trap, you must consider the propagation factor of the transmission line used. A 75 ohm cable feedline and tuner will require a 75 ohm cable trap. A 300 ohm unbalanced ("twin-lead") feedline and tuner will require a 300 ohm trap.

Assume that 300 ohm balanced line has a propagation factor of about .82; thus, a quarter-wave trap for 6 meters would be about 48½ inches long. It is best to begin with a stub a bit longer than calculated. Be sure one end of such a

stub is open-circuited. Connect the other end directly across the antenna terminals on the TV set, FM receiver, VCR, or whatever.

The use of a 75 ohm type-F "tee" fitting allows paralleling with little hassle in coaxial cable installations. Adjust the length of the tuned stub by trimming very small increments while observing the interference. With any luck, the trap will eliminate the TVI without much impact on the desired television signal, but don't bet on it.

Another easy shot at reducing TVI may be taken by installing ferrite cores around the appliance's external wiring. This includes AC line cord, remote speaker leads, and any other conductors (except the antenna feedline) coming from or to the set. I've only seen this work once, but it doesn't cost much to try.

Of course, you may find yourself almost off the hook if the complainant's television is connected to a pay-TV cable system. After all, it is the cable-system operator's obligation, as a public utility, to offer uninterrupted service to its subscribers. If you interfere with your neighbor's reception (or your own, for that matter) without directly connecting anything to his appliances or converter box, it is the system operator's duty to fix the problem.

This sounds easy, but in practice I've found that few, if any, cable-system operators have this no-nonsense outlook. They will yell and scream that you're at fault, their system is perfect, there wasn't a problem until you started transmitting, ad nauseum. At this point I usually demand to speak with the chief engineer (in person, if possible). I calmly advise him that I've monitored his system's egress levels and found them to exceed FCC standards by a considerable margin. I'm offering him exactly one opportunity to deal with this problem before I send my fully documented report to the FCC field office. And while he's at it, he had better fix my neighbor's service so it is free of interference from my amateur transmissions. Otherwise, I will mail that information to the FCC and the state Board of Public Utilities as well.

It's amazing. This kind of statement either gets immediate action or none at all. But as a consumer, you have the same rights as any other consumer serviced by a public utility to uninterrupted service of the quantity and quality paid for. If the public utility commission of your state receives enough complaints about a cable system operator, they can and will put him out of business.

You wouldn't pay your water bill if the water wasn't drinkable, or your electric bill if your service was constantly interrupted, would you? Consumers are going to have to educate themselves and demonstrate their discontent with cable television service when there's clearly a problem. I've seen areas with cable TV service that is so poor that even indoor "rabbit ears" will produce a clearer picture. There's no excuse for this kind of service. On the other hand, I've been the happy recipient of excellent cable TV service for years, with no reason to complain.

If the cable company is willing to help resolve a TVI problem, cooperate with them. They may ask you to generate test transmissions at inconvenient times. Try to be available for these tests, since they are very valuable to those who are troubleshooting the system for "leaks," ground loops, or whatever. In one neighborhood I helped the cable company find an intermittent ground by using my 2 meter hand-held as an RF "sniffer." I listened for cable leakage at 145.25 MHz. As I scouted the neighborhood, I was able to zero in on the distribution amplifier radiating the problem signal. Hitting the pole supporting this amplifier with a big hammer caused modulation of the leakage signal! While the cable company's team of field technicians looked for this problem for days, I found it in about 10 minutes, using my ICOM IC2AT and a big hammer. The cable company was overjoyed when I pointed out the problem to them, and they fixed it.

One last suggestion: When all else has been tried and TVI problems appear hopeless, substitute television sets. I had an old Sylvania tube-type set which was better at ignoring interfering signals than any other I'd seen. When all else failed, I'd lend the complaining neighbor this set for a week. It demonstrated that it was his set, not my transmissions, that were the cause of his problem. This is an *incredibly effective demonstration*. But it may not solve your problem permanently, unless you are willing to give away a good TV set.

SONNY IRONS says," I hate switches, buttons and knobs."

"That is why I make MAXCOM'S."®

VSWR 1.5:1 OR LESS

AUTOMATIC ANTENNA MATCHER
FOR ALL S.S.B. RADIOS
"ONE ANTENNA 100 KHZ. TO 200 MHZ."

Priced From $299.00

MAXCOM has made Global Communications Simple!!!

For FREE information,
Call Sonny at (305) 527-5172
or Write:
Sonny Irons
P.O. Box 502 Ft. Lauderdale, FL 33302

® MAXCOM is a registered trademark and is owned by Maxcom Electronics, Inc.

CIRCLE 85 ON READER SERVICE CARD

Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

The History of Communications—Part III

"It is an extraordinary era in which we live. It is altogether new. The world has seen nothing like it before. I will not pretend, no one can pretend, to discern the end; but everybody knows that the age is remarkable for scientific research into the heavens, the earth, and what is beneath the earth; and perhaps more remarkable still for the application of this scientific research to the pursuits of life. . . . We see the ocean navigated and the solid land traversed by steam power, and intelligence communicated by electricity. Truly this is almost a miraculous era. What is before us not one can say, what is upon us no one can hardly realize. The progress of the age has almost outstripped human belief; the future is known only to Omniscience."

Daniel Webster, 1847

In our last installment (some months ago) we discussed how Samuel F.B. Morse developed his famous code in the mid-1830s by assigning the simplest formats to those letters of the alphabet which were most frequently used. By 1850 the electric telegraph had spread all over England, Europe, and the more settled areas of North America. But all wires stopped at the edge of the great seas. In 1858 an underwater cable linked England and North America.

The Discovery of Radio Waves

Up until the mid-1890s all electrical communication was accomplished by either telegraphy or telephone linked by wire. In 1867 James C. Maxwell, a Scotch physicist and mathematician, reasoned the action of "ether" which he defined as an odorless, invisible, tasteless medium which was available everywhere—in solid bodies as well as space—through which light, heat, and magnetic waves could pass.

Heinrich Rudolph Hertz, a German physicist, was extremely fascinated by the Maxwell theory and took up the task of confirming it. He was the first to create, detect, and measure electromagnetic waves using oscillatory radiating circuits. He found a very close relationship between these waves and light, observing that both traveled at the same velocity—186,000 miles per second. Electric waves could be reflected, refracted, and polarized like waves of light.

While vacationing in the Alps, Guglielmo Marconi, a young teenage Italian, picked up an electrical journal. He read how Hertz had created and radiated electromagnetic waves by using a battery-operated induction coil connected to a spark gap. Marconi began dreaming of a way to send signals from transmitter to receiver without the aid of wires—wireless signalling. He was destined to become the world's first amateur radio operator.

Marconi put together a Hertz wave emitter and a telegraph key switch. He succeeded where others had failed by making use of the so-called ground-return circuit; that is, the transmitter, receiver, and antenna all had connections with the ground. The term *Marconi antenna*, a dipole with the radiating element connected to the signal source and the other element to ground, exists to this day. The primary of Marconi's induction coil was energized from a battery, the current of which went through the telegraph key. When the key was pressed, the current passed through the coil and was transformed into high-tension electricity which caused sparks to jump across a gap.

When the sparks occurred, electric waves were radiated into space. Marconi changed the tuning (frequency) of his spark apparatus by simple letting his aerial antenna down and cutting off part of the wire, since he knew that a straight wire had both capacitance and inductance. Marconi's receiving device, which in the beginning was located on the same table as his spark gap transmitter, contained two collecting or resonating plates into which currents were induced from the emitted waves.

In 1894 he was able to detect an electric wave 30 feet away. In 1895, it was one mile. Using more powerful equipment it was 10, then 20, then 50 miles. By 1901 a 200 mile range was achieved. Wireless telegraphy became the rage of Europe, then America. Marconi thought magnetic waves could leap the ocean! The great American electric inventor Thomas A. Edison said it was impossible!

Cape Cod Selected For Radio Experiment

South Wellfleet, Massachusetts, jutting out into the ocean on the arm of Cape Cod, was thought by Marconi to be the westernmost tip of America. It offered an unobstructed straight-line path to Poldhu on the English coast, where in 1901 Marconi had constructed a powerful station. Marconi paid $250 for 8 acres of otherwise worthless Cape Cod land, which is today worth millions!

The South Wellfleet station was modeled after the one built by Marconi in Poldhu (Cornwall), England. A circular series of twenty 200 foot ship's masts were planted in the sandy soil about 165 feet from the ocean. Then disaster struck. The circular ring of towers in both England and South Wellfleet blew down in storms. Each tower pulled the next one down. The Poldhu antenna was replaced with a "V-shaped aerial between two salvaged 150 foot masts.

The western leg of the trans-Atlantic experiment was then transferred from Cape Cod to Signal Hill at St. John's, Newfoundland. It was prearranged that a three-dot Morse code signal, the letter "S," would be transmitted from Poldhu starting December 11, 1901. The following day it was heard! The receiving antenna was an aerial wire attached to a kite soaring at a height of 400 feet. Marconi was only 27 at the time.

What Thomas A. Edison said was impossible had been accomplished: Magnetic waves could indeed span the great oceans! Few know that this remarkable feat was really scheduled for the U.S.—South Wellfleet, Massachusetts.

To Marconi's dismay a Newfoundland cable company had exclusive communications rights. Four days later Marconi was served with a Cease and Desist Order and was required to vacate Signal Hill. The Canadian government offered Marconi another site at Glace Bay, Nova Scotia.

A new set of four (210 foot high) towers was constructed at South Wellfleet in 1902. On January 18, 1903 Marconi himself tapped out a telegraphic message that was to have been relayed to England through Glace Bay. All involved were stunned when the reception acknowledgement came direct from Poldhu, England!

Another early scientist, Sir Oliver Heaviside, presented his theory that there was a conducting layer in the upper atmosphere. He thought the space be-

National Volunteer Examiner Coordinator, P.O. Box 10101, Dallas, TX 75207

tween the earth and the conducting medium was a kind of wave guide. Later, the conducting layer in the upper atmosphere was popularly thought of as a "ceiling" or "mirror" that could reflect radio waves back to earth.

The historic first two-way trans-Atlantic message, reflected from the *mirror-in-the-sky*, was greetings on behalf of the American people from President Theodore Roosevelt to His Majesty, King Edward VII. A return message to the president from "Edward R. & I" was received. The texts of both messages made the front page of the *New York Times*. The age of two-way radio communication between Europe and the New World had arrived.

From that day forth European news was relayed to the *New York Times* through Cape Cod. Ocean-going vessels adopted Marconi's apparatus to receive news broadcasts. Business and social messages could be sent to Europe for 50 cents a word.

Local Cape Cod residents could hear the crashing spark some 4 miles away. Telegraphers operating at 17 words-per-minute manned the Cape Cod station for some 15 years, after which, due to erosion and threatened by collapse, the station closed, never to reopen.

The timbers from the huge wooden towers are still there today protected in the Cape Cod National Seashore by the National Park Service. Some are under water, since Cape Cod is slowly eroding away at the rate of 3 feet a year. We had an opportunity to see them while on vacation this past summer. Old "CC" was replaced by "WCC" in Chatham, Massachusetts in 1920.

The Quarter Century Wireless Association has provided a replica of the original spark gap transmitter which made the first two-way radio contact across the Atlantic. It is located in the National Park Service Headquarters Building at South Wellfleet. If you visit Cape Cod, we recommend you look up what is one of the nation's little-known historic landmarks, Station "CC," the first "Voice of America."

Much of the information for this story came from park historian Michael E. Whatley of the Cape Cod National Seashore, who has spent years researching and writing the Marconi/Cape Cod story.

USSR Claims It Invented Radio

While we may like to think of Marconi as the father of radio, in the Soviet Union Alexander Popov (1859–1906) is hailed as its creator. "Radio Day" is celebrated as a national holiday in the USSR. *Soviet Life* saluted 1985 as the 90th anniversary of the invention of radio.

Soviet Life, published at the USSR embassy in Washington, is a "look-alike" to the American *U.S. Life* magazine published in the Soviet Union under a reciprocal arrangement. The October 1985 *Soviet Life* supposedly documents with American evidence how Alexander Popov, a Russian physicist and electrical engineer, invented radio.

The USSR version of the discovery of radio is that Popov attended the 1893 World's Columbian Exposition in Chicago, which marked the 400th anniversary of Columbus's discovery of America. Popov was disappointed that he didn't see any achievements in the areas of electrical engineering or communications while in Chicago.

He eventually visited Thomas Alva Edison, the great American inventor, who had come up with the concept of "induction for transmitting signals over great distances." (Westerners credit Marconi with this concept.) Popov was eager to meet the man who authored this original idea.

Edison was not at his New Jersey home, but Popov toured his workshop. He was amazed at the abundance of material—metal, glass, and the like—and a huge quantity of instruments. "Two years later (1895), Alexander Popov solved the problem of wireless communication by constructing the world's first apparatus to receive electrical signals."

In September 1901 a Philadelphia newspaper reported that a U.S. company had made successful use of Popov's wireless telephone and telegraph system of stations for transmitting reports on the yacht races that were then in progress. The newspaper report also mentioned Marconi, stating that 14 months after Popov gave his invention to the world, Marconi handed in an application to patent an instrument of wireless telegraphy almost identical to Popov's, and in July 1897 he received a patent for it.

The *Soviet Life* story pictures a page from the 1901 *Philadelphia North American* newspaper complete with Professor Popov's photo and his wireless apparatus. Confusion surrounds the purposes of the Popov invention, however, and many believe the purpose of it was to record lightning rather than for signalling.

To be continued: Part IV of the History of Communications will deal with The Era of the Amateur—and The Useless Shortwaves."

From The Mailbag

This is a monthly feature based on reader-submitted questions of general interest involving amateur radio licensing.

Why do I have to learn the Morse Code? I won't be using it, nor am I required to. We get a lot of mail, and more inquiries on Morse code than on any other single subject—by far. Call-sign questions rank second. Everything else is distant from these two issues. I am almost at a loss to comment further on the code. It has been well cov-

ered in past columns, but apparently you don't accept my answers, or haven't seen them. Let's go over it again one more time.

Morse code proficiency is an *international* requirement for high-frequency operation below 30 MHz. *International Radio Regulations—Article 32, Section I, Paragraph 3.1.)* It is not *internationally* required for VHF (over 30 MHz) and higher frequency ham band operation, but (apparently) the U.S. amateur community wants the requirement to remain because: (A) I had to learn so you must, too; (B) It is the most widely recognized method of signalling in the world; (C) It is a low cost means of transmitting information particularly in times of emergency; (D) The code requirement will keep the number of amateur radio operators low and the ham bands free of QRM (interference); (E) We don't want another CB fiasco in the Amateur Radio Service; (F) It is often the only type of signal that can get through; (G) Code proficiency is a necessary part of the amateur radio tradition; (H) The code serves as a filter to screen out those who are not really serious about the pursuit; (I) It is the most spectrum efficient means of communication; (J) Obtaining Morse code proficiency indicates a willingness to pay the price to obtain amateur privileges and you are therefore a higher class individual; (K) Anything obtained easily is not valued. A code-free class will cheapen amateur radio; (L) Morse communication succeeds where other modes fail; (M) It is the most economical method of communication, code rigs cost less to manufacture; (N) The CW mode consumes less power since it has a lower duty cycle; (N) The code is fun, . . . and we could go on and on.

Our FCC requires Morse code proficiency for admittance to the amateur fraternity because existing amateurs want it that way. Don't blame the FCC. The Commission would immediately authorize code-free amateur operation if the public wanted it. Existing amateur radio operators, led by the American Radio Relay League, have steadfastly opposed code-free amateur operation. Simply stated, there was not enough support from code-free factions to overcome the powerful lobbying of the ARRL when the FCC attempted to create a code-free amateur class some time ago.

I personally oppose the code for VHF and higher frequency operation since it tends to keep the number of amateur radio operators low. I believe this to be dangerous to our future. The Amateur Radio Service has some 70 MHz of prime spectrum under 1 GHz. Well-funded commercial interests are constantly seeking more of our spectrum since we have a very low authorized user-to-spectrum allocation ratio. There are simply not enough frequencies to go around, so other radio services grab for our underutilized amateur spectrum. Unless we get more activity on the ham bands, you can anticipate a continuing spectrum attack, with some of these being successful. It is already happening.

Worldwide, many governments have a codeless VHF/UHF amateur radio class, and more (including Canada) are contemplating them all the time. One advantage of a code-free VHF/UHF amateur class is spectrum reusability. Due to the propagation characteristics, the higher frequencies can support a very high number of users. My mail indicates that newcomers favor a code-free amateur license class, while long-term amateurs do not. I doubt this will ever change. Our licensing requirements probably need to catch up with the times. Far more individuals seem interested in computer than in Morse code operation.

How can I get started in amateur radio? You can learn on your own! We have collaborated with Gordon West, WB6NOA, well-known West Coast amateur radio educator, in producing a self-study course that tells you everything you need to know starting at "ground-zero." Among other things, the new *Novice Voice Class* package contains a complete Morse code training program (two long-play cassette tapes) and a 112-page textbook containing all of the actual test questions (with multiple choices, answers, and explanations). Covered are topics such as FCC rules, operating procedures, radio-wave propagation, amateur radio practices, electrical principles, circuit components, antennas, and more. Cost: $19.95 plus $2.00 shipping. See our advertisement elsewhere in this issue.

Where and how do I take the Novice amateur radio examination? The Novice FCC examination is administered by two volunteer examiners who are presently licensed (General class or higher level) amateur radio operators. They select a certain number of questions from each of nine topics. All of the questions (and answers) are known. There is a question pool of 302 possible questions. You merely have to study the question pool and become knowledgeable on the Novice requirements. A beginner can usually qualify for the beginning FCC amateur license in about three weeks.

To find a volunteer examining team we suggest you inquire at your neighborhood electronics store, particularly if they sell amateur radio equipment. They generally know who is administering Novice examinations. You could also ask any neighborhood amateur operator if he knows where an examination session can be found. Amateurs can usually be identified by their rotatable beam antennas.

You may also want to set your scanner to the 2 meter amateur band between 146 and 148 MHz, particularly. Amateurs usually talk about upcoming test sessions. All you have to do is appear at the session! There are hundreds of VEC test sessions administered monthly, and there is no charge to take a Novice test. Most VEC system sessions are for administering the higher class license requirements, but they are usually glad to administer the Novice test, too.

The Novice examination consists of a 5 word-per-minute Morse code test and a 30-question multiple-choice exam. You pass the Novice code (Element 1A) test if you correctly copy 25 characters in a row, or answer 7 out of 10 questions about the text transmitted. You must correctly answer 22 out of a possible 30 multiple-choice questions to pass your theory (Element 2) examination. Your Novice license is generally mailed to you by the FCC about six weeks after passing the test.

NEW! CB Radios & Scanners

Communications Electronics,™ the world's largest distributor of radio scanners, introduces new models of CB & marine radios and scanners.

NEW! Regency® TS2-RA

Allow 30-90 days for delivery after receipt of order due to the high demand for this product.

List price $499.95/**CE price $339.95**

12-Band, 75 Channel • Crystalless • AC/DC

Frequency range: 29-54, 118-175, 406-512, 806-950 MHz.

The *Regency* TS2 scanner lets you monitor Military, Space Satellites, Government, Railroad, Justice Department, State Department, Fish & Game, Immigration, Marine, Police and Fire Departments, Aeronautical AM band, Paramedics, Amateur Radio, plus thousands of other radio frequencies most scanners can't pick up. The *Regency* TS2 features new 40 channel per second *Turbo Scan*™ so you wont miss any of the action. Model **TS1-RA** is a 35 channel version of this radio without the 800 MHz. band and costs only $239.95.

Regency® Z60-RA

List price $299.95/**CE price $148.95/SPECIAL**

8-Band, 60 Channel • No-crystal scanner

Bands: 30-50, 88-108, 118-136, 144-174, 440-512 MHz.

The *Regency* Z60 covers all the public service bands plus aircraft and FM music for a total of eight bands. The Z60 also features an alarm clock and priority control as well as AC/DC operation. Order today.

Regency® Z45-RA

List price $259.95/**CE price $139.95/SPECIAL**

7-Band, 45 Channel • No-crystal scanner

Bands: 30-50, 118-136, 144-174, 440-512 MHz.

The *Regency* Z45 is very similar to the Z60 model listed above however it does not have the commercial FM broadcast band. The Z45, now at a special price from Communications Electronics.

Regency® RH256B-RA

List price $799.95/**CE price $329.95/SPECIAL**

16 Channel • 25 Watt Transceiver • Priority

The *Regency* RH256B is a sixteen-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to 16 frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH256 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A *60 Watt* VHF 150-162 MHz. version called the **RH606B-RA** is available for $459.95. A UHF 15 watt, 10 channel version of this radio called the **RU150B-RA** is also available and covers 450-482 MHz. but the cost is $439.95.

Bearcat® 50XL-RA

List price $199.95/**CE price $114.95/SPECIAL**

10-Band, 10 Channel • Handheld scanner

Bands: 29.7-54, 136-174, 406-512 MHz.

The *Uniden Bearcat* 50XL is an economical, handheld scanner with 10 channels covering ten frequency bands. It features a keyboard lock switch to prevent accidental entry and more. Also order the new double-long life rechargeable battery pack part # **BP55** for $29.95, a plug-in wall charger, part # **AD100** for $14.95, a carrying case part # **VC001** for $14.95 and also order optional cigarette lighter cable part # **PS001** for $14.95.

PC 22

NEW! Scanner Frequency Listings

The new Fox scanner frequency directories will help you find all the action your scanner can listen to. These new listings include police, fire, ambulances & rescue squads, local government, private police agencies, hospitals, emergency medical channels, news media, forestry radio service, railroads, weather stations, radio common carriers, AT&T mobile telephone, utility companies, general mobile radio service, marine radio service, taxi cab companies, tow truck companies, trucking companies, business repeaters, business radio (simplex) federal government, funeral directors, veterinarians, buses, aircraft, space satellites, amateur radio, broadcasters and more. Fox frequency listings feature call letter cross reference as well as alphabetical listing by licensee name, police codes and signals. All Fox directories are $14.95 each plus $3.00 shipping. State of Alaska–**RL019-1**; Baltimore, MD/Washington, DC–**RL024-1**; Chicago, IL–**RL014-1**; Cleveland, OH–**RL017-1**; Columbus, OH–**RL003-2**; Dallas/Ft. Worth, TX–**RL013-1**; Denver/Colorado Springs, CO–**RL027-1**; Detroit, MI/ Windsor, ON–**RL008-2**; Fort Wayne, IN /Lima, OH– **RL001-1**; Houston, TX–**RL023-1**; Indianapolis, IN–**RL022-1**; Kansas City, MO/ KS–**RL011-2**; Los Angeles, CA–**RL016-1**; Louisville/Lexington, KY–**RL007-1**; Milwaukee, WI/Waukegan, IL–**RL021-1**; Minneapolis/St. Paul, MN–**RL010-2**; Nevada/E. Central CA–**RL028-1**; Oklahoma City/Lawton, OK–**RL005-2**; Pittsburgh, PA/Wheeling, WV–**RL029-1**; Rochester/ Syracuse, NY–**RL020-1**; Tampa/St. Petersburg, FL–**RL004-2**; Toledo, OH–**RL002-3**. A regional directory which covers police, fire ambulance & rescue squads, local government, forestry, marine radio, mobile phone, aircraft and NOAA weather is available for $19.95 each. **RD001-1** covers AL, AR, FL, GA, LA, MS, NC, PR, SC, TN & VI. For an area not shown above call Fox at 800-543-7892 or in Ohio 800-621-2513.

Regency® Informant™ Scanners

Frequency coverage: 35-54, 136-174 406-512 MHz.

The new *Regency* Informant scanners cover virtually all the standard police, fire, emergency and weather frequencies. These special scanners are preprogrammed by state in the units memory. Just pick a state and a category. The Informant does the rest. All Informant radios have a feature called *Turbo Scan*™ to scan up to 40 channels per second. The **INF1-RA** is ideal for truckers and is only $249.95. The new **INF2-RA** is a deluxe model and has ham radio, a weather alert and other exciting features built in for only $324.95. For base station use, the **INF5-RA** is only $199.95 and for those who can afford the best, the **INF3-RA** at $249.95, is a state-of-the-art, receiver that spells out what service you're listining to such as Military, Airphone, Paging, State Police, Coast Guard or Press.

Regency® HX1500-RA

List price $369.95/**CE price $218.95**

11-Band, 55 Channel • Handheld/Portable Search • Lockout • Priority • Bank Select Sidelit liquid crystal display • EAROM Memory Direct Channel Access Feature • Scan delay

Bands: 29-54, 118-136, 144-174, 406-420, 440-512 MHz.

The new handheld *Regency* HX1500 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 55 channels at the same time including the AM aircraft band. The LCD display is even sidelit for night use. Includes belt clip, flexible antenna and earphone. Operates on 8 1.2 Volt rechargeable Ni-cad batteries (not included). Be sure to order batteries and battery charger from the accessory list in this ad.

Bearcat® 100XL-RA

List price $349.95/**CE price $178.95/SPECIAL**

9-Band, 16 Channel • Priority • Scan Delay Search • Limit • Hold • Lockout • AC/DC

Frequency range: 30-50, 118-174, 406-512 MHz.

Included in our low CE price is a sturdy carrying case, earphone, battery charger/AC adapter, six AA ni-cad batteries and flexible antenna. Order your scanner now.

★★★ *Uniden CB Radios* ★★★

The *Uniden* line of Citizens Band Radio transceivers is styled to compliment other mobile audio equipment. Uniden CB radios are so reliable that they have a two year limited warranty. From the feature packed PRO 540e to the 310e handheld, there is no better Citizens Band radio of the market today.

PRO310E-RA *Uniden* 40 Ch. Portable/Mobile CB . . . $85.95
NINJA-RA PRO310E with rechargeable battery pack $99.95
B-10-RA 1.2V AA Ni-cad batt. for Ninja (set of 10) $20.95
PRO520E-RA *Uniden* 40 channel CB Mobile $59.95
PRO540E-RA *Uniden* 40 channel CB Mobile. $119.95
PRO710E-RA *Uniden*40 channel CB Base $119.95
PC22-RA *Uniden* remote mount CB Mobile $99.95
PC55-RA *Uniden*mobile mount CB transceiver. $59.95

★★★ *Uniden Marine Radios* ★★★

Now the finest marine electronics are available through CEI. The *Unimetrics* **SH66-RA** has 50 transmit and 60 receive frequencies with 25 or 1 watt power output. Only $169.95. The *Unimetrics* **SH 88-RA** is a deluxe full function marine radiotelephone featuring 55 transmit and 90 receive channels and scanning capability for only $259.95. The *Unimetrics* **SH3000-RA** is an excellent digital depth sounder, good for 300 feet. It has an LCD continuously backlit with red light display and a 5 ft. or 10 ft. alarm. Only $189.95. Order today.

Bearcat® 800XLT-RA

List price $499.95/**CE price $289.95/SPECIAL**

12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC

Bands: 29-54, 118-174, 406-512, 806-912 MHz.

The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½."

OTHER RADIOS AND ACCESSORIES

Panasonic RF-2600-RA Shortwave receiver $179.95
RD55-RA *Uniden* Visor mount Radar Detector $98.95
RD9-RA *Uniden* "Passport" size Radar Detector . . . $169.95
***NEW!* BC70XLT-RA** *Bearcat* 20 channel scanner . . . $168.95
BC 140-RA *Bearcat* 10 channel scanner $92.95
BC 145XL-RA *Bearcat* 16 channel scanner. $98.95
BC 175XL-RA *Bearcat* 16 channel scanner $156.95
BC 210XLT-RA *Bearcat* 40 channel scanner. $196.95
BC-WA-RA *Bearcat* Weather Alert™ $35.95
R1080-RA *Regency* 30 channel scanner $118.95
R1090-RA *Regency* 45 channel scanner $148.95
UC102-RA *Regency* VHF 2 ch. 1 Watt transceiver . . . $117.95
P1412-RA *Regency* 12 amp reg. power supply . . . $189.95
MA549-RA Drop-in charger for HX1200 & HX1500 . . . $84.95
MA518-RA Wall charger for HX1500 scanner $14.95
MA553-RA Carrying case for HX1500 scanner $19.95
MA257-RA Cigarette lighter cord for HX12/1500 . . . $19.95
MA917-RA Ni-Cad battery pack for HX1000/1200 . . . $34.95
SMMX7000-RA Svc. man. for MX7000 & MX5000 . . . $19.95
B-4-RA 1.2 V AAA Ni-Cad batteries (set of four) $9.95
B-8-RA 1.2 V AA Ni-Cad batteries (set of eight) $17.95
FB-E-RA Frequency Directory for Eastern U.S.A. . . . $14.95
FB-W-RA Frequency Directory for Western U.S.A. . . . $14.95
ASD-RA Air Scan Directory $14.95
SRF-RA Survival Radio Frequency Directory $14.95
TSG-RA "Top Secret" Registry of U.S. Govt. Freq. . . . $14.95
TIC-RA Techniques for Intercepting Comm. $14.95
RRF-RA Railroad frequency directory $14.95
EEC-RA Embassy & Espionage Communications . . . $14.95
CIE-RA Covert Intelligenct, Elect. Eavesdropping . . . $14.95
MFF-RA Midwest Federal Frequency directory $14.95
A60-RA Magnet mount mobile scanner antenna. . . $35.95
A70-RA Base station scanner antenna. $35.95
MA548-RA Mirror mount Informant antenna. $39.95
USAMM-RA Mag mount VHF ant. w/ 12' cable. $39.95
USAK-RA ¾" hole mount VHF ant. w/ 17' cable. . . . $35.95

Add $3.00 shipping for all accessories ordered at the same time.
Add $12.00 shipping per shortwave receiver.
Add $7.00 shipping per radio and $3.00 per antenna.

BUY WITH CONFIDENCE

To ***get the fastest delivery from CE*** of any scanner, send or phone your order directly to our Scanner Distribution Center.™ Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically unless CE is instructed differently. A $5.00 additional handling fee will be charged for all orders with a merchandise total under $50.00. Shipments are F.O.B. Ann Arbor, Michigan. No COD's. Most products that we sell have a manufacturer's warranty. Free copies of warranties on these products are available prior to purchase by writing to CE. Non-certified checks require bank clearance. Not responsible for typographical errors.

Mail orders to: Communications Electronics,™ Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add $7.00 per scanner for R.P.S./U.P.S. *ground* shipping and handling in the continental U.S.A. For Canada, Puerto Rico, Hawaii, Alaska, or APO/FPO delivery, shipping charges are three times continental U.S. rates. If you have a Discover, Visa or Master Card, you may call and place a credit card order. Order toll-free in the U.S. Dial 800-USA-SCAN. In Canada, order toll-free by calling 800-221-3475. FTCC Telex anytime, dial 825333. If you are outside the U.S. or in Michigan dial 313-973-8888. Order today.

Scanner Distribution Center™ and CE logos are trademarks of Communications Electronics Inc.

‡ *Bearcat* is a registered trademark of Uniden Corporation.
† *Regency* and *Turbo Scan* are registered trademarks of Regency Electronics Inc. AD #080187-RA

For credit card orders call 1-800-USA-SCAN

COMMUNICATIONS ELECTRONICS INC.™

Consumer Products Division

P.O. Box 1045 □ Ann Arbor, Michigan 48106-1045 U.S.A.
Call 800-USA-SCAN or outside U.S.A. 313-973-8888

CIRCLE NO. 151 ON FREE INFORMATION CARD

Rob, WA3QLS

Delaware Amateur Supply

Paul, WA3QPX

71 Meadow Road, New Castle, Del. 19720 **302-328-7728**

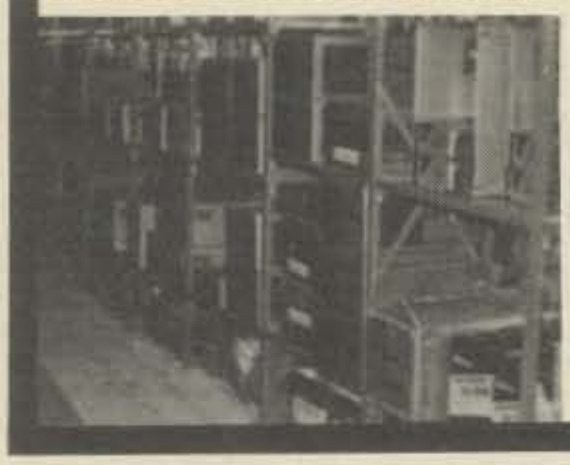
Factory Authorized Dealer! **9-5 Daily, 9-8 Friday, 9-3 Saturday**

AEA • ALINCO • AMERITRON • CUSHCRAFT • ICOM • KANTRONICS • KENWOOD • MOSLEY • SANTEC • TELEX HY-GAIN • TENTEC • YAESU • AND MORE!

Large Inventory, Daily UPS Service

800-441-7008

Katherine, KA3IYO



New Equipment Order & Pricing

Prices are subject to change without notice or obligation. Products are not sold for evaluation.

NO Sales Tax in Delaware! one mile off I-95

SERVICE, USED GEAR INFO: 302-328-7728

Please send all reader inquiries directly.

AMATEUR TELEVISION

HAMS SHOULD BE SEEN AS WELL AS HEARD!

TVC-4G 70cm ATV Downconverter
Now only $99
Delivered UPS surface in cont. USA

- See live action color & sound like broadcast TV
- Many areas have ATV Repeaters (call us or see the 87/88 ARRL Repeater Directory pg. 328 for your area)
- Most ATVers use home cameras and VCRs to show the shack, projects, home video tapes, public service events like parades, races, etc.
- Some repeaters also have weather radar, Space Shuttle video, BBS, & computer video

It's easy to start watching: 70cm antenna, a TVC-4G and any TV set tuned to ch2, 3 or 4. Our TVC-4G tunes the whole 420-450 mHz band & includes GaAsfet preamp & mixer, AC/12vdc wall plug, attractive shielded 4x2.5x7 cabinet. We also have wired & tested boards for the builder starting at $39. See ARRL Hbk chapter 20. When you are ready to try transmitting, we have transmitters, transceivers, antennas, and all your ATV needs for the 70, 33 & 23cm bands.

Hams, Call or **Write** for our full catalog of ATV gear!

(818) 447-4565 m-f 8am-5:30pm pst.

P.C. ELECTRONICS
2522 Paxson Ln Arcadia CA 91006

Tom (W6ORG)
Maryann (WB6YSS)

CIRCLE 53 ON READER SERVICE CARD

DOCKING BOOSTER

Converts Your HT to a Powerful Mobile Unit

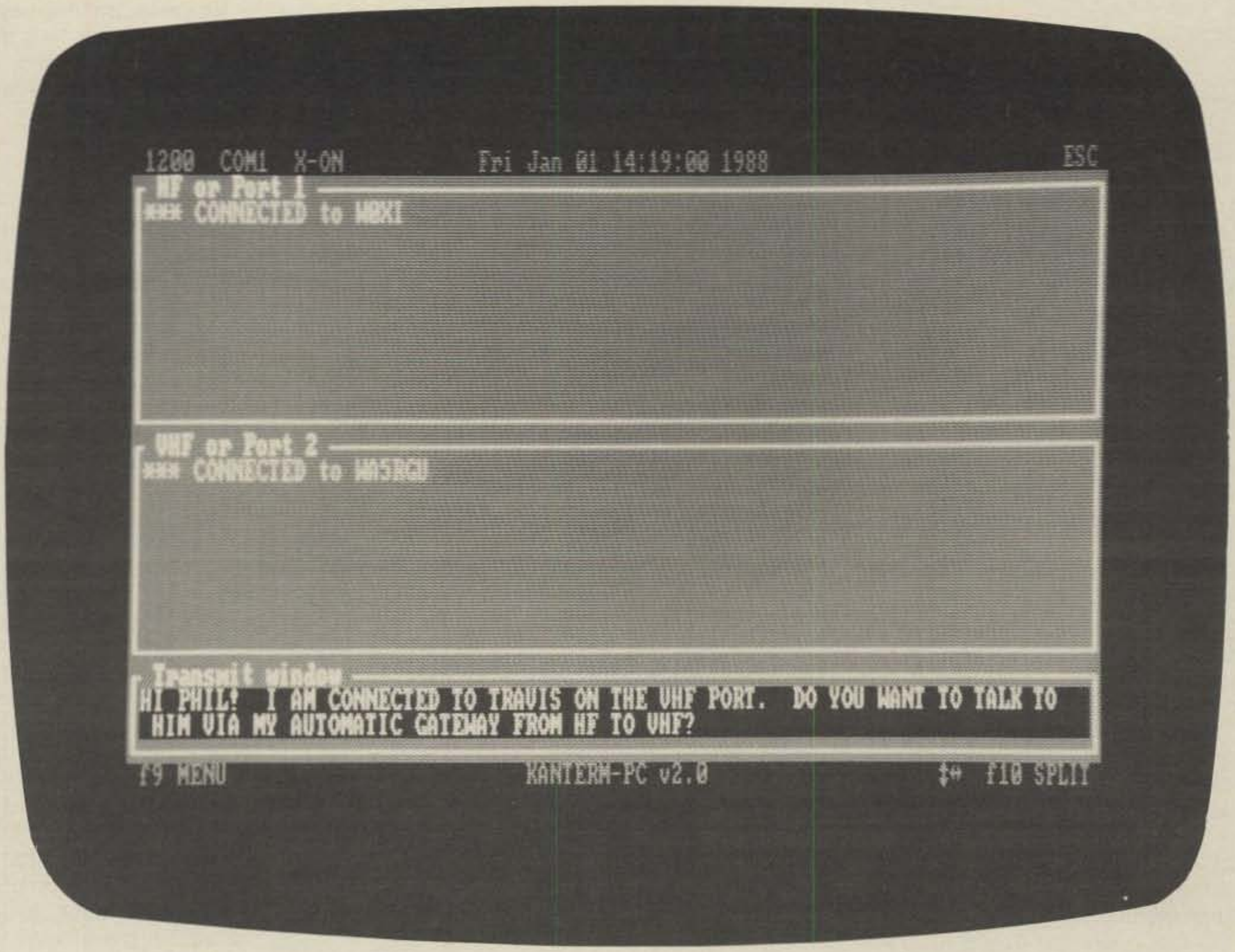
- **30 watts output**
- **GaAs FET pre-amp**
- **Fits on car door**
- **2 Meters or 70 cm**
- **Icom**
- **Kenwood**
- **Yaesu**

NEW! DUAL BANDER FOR FT-727

NAVAL ELECTRONICS, INC.
5417 Jetview Circle • Tampa, FL 33634
Phone:813-885-6091 • Telex: 289-237 (NAVL UR)

CIRCLE 54 ON READER SERVICE CARD

YOU'LL SEE THIS SCREEN ONLY ON A KAM™



The screen above shows a KAM™ in packet connect with **WØXI** on HF and **WA5RGU** on VHF, simutaneously! In addition, KAM, Kantronics' All Mode, is the only true dual-port on the market supporting simultaneous HF/VHF connects, gateway operation, a Personal Packet Mailbox™, as well as CW, RTTY, ASCII, and Amtor modes. Used in conjunction with Kantronics' KANTERM for the PC, the combination offers **split-screen/split-port operation.**

Kantronics
RF Data Communications Specialists
1202 E. 23 Street Lawrence, Kansas 66046 (913) 842-7745

QRP

BY ADRIAN WEISS, W0RSP

THE ART OF VERY LOW POWER OPERATING

The QRP Scene: Don't Wait For The '90s

Last time we looked at the DX prospects for QRPers. This time we'll look closer to home. —K2EEK

With respect to stateside QRPing, the effect of the solar minimum is hardly noticeable. In fact, QRP activity has really taken off during the 1980s. Thom Davis, K8IF, past-president of the QRP ARCI, succeeded in converting the 100 watt organization to a bonafide 5 watt QRP club in 1980. Since then the club's awards are all bonafide-QRP as are its various activities such as the Spring and Fall QSO Parties, Sprints, and Nets.

The QSO Parties and the ARRL Field Day are the major QRP events in this country, and the results have been showing a steady improvement during the past seven years. Two significant changes occurred which help get across my point. Once the QRP ARCI turned into a bonafide QRP outfit, it joined with *The Milliwatt Field Day Program* and the Michigan QRP Club in an expansion of the Field Day award that had been sponsored by *The Milliwatt* since 1970. A club plaque and honor roll of the top 20 clubs and a One-Watt Trophy were added to the Five-Watt Trophy. The second addition in 1984 was my idea—the Milliwatt Achievement Certificates to be awarded to top-scoring milliwatt stations in the three qualifying events. This award was intended to attract more high-power QRPers to the challenge of milliwatting, and it did.

In the first qualifying event, the 1984 Spring QSO Party, Gene Smith, KA5NLY, Contest Chairman for the QRP ARCI reported: "The logs are in and W0RSP has certainly gotten things going now that he is sponsoring a Milliwatt Achievement Certificate for our regular contests. Four of the five top scorers were stations running less than one watt!" There were 111 entries overall. Four of the top five (of 74 entries) in the Fall 1984 QSO Party again were milliwatters. Eight of the top 10 (of 99) were milliwatters in the Spring 1986 bash. The same pattern emerged in the other parties.

Field Day

Field Day is the real test. Competition is fierce, QRM is ear-splitting, operation is at an intense pace, and more often than not, the weather doesn't help a bit. Nonetheless, the top entrants in the One-Watt Field Day category in the five years since its inception have managed the following QSO totals: 239, 241, 425, 373, and 236. In 1985 W9PNE worked 65 stations at the 100 mw level just to see if it could be done! You have to admit that these aren't bad totals considering the output power was less than 1 watt! Also, the top 5-watters (1 transmitter, maximum of 2 operators) for the past 6 years have had these QSO totals: 741, 999, 259, 435, 1046, 486, and 500. Some pretty astounding totals there! And remember that we're looking at the bottom of Cycle 21. QRP, plain and simple, still works! To keep things realistic, however, I have to note that some new QRPers go out into the field for their first time and work only a few stations because of lack of experience and poor planning. But others do pretty well. One thing is certain: They all claim that they had a great time and will do it again!

Participation in Other QRP Activities

The most surprising aspect of this solar minimum is the level of participation in QRP activities. Entries into the QSO Parties have actually increased considerably over the peak years 1978–81. But that's a twice-a-year turnout. The real bread-'n-butter index is QRP net participation.

The QRP ARCI sponsors six regional nets in order to give QRPers a regular opportunity to meet, exchange reports, and ragchew. The Northwest, Gulf States, Southeast, Southwest, Greak Lakes, and Northeast nets meet weekly on 7040 kHz at various times, while the Transcontinental Net meets on 14060 kHz for nationwide coverage. When the newly added Northwest Net opened in 1984, 13 stations from 5 states showed up to kick things off. The Western States Net opened the first QRP SSB net on 7285 kHz in 1986 with surprisingly good results, and the group has been able to hold on to its frequency.

By 1986, net participation had grown. The club decided to award something of a championship prize to the station with the greatest number of check-ins for the year. Danny, K3TKS, net manager, chalked up 121 check-ins to emerge as champion, but the overall numbers make the point. A total of 240 QRP stations checked into the nets during 1986 with an average number of check-ins of 7.3625 per station. Nineteen stations have over 100 check-ins, and about half of them have over 200 stations. In other words, you can work quite a few QRPers on the nets.

Setting Up a QRP Station

Let's get to the big question in the minds of those of you who feel that QRP could be your kind of activity: What kind of rig do I need for QRP operation? The answer is short and simple: The rig you now have will do nicely! That's another attractive feature of QRP—no need to spend extra money just to find out if you like it.

I don't know of any recent (post-1977) transceiver that cannot be cranked down to less than 5 watts RF output on CW (the major QRP mode), although there may be one or two. It's a simple matter of backing off the RF gain control until power output drops to under 5 watts. Many QRPers use a QRO transceiver in this manner for their QRP operating.

The meter on most modern units has a "watts" scale usually calibrated for SWR purposes, and the calibration is usually accurate enough to ensure being under the 5 watt limit. Many, such as the TS930 or the ICOM units, are quite accurate down to about 2 watts output. If the meter on your rig doesn't have a "watts" scale, you can borrow an in-line wattmeter from a friend, homebrew one, or pick one up through the ads in the amateur magazines. Once you get the output down to the 5 watt limit, you can give QRP a try.

The first step is to convince yourself that you can get out with QRP. During the next several QSOs ask the other guy to give you reports comparing your QRO signal with your 5 watt output signal. When he gives you the go ahead, just crank the gain down and see what he says. You may be in for a big surprise! Once you're convinced, try doing it all at the 5 watt level.

The first rule is don't call CQ as a means of raising a QSO. Look around for a solid incoming signal and call him. Don't expect everyone to come back to you. Remember what I said about the call/QSO ratio last time. Patience is the paramount QRP virtue, and you should try practicing it from the first!

Second, give it a while. QRP operation

833 Duke St. #83, Vermillion, SD 57069

requires you to change your operating habits. Instead of calling the first "CQ" you stumble across, you'll try to "read" the path and pick the stations you call more carefully. Missing a series of calls is the best way to learn to recognize what not to try. As I said, give it a while. Think about why you missed this guy but worked that guy and so on. It may be due to propagation or your operating technique or competition from a QRO station or any of a host of reasons.

QRP Calling Frequencies, Nets

Once you've gotten underway, you'll probably want to work other QRPers. The World QRP Federation has settled on established QRP calling frequencies for each band and mode, and these are a good place to start hunting for QRPers. However, most QRPers hunt around the bands for stations to call, pursuing their usual interests such as ragchewing, DXing, collecting states for WAS, and the like. As a result, the QRP calling frequencies are more or less a place to check periodically for other QRPers calling "CQ QRP" or to give a couple of calls yourself. Most of us monitor the calling frequencies at least once during every operating period.

I have frequently encouraged QRPers to make a habit of beginning every operating period by calling "CQ QRP" on the calling frequency. Otherwise, everyone listens and hears nothing. Personally, I've found that a couple of calls usually drag another QRPer out of the woodwork. Many of us keep our rigs tuned to the calling frequency while doing other things in the shack. For example, my computer is on the table next to the rig, and it's usually on 14060 kHz while I'm working. If I hear a "CQ QRP," I pounce on it!

The SSB calling frequencies are 15 kHz inside the top edge of each band. The CW calling frequencies are "60 kHz up except 40 kHz on 40"—an easy way of remembering 3560, 7040, 14060, 21060, and 28060 kHz. When calling "CQ QRP," remember that your signal is likely to be weak, so reduce code speed to about 12–15 wpm. Form characters clearly and space correctly. Call for about a minute and then monitor. When you monitor for a response, be sure to check ± 2 kHz. Some QRPers are rockbound and can't move onto your frequency, so you have to find them. That's what the RIT knob is for.

The seven QRP nets meet on various days of the week, providing the opportunity to check into different nets on different days. The usual summer-fall schedule is shown in Table I.

The Michigan QRP Club sponsors its net on Tuesday at 0200 UTC and Wednesday at 0100 UTC on 3535 kHz. The Michigan QRP Club caters to Michigan hams and is an active group that promotes frequent gatherings. They welcome new members and check-ins from all over. For example, check-ins for the fall quarter of 1986 included KH6CP/1, ND9X, W5MFD, VE1BF, NU4B, K3AS, NF5Y, N9ZZ, KT9L, KE8P/4 (FLA), and WA1WLU. If you are in the Flint (Burton), MI area on the first Saturday of the month, drop into the Regency Restaurant on the corner of I-75 and Belsay Road at 1000 local time for the "breakfast net." Talk-in is on 147.06 MHz. The agenda includes usual matters of interest to QRPers including parts, antennas, frequency counters, HW-8 calibration problems and solutions, and rehashes of Field Day. A call to President Jerry Totten, K8JRO, at 313-686-7878 most evenings will confirm the meeting if you want to check it out ahead of time.

Net	Freq.	Day	UTC
TCN Transcon	14060	Sun.	2300
SEN Southeast	*7030	Thur.	0001
GSN Gulf	3560	Thur.	0200
GLN Great Lakes	3560	Thur.	0200
WSN Western	3558	Sat.	0400
	7040	Sat.	1600
NEN Northeast	7040	Sat.	1200
WSN SSB	7285	Wed.	2000

**If conditions are poor on 7030 kHz, QSY to 3535 kHz at 0031 UTC.*

Table I–QRP nets' summer-fall schedule.

Membership Info

Next time we'll cover the QRP ARCI and Michigan QRP Club programs in detail. In case you want to join up now, the QRP ARCI membership fee is $11.00 (check/money order to QRP Amateur Radio Club International) to William K. Harding, K4AHK, 10923 Carters Oak Way, Burke, VA 22015. It includes a lifetime membership QRP number and four issues of the excellent *QRP Quarterly*. A $5.00 check/MO to Treasurer, Michigan QRP Club, 5346 W. Frances Road, Clio, MI 48420, nets you a lifetime membership number and four issues of *The Five Watter*, the club newsletter.

An easy way to learn everything you need to know to jump right into QRP is to read my book *The Joy of QRP: Strategy for Success*. It covers all aspects of QRP, and is slanted toward newcomers with important material on planning for QRP operation, operating techniques, band selection, antennas, and so on. (It's available for $10.95 plus $2.00 shipping and handling from *CQ* Book Shop, 76 North Broadway, Hicksville, NY 11801.)

To wrap this up, let me invite those of you who feel that QRP might be the thing for you to go ahead and give it a shot. You might like it!

73, Ade, WØRSP

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

ARRL Novice Roundup Contest

The American Radio Relay League (ARRL) sponsors the annual Novice Roundup (NR) Contest. This is a nine day contest stretching over a full week and two weekends. It is a pleasant low-pressure contest for Novices and Technicians who may otherwise have little (or no) interest in contesting. One can participate just a few minutes or as long as 30 hours (maximum) in the NR. This year's NR is the first one since 1968 to include voice contacts.

The Novice Roundup was established many years before Technician licensees were granted CW operating privileges on HF. The name remains appropriate because operation remains confined to the frequency segments (sub-bands) available to Novice class licensees. Technicians have full operating privileges above 50 MHz, but their NR activities are limited to frequencies shared with Novices.

The objective is for Novices and Technicians to contact as many amateurs as possible. Your points (number of contacts) are multiplied by the total number of ARRL/CRRL sections and foreign (DX) countries contacted to produce your final score.

This contest is primarily for American Novice and Technician class licensees, but General, Advanced, Extra, and foreign (DX) operators are also invited to operate in it. Novices and Technicians can work all amateurs, but General, Advanced, Extra, and DX amateurs are allowed to work only Novices and Technicians in the contest. This guarantees that at least one Novice or Technician is involved in each NR contact. It is open to all Novice and Technician operators in the 50 states, plus those who are in US possessions and territories.

It is common to have other amateurs ask you what "NR" is, or what the NR rules are, during the first days of this contest. It is unreasonable of them to expect you to lose operating time providing such information; it is suitable to simply direct these operators to the January issues of *CQ* or *QST* for NR details. Know the NR contest rules and abide by them.

Benefits

I advise you to operate in the NR even if you have a poor station, low CW proficiency, or no interest in CW operation at all. It will be nice to get a certificate for working at least 200 NR contacts. You will have just cause to be extremely proud if you are the top scorer in your ARRL section or division or one of the top ten scorers in the country. However, you do not need to achieve these lofty accomplishments to benefit from NR activity. This contest provides a great opportunity to contact amateurs in many counties, states, and countries. You can probably work more contacts during one day of the NR contest than you normally work in a month. These contacts can help you qualify for hundreds of operating awards, even if you upgrade and the call sign is changed.

NR operation will let you judge your operating skills and station performance against those of other operators. NR participation can also help you increase code receiving and sending proficiencies—if you choose to operate CW. That will help you prepare to pass license upgrade tests. You can benefit in many ways by operating in contests.

2814 Empire Ave., Burbank, CA 91504

This is Deanna Gorzynski, KB8ALR, of Boulder, Colorado. Her father is WA8KEM, and her uncle is K9DID. She shares this station with her dad. Her rig is the Drake TR-4 transceiver in the lower left corner of the photograph. Deanna is a member of the Boulder Area Radio Club (WØDK), which has a station set up in the county courthouse.

Competition and Awards

Novices just compete against Novices, and Technicians only compete against Technicians. Novices and Technicians do not compete against each other in this contest.

The ARRL issues a nice certificate to each Novice and Technician who participates in the contest. These certificates are endorsed appropriately for the top-scoring Novices and Technicians in each ARRL section and division.

General, Advanced, Extra, and foreign (DX) amateurs are invited to take part in the NR contest, but they are not eligible for NR certificates. These operators provide contacts, QSL cards, and operating practice for Novices and Technicians.

Dates and Times

The NR contest starts at 0001 UTC on the 30th of January, and it ends at 2359 UTC on the 7th of February. To state it more simply, it starts Friday evening January 29th (local time), and it ends Sunday evening February 7th. The NR starts one minute past 4, 5, 6, and 7 p.m. PST, MST, CST, and EST, respectively. Similarly, the NR ends one minute before 4, 5, 6, and 7 Pacific, Mountain, Central, and Eastern Standard Times, respectively.

Novices and Technicians are allowed to work a maximum of 30 hours in the NR. The NR log must show each time one goes on and off the air during the contest, and the *minimum* allowable time off the air is 15 minutes. Listening time on the air counts as contest operating time; it must be shown as time on the air.

Frequencies, Modes, and Output Powers

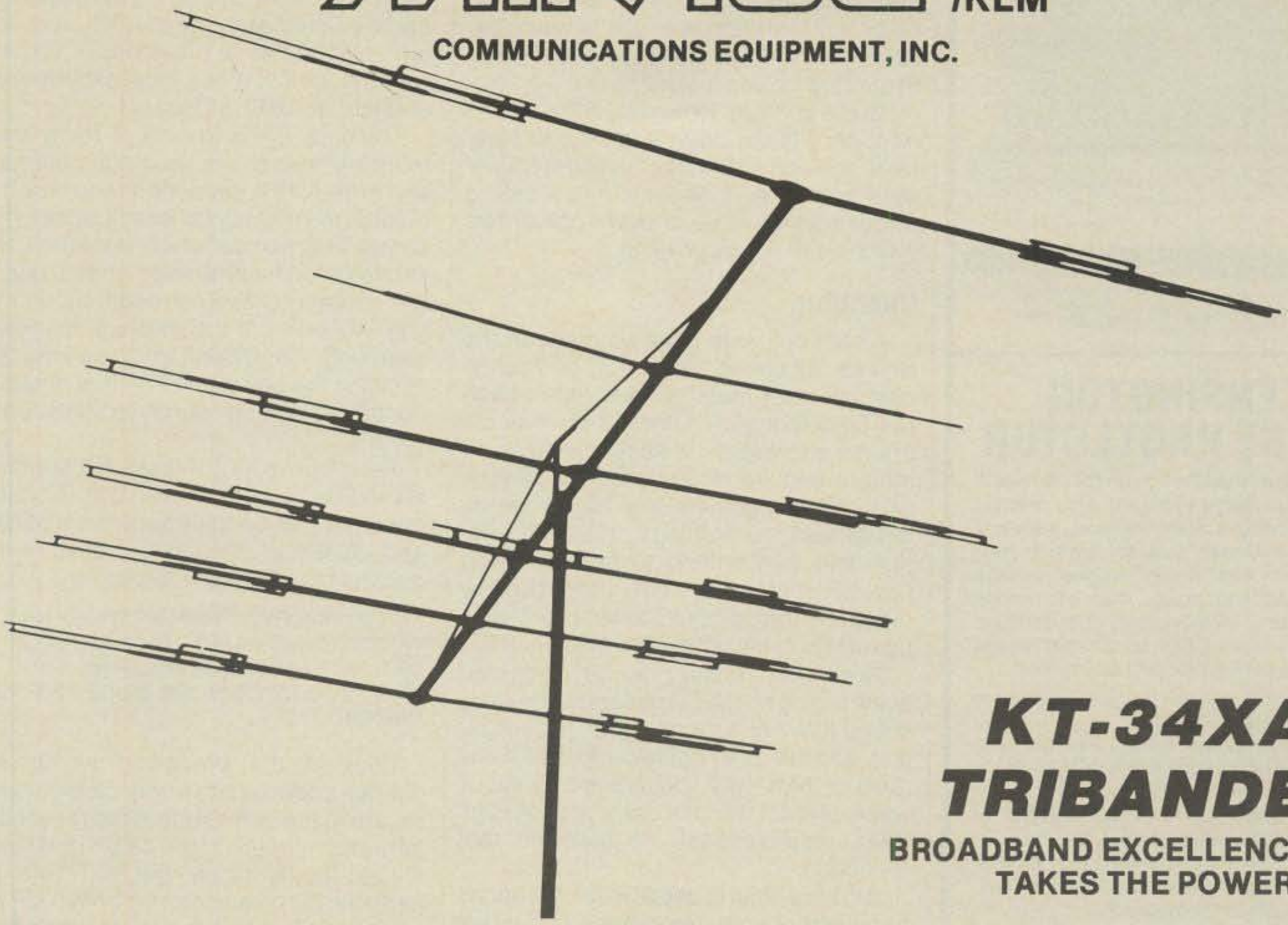
The high-frequency (HF) Novice subbands are 3700–3750 kHz, 7100–7150 kHz, 21.1–21.2 MHz, and 28.1–28.5 MHz for CW. All classes of USA amateurs are limited to 200 watts maximum output power in these subbands except for 10 meters. Only Novices and Technicians are limited to 200 watts maximum output power in the 28.1–28.5 MHz Novice subband.

Although CW is allowed throughout the 10 meter subband, it is commonly used just in the 28.1–28.3 MHz segment, where RTTY (radioteletype) and packet radio are also allowed. The suggested simplex packet-radio frequencies on this subband are 28102.3 and 28104.3 kHz. Voice contacts are restricted to the 28.3–28.5 MHz segment of this subband.

The other Novice subbands are 222.10–223.91 MHz and 1270–1295 MHz. Novices and Technicians may operate all modes available to all other classes of USA amateurs on these bands. However, Novices are limited to

MIRAGE /KLM

COMMUNICATIONS EQUIPMENT, INC.



KT-34XA TRIBANDER

BROADBAND EXCELLENCE THAT TAKES THE POWER

KLM's KT-34XA TRIBANDER is the 2nd generation of a unique new series of antennas designed to provide superior **broadband** coverage on 20, 15, and 10 meters. The combination of lossless linear loading and hi-Q air capacitors enables the KT-34XA to outperform **all** commercial available tribanders and meet or exceed the performance of a conventional stacked monoband system. The lower weight and windload of a single antenna mean reduced tower and rotator requirements. Thus, overall system costs can be kept to a minimum while enjoying the best of monobander-type performance.

KLM's field proven KT-34A is the heart of the "XA" model. The boom length of the "XA", however, has been doubled, and one tri-resonant and one full size 10 meter element have been added. These changes increase the gain to **11-11.3 dBd** on 10M, **9-9.5 dBd** on 15M, and **8.5-9 dBd** on 20M. Two driven elements are used to make the KT-34XA unusually broadbanded (a concept applied to many KLM antennas). Gain is virtually flat across each band except for 10 meters which has been optimized for the DX'er, 28-29 MHz. The chart shows the remarkable performance qualities of the KT-34XA.

The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 4 KW PEP and an unusually high level of operating **efficiency**. Linear loading also makes full ¼-wave elements possible on 15 and 10 meters, and brings 20 meters much closer to the desirable ¼-wave than any conventional tribander.

BANDWIDTHS:	14.0-14.350 MHz	**GAIN:**	8.5-9dB
	21.0-21.50 MHz		9-9.5dB
	28-29 MHz		11-11.3dB
VSWR:	1.5:1	**BOOM LENGTH:**	32 ft. × 3" O.D.
FB/FS:	20dB/40dB	**TURN RADIUS:**	21.5 ft.
FEED IMP.:	50 ohms w/balun	**WINDLOAD:**	9 sq. ft.
BALUN:	3-60-4:1 5KW PEP	**WT. (LBS.):**	75 lbs.
ELEMENT LENGTH:	24 ft.	**MAST:**	2" O.D. (standard)

Mechanically, the KT-34XA has been built to survive the toughest weather conditions. All aluminum, including the boom, is strong 6063-T832 alloy. All electrical hardware is stainless steel. Virtually indestructible "Lexan" insulators, just like those on KLM's 40 meter "Big Sticker," are used for mounting the elements and insulating them from the boom. KLM's 3-60 MHz 4:1 balun is supplied for direct connection to any 50 ohm feedline.

Turn your KT-34A into an XA.
Call your local dealer for price.
W. Scott

MIRAGE /KLM

COMMUNICATIONS EQUIPMENT, INC.

P.O. Box 1000 • Morgan Hill, CA 95037
(408) 779-7363

CIRCLE 159 ON READER SERVICE CARD

25 watts on 220 and 5 watts on 1296 maximum output power. The national simplex packet-radio frequency is 223.40 MHz, and the national simplex voice calling frequencies are 223.50 MHz and 1294.5 MHz. It is standard practice to make the initial contact on a calling frequency and to shift up or down one channel to complete the contact. However, if the calling frequency is not busy, it is okay to complete the contact on the calling frequency. If someone is monopolizing a calling frequency, move up or down one or two channels to do your calling.

Operating

All NR contacts must be made in the Novice subbands. A Novice or Technician operator must be involved in each NR QSO (contact). Crossband contacts are not allowed, such as receiving on 10 meters and transmitting on 15 meters. Crossmode contacts are no longer allowed, such as listening to a DX voice station and transmitting to her/him using CW. NR contacts are not allowed on any repeater frequency. Packet-radio digipeater contacts *do not* count in the NR.

The same station may be contacted twice during the NR. One contact must be digital (CW, radioteletype, or packet radio), and the other contact must be voice (SSB or FM). Any subsequent digital or voice contact with the same station is invalid, regardless of the subband that is used.

It is beneficial to use at least two bands to have a reasonable chance to contact amateurs in many countries and ARRL/CRRL sections. The 15 and 10 meter bands provide the best DX opportunities. Use 10 and 15 during the daylight hours; switch to 40 and 80 at night. This type of operation provides the best possibilities of working desired states, provinces, and countries.

When operating on the high-frequency (3-30 MHz) Novice subbands, start at the low end and shift up through the band as contacts are made. Most NR contest activity will be weekday evenings plus night and day of weekends. Schedule your operating time to be on the air during periods of maximum activity.

Novices add /N and Technicians add /T to their call signs during this contest to indicate their eligibility to all amateurs participating in the NR. As examples, a Novice with a call sign such as KB6RXU uses KB6RXU/N, and a Technician with a call sign such as WA6FNM uses WA6FNM/T during the contest. Out-of-area operation is also indicated in call signs. As an example, if Technician WA6FNM is operating in the NR from Louisiana, he would identify as WA6FNM/5T to indicate that he is a Technician operating from Louisiana.

What Do You Say?

The on-the-air NR contest exchange is limited to a signal report (RST for CW or RS for voice) and your ARRL section. This information must be exchanged both ways for the contact to count. You must know your ARRL section to participate in the NR. Fortunately, most ARRL sections are entire states or provinces. If you are not sure, check with a local experienced amateur or ARRL official.

The objective is to work as many amateurs as possible in as many countries and ARRL/CRRL sections as you can. It is helpful to maintain a check sheet that shows at a glance which countries and sections you have already worked during the contest. Cross out each section as you work it on the ARRL's multiplier check-off list. Maintain a second list showing the call sign of the first amateur contacted in each country worked during the NR.

As is true in all contests, NR contacts should be as brief as possible. A typical good NR CW contact between KB6RXU and W6JEP in the first few days of this contest could be as follows:

KB6RXU KB6RXU DE W6JEP W6JEP NR K
W6JEP DE KB6RXU BT 579 LA 579 LA BK
BK R 589 LA 589 LA DE W6JEP BK
BK R 73 CQ NR CQ NR CQ NR DE KB6RXU/N KB6RXU/N NR K

Look at the preceding typical exchange and evaluate it very carefully with regard to the comments in the rest of this paragraph. In the initial call, KB6RXU included the /N. (If you get no takers, repeat this CQ sequence.) When W6JEP answered the call, she just identified both stations twice, left off the /N, and indicated contest participation by sending NR before the invitation to transmit. Once the two-way contact has been established, there is no need to continue using /N or /T.

The KB6RXU reply to W6JEP is very brief; the call signs are just sent one time each and only at the beginning of the reply. The RST report and ARRL section are sent twice to minimize possible requests for repeats. Neither the term *RST* nor the word *section* precedes the report and League section, since it is obvious what both are, and the break sign (BK) is used to eliminate unnecessary identifications. During contest activity a series of short transmissions is not likely to extend past 10 minutes, and the identification shown in the sample exchange suffices.

Note that the W6JEP response is short; the R advises that the KB6RXU contest data has been received. W6JEP then sends the report (RST) and her section twice, identifies with just her call sign to give KB6RXU assurance that he is copying the correct signal, and sends the break sign to invite KB6RXU to respond.

When KB6RXU answers, he sends R to indicate the contest data has been received. He may send "73," and he then sends a short contest call in case another station is waiting for a contest contact.

When the call is sent, the /N is again added to indicate contest eligibility to all amateurs. This indicated brief exchange may be further abbreviated after the first few days of the contest.

A typical NR voice contact could be as follows:

CQ Novice Roundup *(2 or 3 times)* this is WA6FNM Technician
Whiskey Alfa Six Foxtrot November Mike Over
WA6FNM this is KB6SOH Novice Kilo Baker Six Sierra Oscar Hotel Over
KB6SOH from WA6FNM 5 by 9 in Los Angeles Section Over
WA6FNM from KB6SOH 5 by 9 in Los Angeles Section Over
Thank you KB6SOH This is WA6FNM Technician Whiskey Alfa Six Foxtrot November Mike calling CQ Novice Roundup Over

The voice procedure is basically the same as for a code contact. Again, the calling sequence may be abbreviated after the contest has been running a few days.

Do not routinely exchange normal contact information during contest contacts. In other words, do not send your name, location, rig, antenna, weather, or mailing address information as parts of contest contacts. Keep each contact brief. On CW do not send faster than you can receive accurately. Let the other fellow slow down to a speed you can copy. If the other operator sends too fast, tell her/him to send more slowly (QRS).

If you contact a county, state, or country you need to have confirmed, simply request a QSL when you send your card. I send a card to each amateur contacted for the first time. Most amateurs just send a QSL in response to each card received.

Your NR Log Is Your Score

Your NR log must show the time each contest contact started. It is preferable to use Universal Coordinated Time (UTC) when logging radio contacts, since it eliminates possible time zone confusion. The other amateur's call sign (/N and /T indicators not required) and ARRL/CRRL section (or country) must be logged for each contact. Received and sent signal (RST/RS) reports must both appear in the NR log. Your station call sign, frequency, and dates of contest operation are also required. It is best to maintain separate logs and check sheets for voice and digital contacts.

One point is earned for each new station contacted by voice, whether or not contacted amateurs are participating in the contest. You must obtain the report and ARRL/CRRL section (or country). Each digital (CW, RTTY, or packet radio) contact counts for two points.

If you have an ARRL code proficiency certificate, your stated receiving speed (words per minute) is added to point total for the stations you contacted. If you do not hold an ARRL code proficiency certificate, or if you want to increase the rate shown on your certificate, you can submit your January or February W1AW or W6OWP qualifying copy with your NR material to claim these extra points.

The total number of points derived from your contest contacts and your ARRL (not FCC) certified code proficiency rate are multiplied by the number of foreign countries plus ARRL/CRRL sections you contacted during your NR contest operation. Remember that Alaska, Canadian Provinces, Hawaii, and the West Indies (Guantanamo Bay, Puerto Rico, and the Virgin Islands) are ARRL sections, and they do not count as countries in this contest.

Request one set of NR contest forms from the ARRL. Send a self-addressed, stamped business (#10) envelope to the ARRL with your request. They will send two log sheets, two dupe (duplication avoidance) sheets, and one NR contest summary sheet. You are welcome to photocopy League material to meet your needs. The ARRL mailing address is 225 Main Street, Newington, Connecticut 06111. Your NR logs must be mailed to the ARRL within one month after the contest ends.

The contest material submitted to the ARRL is not returned, so do not send your only (original) log sheets. It is a simple matter for most of us to photocopy material before mailing it to the ARRL. Take your time and submit correct material that is easy to read.

NR contest activity has always been slow at the start. It is common to have other operators request an explanation of contest rules. Direct them to the NR coverage in *QST*. NR activity continues to build as the days pass and more amateurs become aware of it. By the last few days of the contest, activity is excellent. See you in NR. Good luck!

We appreciate the cooperation of the NR Contest Manager, Billy Lunt, KR1R. He informed us of the changes in this year's NR contest.

73, Bill, W6DDB

Sixteen-Year-Old Muncie Amateur Named 1987 Young Ham of the Year

Retired Senator Barry M. Goldwater, K7UGA (left), and David J. Rosenman, KA9PMK, of Muncie, Indiana, are pictured here at the Senator's home the day after Rosenman was named 1987 Young Ham of the Year at the ARRL Southwest Regional Convention. Goldwater, an amateur radio operator for over 60 years, was the keynote speaker.

David, KA9PMK, has been a ham for six years and holds an Advanced class license. According to the selection committee, there were other candidates who had impressive achievements in radio, but the committee was looking for a youth who, in addition to amateur radio activities, was an excellent student and well-rounded individual.

He was sponsored by the Muncie Area Amateur Radio Club and was selected from several thousand young amateur operators under 18 years old across the U.S. The award was given by *Westlink Report* and was sponsored by Yaesu U.S.A., Cerritos, California, a major manufacturer of communications equipment. CQ

Barry Goldwater, K7UGA, was the keynote speaker at the presentation of the 1987 Young Ham of the Year Award to David Rosenman, KA9PMK.

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Comments this month will be held to a minimum due to the excessive number of events reported—seven alone for the weekend of January 16–17. That's almost more than we listed for the whole month a few years ago.

A short comment about the WW Phone Contest back in October is in order. Conditions are definitely improving and are on the upswing as was proven by the activity on all bands, especially 10 meters. The numerous contest expeditions reported in the various bulletins did show up, adding to the excitement. But why do some of these expedition stations continue to use a special prefix in their calls rather than the one normally used in that country? Reserve that call for the WW WPX Contest, where the prefix determines the multiplier. And then there are the operators who compound the confusion by only announcing their call once in every dozen or more contacts in a pileup. Giving their call after each completed contact would not take any more time than saying "QRZ?"

There are a couple of CW activities in this month's list of events that require the use of a straight key *only*. They should be of interest to Old Timers who are familiar with the feel of a straight key.

The first one is a 24-hour affair sponsored by the ARRL on January 1st (7 p.m. Thursday to 7 p.m. Friday). Suggested areas of operation are the 20, 40, and 80 meter bands, 60 to 80 kHz up from lower edge. Give the Novice a break—10 kHz from the lower edge of their bands. When participating, use SKN instead of RST when sending your report, which will identify you are using a straight key. Send your list of stations worked to ARRL headquarters, and also your vote for the best fist you heard (not necessarily one you worked).

The second one on February 6th is a shorty, but only for Europeans, since it is confined to 3510–3560 kHz and during a time slot, 1600Z to 1900Z, when 80 meters would not be heard stateside. Contact Friedrich Fabri, DF1OY, Vor dem Steintor 3, D-3017 Pattensen, West Germany, if you are interested.

Deadline for announcements for the April issue is January 15th, and February 15th for the May issue. Use my home address, please.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Jan.	1	ARRL Straight Key Night
*	Jn.1-	De.31	U.B.A. SWL Competition
*	Jan.	2-3	"73" 10 Meter SSB Champ.
*	Jan.	9 & 10	"73" 15 & 20 M. SSB Champ.
	Jan.	9-10	European YL-OM Contest
	Jan.	10	ARCI QRP SSB Sprint
	Jan.	16-17	"73" 160 M. SSB Champ.
	Jan.	16-17	Michigan QRP CW Contest
	Jan.	16-17	North Dakota QSO Party
	Jan.	16-17	Texas QSO Party
	Jan.	16-17	Hungarian DX CW Contest
	Jan.	16-17	AGCW-DL QRP CW Contest
	Jan.	16-17	White Rose SWL Phone
	Jan.	23&24	"73" 40 & 75 M. SSB Champ.
	Jan.	23-25	ARRL VHF Sweepstakes
	Jan.	**29-31**	**CQ WW 160 M. CW Contest**
	Jan.	30-31	French DX CW Contest
	Jan.	30-31	YL-ISSB CW QSO Contest
	Jan.	30-31	White Rose SWL CW
	Jn.30-	Fb. 7	ARRL Novice Roundup
	Feb.	6	AGCW-DL Straight Key
	Feb.	6-7	Crazy 8's HF, VHF, UHF
	Feb.	6-7	Vermont QSO Party
	Feb.	6-7	New Hampshire QSO Party
	Feb.	13-14	Dutch "PACC" Contest
	Feb.	13-14	QCWA CW QSO Party
	Feb.	13-15	YLRL YL-OM Phone Contest
	Feb.	20-21	ARRL DX CW Contest
	Feb.	22-26	Operation Search Contest
	Feb.	**26-28**	**CQ WW 160 M. SSB Contest**
	Feb.	27-28	French DX Phone Contest
	Feb.	27-29	YLRL YL-OM CW Contest
	Mar.	5-6	ARRL DX Phone Contest
	Mar.	12-13	QCWA Phone QSO Party
	Mar.	12-13	RSGB Commonwealth
	Mar.	19-20	YL-ISSB Phone QSO Party
	Mar.	20-21	Wisconsin QSO Party
	Mar.	**26-27**	**CQ WW WPX SSB Contest**

* *Covered last month.*

"73" Magazine World SSB Championship Contests

73 Magazine has saturated the month of January with their SSB Championships on all bands, 10 through 160 meters. Dates are indicated in the Calendar of Events.

Complete details—including operating times and other requirements, plus names and addresses of the directors and where to send your logs for each band—were given in last month's calendar. Space does not permit reviewing it again this month.

Although not required, it is recommended that you use their official log forms. A large SASE to the Contest Chairman, Bill Gosney, KE7C, will get you a supply. Send it to 2665 N. Busby Road, Oak Harbor, WA 98277.

Contest entries must be postmarked no later than February 18th to the respective directors.

European YL-OM "Midwinter" Contest

CW: Sat., Jan. 9 Phone: Sun., Jan. 10
0700Z to 1900Z each day

This contest is organized by four European YL Clubs—the English, Belgian, Dutch, and Italian.

Bands: All five bands, 3.5 through 29.7 MHz. Use sections according to IARU Region I recommendations.

Exchange: RS(T) plus QSO serial number and country. OMs start with 001; YLs start with 2001.

Points: Each QSO with a YL, 5 points. OM QSOs, 3 points. Stations may be worked once on each band.

Multiplier: Each DXCC country worked, counted once only, *not* once per band.

Final Score: Total QSO points from all bands times the DXCC countries worked.

Frequencies: CW—3510–3560, 7010–7040, 14025–14070, 21025–21070, 28025–28070. Phone—3600–3650, 3700–3775, 7050–7100, 14150–14250, 21200–21300, 28500–28700.

Awards: Certificates to the top YL and OM winners in each category in each country.

There is an SWL division. Score 5 points for each YL station heard. Multiplier same as above.

Use separate logs for CW and phone. Include a column for each new multiplier and QSO points. A summary sheet showing the scoring, a signed declaration that all rules and regulations have been observed, and your name and address in Block Letters are also required.

Mailing deadline to the contest manager is February 20th. They go to: D. Wildeboer, PA3CEB, Kettingweg 3, 8281 PN Genemuiden, The Netherlands.

ARCI QRP SSB Sprint

2000Z to 2400Z Sunday, January 10

Rules are the same as the CW Sprint held last month, so refer to the December Calendar. Suggested frequencies, of course, will be different for SSB operation: 1810, 3985, 7285, 14285, 21285, 28385, 28885, and 50385 kHz.

Sample log and summary sheets, as well as a copy of the results, are available from KA5NLY. Include a large SASE with each request. Rules will be published in the *QRP ARCI Quarterly*.

High-Claimed Scores 1987 World-Wide VHF WPX Contest

Multi-Operator, Multi-Band

4U1UN	335,340
NN8H	264,480
KT2B	110,187
WW4T/3	103,075
W5TEX	71,920

Multi-Operator, Single Band

PA6VHF	115,500
WB5RUS	43,078
DFØCQ	32,970
N7AMA	13,825
JA1YAD	4,797

Single Operator, Single Band

YU2WV	95,328
KB7IJ/5	81,243
JA1RJU/7	31,450
KI6O	28,665
K5CBL	21,716

Single Operator, Multi-Band

N2BJ	177,300
K5UR	134,942
N5HHS	99,180
WD9IIX	65,912
NØLL	53,439

Single Operator, Single Band QRP

N5HYV	21,318
OK1ADS	9,840
KS9J/Ø	6,431
WB7FDQ	5,152
JA2TTL	4,794

FM Only

KB1XD	6,670
K7IDX/7	3,422
JE1PIK	2,592
DG9NBE	2,176
DK3GI	1,344

Portable

KU4V	46,080
KS9O	37,800
VE3JAR	16,038
NW7O/7	15,120
KJ4BF	4,872

Note: These are the raw, uncorrected scores. Listed are the top five entrants in each category without regard for geographic location. Full, corrected scores will appear in the June 1988 issue ... WB2WIK.

Mailing deadline for logs is February 10th to: Eugene Smith, KA5NLY, Pentagon P.O. Box 46599, Washington, DC 20050-6599.

Texas QSO Party

0000Z Sat. to 1800Z Sun., Jan. 16–17

This year's party is again organized by the West Texas DX Association. The same station may be worked on each band and each mode, and mobiles in each county change. Single operator only.

Exchange: QSO no. and QTH. County for Texas stations. State, province, or country for others.

Scoring: Texas stations score 1 point per QSO on phone, 2 points if on CW, fixed or mobile. (In-state contacts permitted for QSO and multiplier credit.) Non-Texans same as above. However, Texan phone mobiles are worth 5 points, CW mobiles 7 points.

Multiplier: Texans use states, VE provinces, DX countries, and Texas counties. Non-Texans use Texas counties (maximum of 254).

Frequencies: CW—3565, 7065, 14065, 21065, 28065. Phone—3940, 7260, 14280, 21370, 28600. Novice—3710, 7110, 21110, 28110.

Awards: Certificates to the top scorers in each state, VE province, and DX country, and top 10 Texas stations. There are also plaques for the overall winners in seven different areas: U.S., U.S. Novice, DX, VE, Texas fixed, mobile, and Novice stations.

All logs must be received by March 14th. This year they go to: Les Bannon, WF5E, 3400 Bedford, Midland, TX 79703.

AGCW-DL QRP CW Contest

1500Z Sat. to 1500Z Sun., Jan. 16–17

This is the winter edition of this QRP contest organized by the AGCW-DL. It's a CW only on all 6 bands, 10–160 meters. The same station can be worked on each band for QSO and multiplier credit.

There are five classes as follows:

A. Single Op.—3.5 watts or less.
B. Single Op.—10 watts or less.
C. Multi-Op.—10 watts or less.
D. QRO stations, over 10 watts.
E. SWL's.

Multi-operator stations may operate the full 24 hours. All other classes must take a 9-hour break.

Exchange: RST, QSO no., and power input. Add × if transmitter is crystal controlled (559001/5×, QRO stations 579002/QRO).

Points: QSO with own country, 1 point. Other countries own continent, 2 points. DX outside own continent, 3 points. Crystal-controlled stations are limited to 3 crystals for each band, and take double above points.

Multiplier: One for each country and one for each DX contact. For scoring purposes call areas in JA, PY, VE, VK, W/K, and ZS are counted as multipliers.

Final Score: Total QSO points times the multiplier on that band. Add the sum of scores from each band.

Awards: Certificates to the first three places in each class on each band. Use a separate log for each band.

All entries must be received no later than six weeks after the end of the contest. Include 1 IRC for copy of results.

Entries go to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Republic of Germany.

North Dakota QSO Party

0000–0800Z & 1600–2400Z Sat., Jan. 16
0800–1600Z Sun., Jan. 17

Sponsored by the Red River Radio Amateurs of Fargo, North Dakota, this one will make one of the rarer states available for WAS and County Hunters.

The same station may be worked once on each band and each mode.

Exchange: RS(T), QSO no., and QTH. County for ND stations; state, province, or country for others.

Scoring: Count 10 points for phone QSOs, 20 points for CW, and 50 points for RTTY. ND stations add 1000 bonus points for working 5 Novices.

Final Score: ND stations multiply total QSO points from all bands by sum of states, provinces, and countries worked per band and mode. Others multiply by total number of ND counties worked (maximum of 53).

Frequencies: CW—1810, 3540, and 35 kHz up from edges on other bands. Phone—1835, 3905, 7280, 14295, 21380, 28500. Novice—25 kHz up from edges of Novice bands.

Awards: Certificates and plaques. Include a large SASE with your entry for a copy of the results to see if you won anything.

Mail logs by February 28th to Mike Beaton, KDØA, 2267 Flickertail Drive, Fargo, ND 58103.

Hungarian CW Contest

2200Z Sat. to 2200Z Sun., Jan. 16–17

This is an annual affair organized by the Hungarian Radioamateur Society to promote better relations between HA's and amateurs in other countries.

Classes: Single operator, both single and all band, and multi-operator all band (club stations).

Exchange: RST and QSO contact number starting with 001. HA stations will also add two letters to identify their county. There are 20 counties: BA, BE, BP, BN, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA.

Points: Contacts with HA stations count 6 points. With other stations outside own continent, 3 points. Same station may be worked on each band for QSO points.

Multiplier: Each different HA county worked on each band.

Score: Total QSO points from all bands times the sum of the multipliers from each band.

Frequencies: 3500–3590, 7000–7035, 14000–14090, 21000–21090, 28000–28090 kHz.

Awards: Certificates to the top scorers

in each class in each country. Additional awards if returns justify.

Use a separate log sheet for each band and include a summary sheet showing the scoring, etc. The usual signed declaration is also requested.

Mail your entry within six weeks from the end of the contest to Hungarian Radioamateur Society, Contest Bureau, P.O. Box 86, H-1581 Budapest, Hungary.

Michigan QRP CW Contest

1200Z Sat. to 2359Z Sun., Jan. 16–17

This is the eighth annual CW contest sponsored by the Michigan QRP Club. The contest is open to all amateurs and all are eligible for awards.

Classes: (A) Less than 1 watt output. (B) 1 to 5 watts output. (C) Over 5 watts output.

Exchange: RST; state, province, or country; and Club membership number. Non-members send power output.

Scoring: Contacts with members 5 points. Non-members 1 point. Bonus of 1.5 if power used is 100% battery or natural.

Final Score: Total QSO points × states, provinces, and countries worked per band × 1.5 power bonus if applicable.

Frequencies: 1810, 3560, 7030, 7040, 14060, 21060, 28060. Novice—3710, 7110, 21110, 28110 kHz.

Awards: Certificates to top scorers in each state, province, and country.

Use a separate log for each band and include a summary sheet showing the scoring, operating class, and equipment used; plus the usual signed declaration.

Sample forms are available with an SASE to K8DD, 1640 Henry, Port Huron, MI 48060.

Logs must be received no later than March 1st by L.T. Switzer, N8CQA, 654 Georgia, Marysville, MI 48040. Include a large SASE for a copy of the results.

White Rose SWL LF Contest

1200Z Sat. to 1200Z Sun., Jan. 18–19

Very few DX contests have an SWL category. Here is one for SWLs only sponsored by the White Rose Radio Society of England.

There are two separate sections, phone and CW. No mixed-mode entries. Only the three LF bands—1.8, 3.5, and 7 MHz—may be used.

Points may be claimed only for stations heard in contact with another station. Both stations may be logged, but the practice of logging a series of QSOs made by one station is not allowed. Logs must not include the same call in the "station worked" column more than 10 times on each band. A station appearing in the "worked" column can only be claimed once for scoring.

Score 1 point for each station heard on each band from one's own continent, 5 points if station is in another continent. Maximum of 5 stations from each country.

Multiply total points by number of different countries heard on each band. Add three bands' totals for final score.

The ARRL country list is the standard. In addition, each call area in the U.S., Canada, Australia, and New Zealand will be considered a separate multiplier.

Show date and times in GMT, band, station heard, station being worked, and signal report. Points may only be claimed for stations actually heard. If points are claimed for both stations, both calls must appear in the "station heard" column.

Certificates of merit will be awarded at the discretion of the society.

Entries must be received no later than February 23rd and go to: Contest Manager, John Hart, G3ZGA, White Rose ARS, 146 Street Lane, Leeds LS8 2AD, England.

ARRL VHF Sweepstakes

1900Z Sat. to 0400Z Mon., Jan 23-25

This is the 41st ARRL January VHF Sweepstakes. ARRL Headquarters recommends that you use the official log forms. It will make your log keeping and the scoring much easier. A large SASE to Newington will get you the necessary forms.

Complete rules will be found in the December issue of *QST*. They are a bit complicated, so look them over carefully.

CQ WW DX 160 Meter Contest

CW: Jan. 29–31 SSB: Feb. 26–28
2200Z Friday to 1600Z Sunday

Complete rules were published in the November issue and are the same as those we have been using these past many years. Following is a brief rundown.

Exchange: Has been reduced to an exchange of QTH only. State for the U.S., area for Canada, and country abbreviation for DX. Signal report is optional. *(However, for the sake of establishing a valid contact for QSL purposes, I advise that a signal report be given.—ed.)*

Scoring: Contacts with stations in own country 2 points, other countries in same continent 5 points, and with other continents 10 points.

Multiplier: Each U.S. state (48), Canadian area (13), and DX country. (ARRL and WAE country lists and WAC boundries are the standards.)

Awards: Certificates to the top-scoring stations in each U.S. state, Canadian area, and DX country. And an assortment of 12 plaques for U.S. and world winners.

Penalties: Three contacts will be deleted for each duplicate that has not been removed.

Disqualification: Taking credit for excessive duplicate contacts, and the usual assortment of rules violations and unsportsmanlike conduct.

The traditional "DX Window," 1825–1830 kHz, that has been a part of 160 since the start of DXing on the top band, is being phased out, but a new spot, 1907–1912 kHz, has been created for Pacific DX. *(The old window was no longer being observed, so the success of the new window is questionable.—ed.)*

Mailing deadline for logs is February 29th for CW entries and March 31st for the SSB section.

They can be sent directly to the 160 Contest Director, Donald McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32904. They can also be sent to *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. Be sure to indicate CW or SSB on the envelope.

ARRL Novice Roundup

0001Z Sat. Jan. 30 to 2359Z Sun. Feb. 7

With Novice Enhancement now in effect, this year's Roundup will be operating under new rules to take advantage of the new Novice privileges.

It's a nine-day long contest, but only 30 hours of actual operating time is permitted for scoring.

Novice/Tech will work each other and higher class licensees who, of course, are limited to contacting Novice/Tech only. All bands and modes open to Novice/Tech can be used.

Exchange: Signal report and ARRL section (country for DX stations).

Scoring: One point for phone QSOs, two points for CW, including RTTY and packet.

Multiplier: Each ARRL/CRRL section plus each DXCC country. There is also a bonus for stations holding a code proficiency certificate.

Final Score: Add your code bonus to your QSO points total and multiply that total by your multiplier.

Awards: Certificates to every Novice/Tech who submits a valid entry. Higher class licensees are not eligible for awards.

The use of official forms is highly recommended. A large SASE to ARRL Headquarters will get you a Novice package with all the forms.

Look for a detailed announcement and operating suggestions in the December issue of *QST*.

Postmark your entry no later than March 7th to: ARRL Novice Roundup, 225 Main Street, Newington, CT 06111.

French DX Contest

CW: Jan. 30–31 SSB: Feb. 27–28

This year's announcement from the REF showed no change from last year's

format. It's still the world working the French Europeans as well as the other French departments and territories all over the world. The French areas can usually be identified by the letter "F" in the prefix.

Classes: Single operator and multi-operator. Multi stations must remain on the same band at least 15 minutes.

Exchange: RS(T) plus a 3-figure QSO number starting with 001. French stations will also include two figures or letters identifying their department.

Points: One point per contact between stations in the same continent, 3 points if with other continents.

Multiplier: Each French European department (95) and each overseas department and territory worked. Also DA1 and DA2 French Army, 2A and 2B Corsica, and the Club station F6REF.

Final Score: Total QSO points from all five bands (3.5–28 MHz) times the sum of the multipliers from each band.

Awards: Certificates to the top scorers in each country. European single operator must make at least 100 QSOs; multi-operators 250 QSOs. All other areas 50 QSOs for single operator, 100 QSOs for multi-operator.

Stations making over 250 contacts must include a dupe check list with their log. The usual disqualification rules for excessive duplicate contacts and other violations will be strictly enforced.

All entries must be postmarked no later than March 5th for CW and April 5th for SSB. This year they go to The REF Contest Committee, Att: Lucien Aubry, F8TM, 2 Square Trudaine, F-75009, Paris, France.

Of the 266 CW and 109 SSB overseas logs received in the 1987 contest, the following were the only North American entries: CW—N8FU 6636 points, K9BG 6355, W6NNV 216, VE4MF 2000. SSB—W2/F2YS 80316, WK4F 2232, WB2TKD 1914, KC7KU 1071, W4FRU 210, VE2BKL 12642, VE1AGZ 3330, VE3PJL 1764, VE2AFC 270, and HI2LC 594. 4X/W3FYT 15921, and multi-op NG1W 61440.

YL ISSB QSO Party

CW: Jan. 30–31 SSB: Mar. 19–20
0001Z Saturday to 2359Z Sunday

The party is open to all, but the emphasis is on membership participation.

Categories: Single operator, DX-US Partners, and YL-OM Teams.

Exchange: Call, RS(T), QTH (state, prov., terr., dist. or country), name, ISSB number, YL-OM teammate, DX-US partner.

Points: One point for non-member contacts, 3 points for member contacts on the same continent, and 6 points if in a different continent.

Multiplier: Only contacts with member stations count as a multiplier. There are ten different categories. Get the list from WA9AEA.

Frequencies: The General portions of the CW and phone bands, 10 through 80 meters. Avoid 14332 used by ISSB Net. Check 40 and 80 hourly. VHF and UHF may be used simplex.

Awards: Category and QTH area winners.

Logs: Should be set up as outlined in the exchange and should indicate at least two 6-hour rest periods. A summary sheet showing the scoring and other essential information would be helpful.

Mailing for all entries is April 30th, and they go to: Bill Early, WA9AEA, P.O. Box 401, McHenry, IL 60050-0401.

(Note: Rules and logging format are much too lengthy and complicated to list here. Strongly suggest you send a large SASE to WA9AEA for more details.—ed.)

Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for January is:

Kennard D. "K.D." Wilson, W6DIX (ex W7GKN, W6BMV, W3GT) USA-CA All Counties #35, 7-23-70

(Note: We frequently hear from County Hunters who were among the early ones to pursue this phase of the hobby, and we sometimes have a chance to share the stories with our readers. K.D.'s story first appeared in CQ in April 1971.—ed.)

"I am 87 years old now. I first started 'hamming' in 1926 as OH6BWV. In 1927 I went to work in Washington, D.C. and was assigned the call W3GT. I did lots of amateur operating in those days. I also worked AF frequencies, and the Arctic Patrol AB6, as well as Byrd's supply ship in the Antarctic and the Wilkens North Pole expedition. I sure wish I had my logs for those years, but they, along with all the QSL cards, were lost when I transferred to California.

"It was 1931 when we moved to California and I received my present call, W6DIX. I immediately picked up on my hamming, finishing WAS and chasing DX. Then one day one of the gang suggested that I go mobile since there were a number of DX stations that needed the 'rare' California counties, of which there were quite a few up in the mountains. So my wife and I purchased a 17 foot camper, outfitted it with a B&W 150 watt transmitter and a Drake receiver, and set out for the hills. Happily I was able to help quite a number of DX operators as well as stateside stations.

"I was visiting my daughter in Colorado when I decided to hunt counties for myself. I had about 600 different W cards at that time. I sorted them out, wrote to Ed, W2GT, who was then USA-CA Custodian for *CQ*, and away we went. Eventually, I was awarded USA-CA All Counties #35.

"During the late 60s and early 70s we had a 1954 Oldsmobile with amateur radio equipment for SSB. It was the fastest and most powerful car of its class and took us through rain, dust storms, and snow storms. We did get stuck once, however, in a 12 foot snow drift near Leadville, Colorado.

"I retired in 1958. Since than I have injured both legs (at different times) and one arm, all while putting up antennas. I live in a mobile-home park now, and antenna towers are not allowed here. I do have a mobile whip in a tree, however, and a Ten-Tec transmitter for CW. If you need a contact from Sonoma County, California on 14 or 7 MHz, let me know and I will listen for you. 73 es gud hunting, K.D."

Kennard "K.D." Wilson, W6DIX, with his FB mobile station, a 1954 Oldsmobile.

333 South Lincoln Ave., Mundelein, IL 60060.

Awards Issued

Dick Rose, N9DR, completed all his paperwork and received All Counties #548, and USA-CA 3000 #580, Mixed, dated 9-4-87. Dick also qualified for an All CW endorsement for USA-CA 2500 #654, USA-CA 2000 #718, and USA-CA 1500 #806, also dated 9-4-87.

Larry Allen, K1ZIT, submitted his good application and received All Counties #549, and USA-CA 3000 #581, Mixed, dated 9-5-87.

William E. Sempert, K8OHC, qualified for All Counties #550, USA-CA 3000 #582, and USA-CA 2500 #655, Mixed, dated 9-10-87.

Alfred "Al" B. Cornwall, W7HZL, claimed USA-CA 2500 #656, USA-CA 2000 #719, USA-CA 1500 #808, USA-CA 1000 #988, and USA-CA 500 #2198, All CW, dated 9-10-87.

Tom N. Rosebush, VE3KZE, received USA-CA 2000 #720, All CW, dated 9-24-87.

Lin Titus, VE1AIT, submitted his application for USA-CA 2000 #721, Mixed, dated 9-26-87.

Elemer A. Bielek, HA9RE, claimed his endorsement for USA-CA 1500 #805, Mixed, dated 9-2-87, number one to Hungary.

USA-CA Special Honor Roll

Richard S. Rose, N9DR
All Counties #548, Mixed, 9-4-87

Larry Allen, K1ZIT
All Counties #549, Mixed, 9-5-87

William E. Sempert, K8OHC
All Counties #550, Mixed, 9-10-87

O. Brian Schreen, NT7R, received USA-CA 1500 #807, Mixed, dated 9-8-87.

Julio Vera-Cruz, D44BC, qualified for USA-CA 1000 #987, and USA-CA 500 #2197, All SSB, dated 9-9-87.

USA-CA 500 certificates went to:

Joseph W. Curran, N8BZK, USA-CA 500 #2196, All CW, 9-2-87.

Julio Vera-Cruz, D44BC, USA-CA 500 #2197, All SSB, 9-9-87.

Alfred B. Cornwall, W7HZL, USA-CA 500 #2198, All CW, 9-10-87.

Harald Doelle, DJ3AS, USA-CA 500 #2199, Mixed, 9-21-87.

Reynaldo G. Navarrete, HC2RG, USA-CA 500 #2200, All SSB, 9-23-87, number 3 to Ecuador.

John K. Thompson, KC2CD, USA-CA 500 #2201, All 20M SSB Mobiles, 9-30-87.

Awards Available

Italian Islands Award. The Italian Islands Award is available to radio amateurs worldwide. Work Italian islands since 1

USA-CA Honor Roll

3000		1500	
N9DR	580	HA9RE	805
K1ZIT	581	N9DR	806
K8OHC	582	NT7R	807
		W7HZL	808
2500			
N9DR	654	**1000**	
K8OHC	655	D44BC	987
W7HZL	656	W7HZL	988
2000		**500**	
N9DR	718	N8BZK	2196
W7HZL	719	D44BC	2197
VE3KZE	720	W7HZL	2198
VE1AIT	721	DJ3AS	2199
		HC2RG	2200
		KC2CD	2201

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 non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 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 a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

Italian Islands Award available from IIA award manager.

January 1970 for points. Italians need 40 points, other Europeans 20, the rest of the world 10. Each individual island of an archipelago counts even though in the same group. Contacts with the same island will count if a different mode or band is used. One contact with Sardinia on each of 5 HF bands will count as 5 points. Sixty points earns Honor Roll status. Cards are not required, but may be requested. Send GCR list and $8 U.S. or 30 IRCs to: IIA Award Manager, ARI, via Scarlatti 31, 20124 Milano, Italy.

Italian island listing: IA1 Liguri Group, IA5 Tuscan Arch., IBØ Ponziano Arch., IC8 Napoli Arch., ID9 Eolie Arch., IE9 Ustica, IF9 Egadi Arch., IG9 Pelagie Arch., IH9 Pantelleria, IJ7 Cheradi Arch., IL7 Tremiti Arch., IMØ Maddalena Arch. & the Sardinian Isl., ISØ Sardinia, IT9 Sicily.

Requiem Award. ON4RIP (Rest in Peace—Requiem In Pace) is a special station in commemoration of the third battle in the Ypres Salient Fields (Salilent Ypres-Passchendaele). It is operating in remembrance of the 70th anniversary of this struggle in which more than 600,000 casualties were counted. A third of these yound soldiers from anywhere in the world by the fortune of war were denied a known grave.

In commemoration of this battle, which lasted for 99 days and 9 hours, activities are planned by different nations. Radioclub Ypres will participate, and obtained for that purpose the special callsign ON4RIP. This station will be on the air from May 1, 1987 until the end of November 1988 (end of WW I). The station will be operated by radio amateurs from the British Commonwealth, France, Belgium, Germany, and the USA.

During the coming months the remembrance of the 60th anniversary of the unveiling of the memorials for the missing soldiers 'Tyne Cot' and 'Menin Gate' will take place including VIPs and members of the British and Belgian royal families.

The Requiem Award will be issued in cooperation with the city council of Ypres. The rules for the award are to make one contact with ON4RIP. The award is also available to shortwave listeners. The fee for this award is 10 IRCs, 5 pounds, $7 US, 300 BF, 15 FL, 15 DM, 10000 Lira, or 15 SFR. Applications should be sent to Ieperse/Radioclub v.z.w. (Radioclub Ypres), P.O. Box 32, 8900 Ypres (Ieper), Belgium.

Marshall Islands. The Kwajalein ARC will operate KX6BU from 0600Z January 30 until 0600Z February 8, 1988 to commemorate the 44th anniversary of the battles of Kwajalein and Roi-Namur. Frequencies: SSB 14.250, 21.350, 28.550; CW 7.050, 14.050, 21.050, 28.050. For $7.00 KX6BU will issue a QSL, a certificate, and a 64-page book on the battles; $3.00 will bring the QSL and certificate. All requests should be sent to KX6BU, P.O. Box 444, APO San Francisco, CA 96555.

Republic of Chile Award. Radio Club de Chile (CE3AA) has instituted a new award under the name of "Diploma Republica de Chile" (Republic of Chile Award). The rules are as follows.

The award shall be forwarded to any licensed radio amateur of the world who makes contact with 16 different CE radio amateur stations from any Chilean zones, so as to form the phrase "Republica De Chile" with the last suffix letter of their call signs. All contacts starting with January 1, 1986 will be valid on any band and mode. Applicants must send the corresponding QSL cards, or preferably a list of QSOs duly certified by an IARU Member Society. The list must include date, station, band, RS(T), and mode, and must be ordered so as to form the required phrase reading downward. Enclose 8 IRCs and send application to Awards Manager, Radio Club de Chile, P.O. Box 13630, Santiago, Chile. QSL cards (when received) shall be returned with the award. Service to foreign stations shall be by airmail. Radio Club de Chile declines all responsibility in case of missing QSL cards.

Worked All Chile Award. WACE (Worked All Chile) Award is issued by the Radio Club de Chile to all amateur radio stations who can submit satisfactory evidence of having established two-way contacts with CE stations in each of the 10 zones into which the Chilean territory is divided.

The application must contain a list of the stations worked, including the date, signal report, and mode. It is not necessary to send the QSLs if this list is verified and signed by a recognized radio club or national amateur radio organization. All contacts must be made from the same "country." The cost of the award is 8 IRCs. The application must be sent to Awards Manager, Radio Club de Chile, Casilla 13630, Santiago De Chile.

The Fifth Continent Australian Dish (TFCAD). The porcelain wall dish, donated by VK9LM, should encourage contacts between Australia and the other continents and strengthen friendships. This award will be issued to all licensed radio-amateurs in accordance with the following rules.

This award is available for contacts in all modes and on all bands, including the new WARC bands and VHF-Oscar. Worked stations can be counted only one time. Special prefixes for VK stations can be claimed.

Contacts after January 1, 1980 are valid. The award will be issued in three classes as follows:

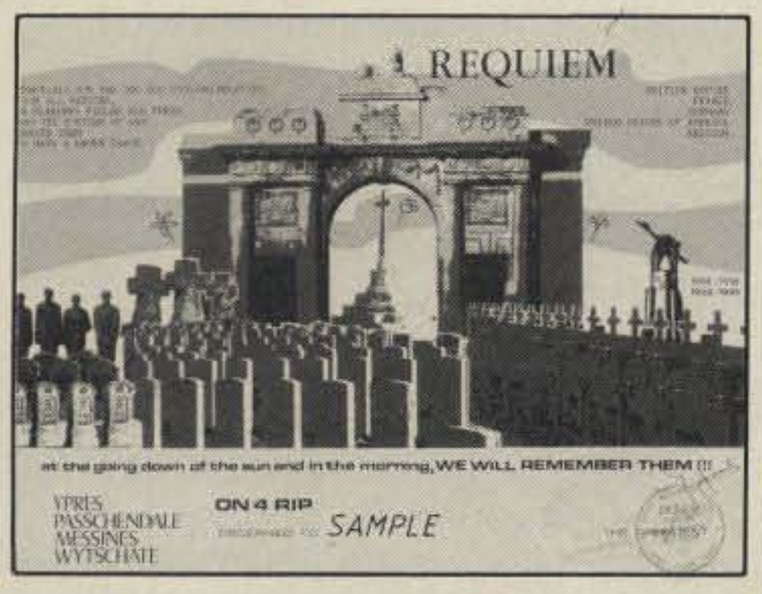
Class III—Standard; Mixed 50 points; UHF/VHF only, 10 points.

Class II—Silver; Mixed 75 points; UHF/VHF only, 20 points.

Class I—Gold; Mixed 100 points; UHF/VHF only, 30 points.

All Districts have to be worked (instead of VK8, a VK9 contact will be accepted) and count only one time. The Capital of every District doubles the points of the district and counts separately. (VK1 Canberra = 4, VK2 Sydney = 2, VK3 Melbourne = 2, VK4 Brisbane = 2, VK5 Adelaide = 2, VK6 Perth = 4, VK7 Hobart = 4, VK8 Darwin = 6, VK1 District CANB = 2, VK2 District NSW = 1, VK3 District VIC = 1, VK4 District QUE = 1, VK5 District S.A. = 1, VK6 District W.A. = 2, VK7 District TAS = 2, and VK8 District N.T. = 3.)

If Capitals are worked more than once, they may be claimed twice, but no more (e.g., Sydney 2× = 4 points. However,



Requiem Award for working special station ON4RIP, Radioclub Ypres.

Republic of Chile Award offered by Radio Club de Chile.

No - 87-88

Fifth Continent Australia Dish provided by VK9LM, available from DJ5CQ.

the two contacts must be made either on two different bands or in two different modes.

All islands count as a Joker with point credits as follows. If islands are worked more than once, they may be claimed twice, but no more (e.g., VK9N 2× = 10 points). However, the two contacts must be made either on two different bands or in two different modes. (VK9N Norfolk 5, VK9X Christmas 6, VK9Y Cocos Keeling 7, VK9Z Wil. & Mel. 8, VK9L Lord Howe 9, and VK0H-M Antarctica 10.)

Applicants should not send QSL cards. Send only a checklist of confirmations *received*, verified by another licensed radio amateur (GCR list). The award manager reserves the right to require submission of 3 to 5 cards. Send application to Rudi Muller, DJ5CQ, Alter Main 23, D-8601 Eb-ing/Bamberg, West Germany. The fee is $12 U.S. or 20 IRCs.

Morokulien Award. The award is available to licensed radio amateurs and SWLs. All contacts on and after 1 July 1968 are valid. There are no band or mode limitations. European applicants must submit proof of contact with LG5LG and SJ9WL on 2 different bands and on 2 different days (4 QSOs). DX applicants must submit proof of contact with LG5LG and SJ9WL. The contacts must be made on different days, but any band may be used (2 QSOs).

For application use GCR list. The fee is 10 NKR, 3 USD, or 6 IRC. The award manager is Morten Kvernmoen, LA9DFA, Kapellveien 9, N-2240 Magnor, Norway.

The K1BV DX Awards Directory

Ted Malinosky, K1BV, has compiled a new "DX Awards Directory" which contains rules for over 680 DX awards from 73 countries, club member lists often shown for specialized awards, and much more helpful information for those hunting DX awards.

Price of the directory for USA and Canada first-class mail is $14.35; for DX surface mail $13.75; for DX airmail (Europe, S.A., C.A.) $16.75; and all other DX mail $18.00. Write to Ted Melinosky, The K1BV DX Awards Directory, 525 Foster Street, Suite 2000, South Windsor, CT USA 06074-2936.

Reynaldo G. Navarette, HC2RG, USA-CA 500 #2200, All SSB, # 3 to Ecuador.

This is Maurice Leray, F6DJV, USA-CA 500 #2194, All CW.

Of Special Interest To County Hunters

Bullfrog County. No doubt many readers have heard of Bullfrog, the new county in Nevada. You may have wondered whether contact is required under the USA-CA program.

After consultation with the USA-CA Advisory Committee and consideration of other input, the USA-CA Custodian has determined that contact with Bullfrog County, as it now exists, will not be required under the USA-CA program.

Bullfrog County was created by "lifting" a 144 square mile area (unpopulated) out of Nye County, the primary objective being, according to a representative of the Nuclear Waste Project Office, State of Nevada, "to develop a special entity for receipt of tax revenues from the Department of Energy's high-level radioactive waste repository program." In addition to the area now proposed as a nuclear waste site, the 144 square mile area includes parts of the underground nuclear test site and Nellis Air Force Range. There is no population and no local government. Radio transmission from this area is not required or encouraged under the rules of the USA-CA program.

New Marac Awards Chairman. The Mobile Amateur Radio Awards Club (MARAC) has appointed a new awards chairman, Bill Nash, W0OWY (6604 Hounds Run So., Mobile, AL 36608). All applications for MARAC awards and related correspondence should be sent to Bill.

Information about MARAC awards, membership, and general operating procedure can be obtained by sending a request to MARAC, P.O. Box 64, Newport, MN 55055.

Note: Jerry Van-Vactor, K0JV, told me of his Commodore 64 data-base system for county hunting records and listings. For details get in touch with Jerry at 1435 Fifth St., Spearfish, SD 57783.

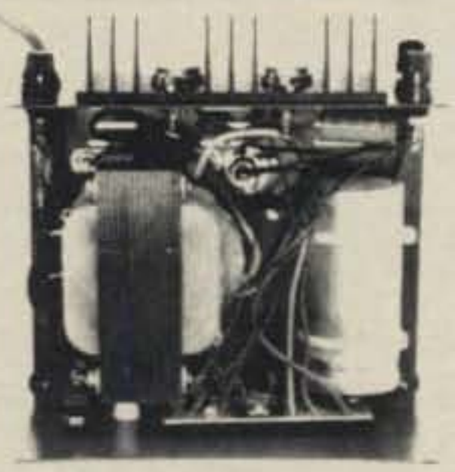
Once more we are presented with a new year. I hope it is a happy, productive year for you and yours.

73, Dorothy, WB9RCY

ASTRON CORPORATION
9 Autry
Irvine, CA 92718
(714) 458-7277

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



INSIDE VIEW — RS-12A

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models **except RS-3A, RS-4A, RS-5A.**
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- **Also available with 220 VAC input voltage**

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM SERIES

MODEL RM-35M

19″ × 5¼ RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A	2.5	3	3 × 4¾ × 5¾	4
RS-4A	3	4	3¾ × 6½ × 9	5
RS-5A	4	5	3½ × 6⅛ × 7¼	7
RS-7A	5	7	3¾ × 6½ × 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 × 7½ × 10¾	11
RS-12A	9	12	4½ × 8 × 9	13
RS-12B	9	12	4 × 7½ × 10¾	13
RS-20A	16	20	5 × 9 × 10½	18
RS-35A	25	35	5 × 11 × 11	27
RS-50A	37	50	6 × 13¾ × 11	46

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES

MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	5	7	4 × 7½ × 10¾	10
RS-10S	7.5	10	4 × 7½ × 10¾	12
RS-12S	9	12	4½ × 8 × 9	13
RS-20S	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

1988 Looks Like A Good Year!

The newest sunspot cycle, Cycle 22, is in its second year, and it is expected to rise rapidly during 1988. The new year is expected to begin with a smoothed sunspot reading of approximately 45, and the cycle is expected to rise to approximately 90 by year's end. If the cycle follows this expected pattern, 1988 will be a good year for radio propagation conditions on the HF amateur bands. Most noticeably should be improvements on the *10, 15,* and *20* meter bands during the daylight hours. By next fall, solar intensity is expected to be high enough to also support fairly regular *6* meter openings to many parts of the world during the daylight hours.

January Conditions

The following is a summary of HF band conditions expected during January 1988. For specific times of DX openings refer to the DX Propagation charts for January 1988 which appeared in last month's column. This month's column contains Short-Skip Propagation Charts for January and February, as well as charts centered on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for openings varying in length between distances of approximately 50 and 2300 miles.

10 Meters: Some fairly good openings should be possible to southern and tropical regions during the daylight hours. Some openings towards Europe and the east should be possible between 8 and 11 a.m., and towards the Far East during the late afternoon. Look for some short-skip openings between distances of about 1300 to 2300 miles during the afternoon hours. Openings over shorter distances may be possible during periods of ionospheric storminess.

15 Meters: Good DX conditions are forecast for this band to most areas of the world during the hours of daylight. Signals from Europe and the east should peak before noon, from the south during the afternoon hours, and from the west and north during the late afternoon. Expect good short-skip openings, ranging between 1000 to 2300 miles, during most of the daylight hours.

20 Meters: Good DX conditions to most areas of the world are expected to continue on this band from shortly after sunrise to an hour or so after sunset. Expect signals to peak for about an hour or two after sunrise and again during the afternoon. The band may occasionally remain open towards South America and the South Pacific area to almost midnight. Good short-skip openings, over distances ranging between 750 to 2300 miles, should also be possible during the daylight hours.

40 Meters: Look for the first signs of DX from Europe and the east during the late afternoon hours, with conditions improving with darkness. The band should open to most areas of the world during the night and remain open until shortly after sunrise. Atmospheric noise, or static, should remain at low seasonal levels during January, and signals may often be exceptionally strong. Good short-skip openings are also forecast during the hours of daylight over distances ranging between approximately 150 to 750 miles. As darkness falls, the short-skip range should increase to between 1000 to 2300 miles.

80 Meters: With low static levels continuing through the month, fairly good DX openings are expected to many areas of the world during the hours of darkness and the sunrise period. During the daylight hours, short-skip openings should be possible up to about 300 miles. During the hours of darkness skip should increase to distances between approximately 400 to 2300 miles.

160 Meters: Look for some DX on this band from a few hours after sunset to shortly before sunrise. Remember that DX conditions tend to peak on this band when it is *sunrise* on the *eastern* terminal of a path. Short-skip openings up to the geometric limit of 2300 miles should be possible during the hours of darkness. Because of extremely high solar absorption in this frequency range, ionospheric propagation generally is not possible during the hours of daylight, although it may sometimes occur over very short distances.

Sunspot Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a mean number of 33.5 for September 1987. This results in a smoothed sunspot number of 22 centered on March 1987. A smoothed sunspot number in the mid-to-upper 40s is expected for January 1988.

How fast is the new cycle climbing? When will it reach its peak? Will Cycle 22 be an exceptionally high or low cycle? Several of the world's experts in solar physics have already made their initial predictions. These have been summed up recently by the Space Environmental Services Center, NOAA, Boulder, Colorado in their report number PRF 626 dated September 1, 1987. The following are the major predictions made for Cycle 22 to date.

Author(s)	Date of Maximum	Peak Smoothed Sunspot Number
Kane	1990	185
Sargent	1991	118
Schatten & Sofia	1990	170
McNish & Lincoln	1990	136
Marshall, etc.	1990	172

The experts appear to be in agreement that Cycle 22 will reach its peak intensity during 1990, or by 1991 at the latest, and that this will be a relatively high cycle.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for January 1988

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 8-9, 26-27	A	A	B	C
High Normal: 6-7, 10-11, 22-25	A	B	C	C-D
Low Normal: 1-2, 5, 12, 16-19, 21, 28-29	A-B	B-C	C-D	D-E
Below Normal: 3-4, 13, 15, 20, 30-31	B-C	C-D	D-E	E
Disturbed: 14	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 S1 and S3, and with considerable fading and noise.

E—No opening expected.

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-to-fair (B-C) on January 1 and 2, fair-to-poor (C-D) on the 3rd and 4th, good-to-fair (B-C) again on the 5th, good (B) on the 6th and 7th, etc.

11307 Clara St., Silver Spring, MD 20902

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should 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

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *standard* time is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones *add* 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA *subtract* 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave 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 10 dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart
January & February, 1988
Local Standard Time at Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	10-15 (0-1)	08-10 (0-1) 10-15 (1-2) 15-17 (0-1)
15	*Nil*	10-16 (0-1)	08-09 (0-1) 09-10 (0-2) 10-15 (1-3) 15-16 (1-2) 16-18 (0-1)	07-08 (0-1) 08-09 (1-3) 09-10 (2-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1) 18-19 (0-1)
20	*Nil*	08-10 (0-1) 10-14 (0-3) 14-16 (0-2) 16-18 (0-1)	06-07 (0-1) 07-03 (0-2) 08-10 (1-4) 10-14 (3-4) 14-16 (2-4) 16-18 (1-2) 18-19 (0-2) 19-21 (0-1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (2-4) 17-18 (2-3) 18-19 (2) 19-21 (1)
40	07-08 (0-1) 08-09 (1-2) 09-10 (2-4) 10-16 (3-4) 16-17 (3) 17-19 (1-2) 19-21 (0-1)	07-08 (1-2) 08-09 (2-3) 09-11 (4) 11-15 (4-3) 15-17 (3-4) 17-19 (2-3) 19-21 (1-2) 21-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-17 (4-2) 17-19 (3-4) 19-22 (2-4) 22-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-17 (2) 17-19 (4-3 19-22 (4) 22-02 (3-4 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-19 (4) 19-21 (3-4) 21-23 (2-1) 23-03 (1-2) 03-07 (1)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-21 (4) 21-23 (3-4) 23-03 (2-3) 03-07 (1-3)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-23 (4) 23-05 (3) 05-07 (3-2)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-05 (3-2) 05-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA
January & February, 1988
Openings Given in GMT

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	*Nil*	18-20 (1) 20-22 (2) 22-23 (1)	16-22 (1) 22-00 (2) 00-02 (1)	04-13 (1) 07-12 (1)*
Central USA	20-23 (1)	19-22 (1) 22-00 (2) 00-01 (1)	17-23 (1) 23-01 (2) 01-03 (1)	03-14 (1) 07-12 (1)*
Western USA	20-00 (1)	19-22 (1) 22-00 (2) 00-02 (1)	18-20 (2) 20-01 (3) 01-02 (2) 02-04 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1) 05-12 (1)* 12-15 (2)* 15-17 (1)*

HAWAII
January & February, 1988
Openings Given in Hawaiian Standard Time

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	08-13 (1)	06-08 (1) 08-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	06-08 (2) 08-12 (1) 12-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Central USA	07-09 (1) 09-12 (2) 12-14 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-15 (4) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-05 (1)*
Western USA	09-11 (1) 11-14 (2) 14-16 (1)	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (2) 07-10 (4) 10-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1) 19-20 (1)* 20-22 (2)* 22-04 (3)* 04-05 (2)* 05-07 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
* Indicates best time 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.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

Sargent had the most precise prediction for both the date of peak intensity and the peak value of the previous cycle, Cycle 21.

VHF Ionospheric Openings

There is a fairly good chance that the big VHF news during January may be the *6* meter band. Reports of some *F*-layer openings to South America, via regular propagation and by means of Trans-Equatorial (TE) propagation, began to come in during the fall months. With an increase in solar activity expected this month, these openings should continue. You will have to be very patient to find them, and chances are considerably better if you live in the southern tier states, but some openings towards Central and South America should be possible during January. Check the band during the daylight hours, at the times that the *10* meter band is shown to peak in the DX Propagation Charts. Check also for TE openings during the early evening hours.

There is a fairly good chance for some meteor-scatter-type openings on the VHF bands during the *Quadrantids* meteor shower, which should take place between January 2 and 4. Expect a peak of about 40 meteor bursts an hour.

Auroral activity is usually at a seasonal low during January, and there is usually little sporadic-E ionization at this time of the year. Some may occur, however, during periods of radio storminess. Check the Last Minute Forecast at the beginning of this column for those days during January that are expected to be Below Normal or Disturbed. Then check the VHF bands for possibly unusual ionospheric conditions during these periods.

73, George, W3ASK

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

We beat the bands and wish for needed calls in vain,
DX is to be still the unguessed memory,
Unworked, unheard, the DX needs remain ....

Scratch one of the durable DX types and you will again learn the story of those days long gone when any voice DX was generally worked in the a.m. mode, when antennas were long-wires or variations thereof, and when shacks had to be big because the rigs themselves were big and often wall to wall. But things do change. DX changed, though there were some who resisted change along the way. SSB was blasted as "... that Donald Duck mode," while the beauty and clarity of the a.m. signal was praised endlessly. Eventually those who resisted change either made the adjustments in their fundamentals or headed for other fields. One learns to adapt to change; one has to.

We remembered those days recently when one of the Locals came trudging up the hill in the short days of early winter. He came with some startling concepts. The years have taught us to curb our skepticism. We learned that what existed when we first became active in DXing was not necessarily perfection, and never to reject any new proposal out of hand. We learned to believe, but what this one told was absoluately unbelievable. Or was it?

This Local was not only a DXer, but also a beekeeper. "Do you know that bees carry electrical charges?" he asked, "and that these charges can run as high as 25 volts?" We had to admit that we had not known that, immediately thinking that this was trivia time and that this one was out to display his knowledge of the insect. The Local continued.

"When the voltage charges move on the abdomen of the bees," he continued, "electric currents are generated and magnetic properties result. Scientists studying the phenomenon report that these magnetic characteristics show a remanence of 1.2×10^{-6} electromagnetic units. Also, organs within the body of a bee may act as electrolytic capacitors. What do you think of that?"

We did not know what to think. While we were hearing some electronic terms, this one was not talking about radio; he was talking about bees. And we had never heard of bees coming equipped with magnetic fields and electrolytic capacitors. He had to be pulling our leg. We had learned a bit since the days when we read in the Boy Scout magazine about the availability of a pamphlet entitled "How to Get Started in Amateur Radio" and had sent off 35¢ for the word. But never had we heard of anything like this one was telling. But then again, back in those Boy Scout days we had not yet heard of Yagi antennas, IC boards, circuit modules, or even coax cable. One learns with the years and one learns more by listening. So we listened and the Local plunged onward.

77 Coleman Drive, San Rafael, CA 94901

While it may not be an unusual thing to find an OM/YL family, it is when you find both right at the top of the Honor Roll. Here are Pete Billon, K6JG, and Jessie Billon, WA6OET, both at the top, K6JG with 316/342 and WA6OET at 316/341. Pete is a retired 747 captain from United Air. They live at Arroyo Grande on the central California coast.

"You might find it interesting to know," the beekeeper continued, "that the paired antennae of a bee tend to act as a dipole with an electric field established between them for periods less than a second. It is interesting to note that the arolium on the tarsus of a bee can act as a circuit breaker between the charged bee and the substrate over which it is walking. As yet research has not shown to what extent bees use body charge for communication in the colony, but a bee's occupation within the hive does appear to change its body charge. But how about that circuit breaker concept? Doesn't that start the bells ringing?"

We were sure that the bells would ring when we understood what he was talking about. We were numb, sitting there and wondering if we were missing something. The Local showed a degree of shock. "You don't get it?" was his insistent query. "But what does a key do when you are sending CW? Isn't that breaking a circuit?" We were ready to acknowledge that he might be right. The Local smiled in satisfaction, but we slipped further into the feeling we were lost on this one. The Local continued.

"Of course, you already know that bees ventilate their hive by stationing bees at the entrance who just stand and fan air into the hive with their wings. On a warm day you will see them in rows fanning the air. But these bees develop a positive charge, as do foraging bees, usually up to 1.5 volts. When there are atmospherics such as thunderstorms which might affect this positive charge, the foraging bees can develop a negative charge, and bees with negative charges will not be allowed to enter the hive. Guard bees at the entrance will block efforts of a negatively-charged bee to enter, all of this reinforcing the belief that magnetic and electrical fields have a big part in the life and behavior of a honey bee. Isn't that interesting?"

It was and perhaps would have been more so if we did not have a bit of difficulty in following his words. "Guard bees?" we echoed. "Isn't that a bit far-fetched?" We were thinking that it was, but the Local was right back at us.

"Of course, guard bees!" he insisted. "A beehive will place guards at the entrance to check incoming traffic and to reject unwanted intruders such as yellow jackets, mice, or anything else trying to rob the hive. Guards check the incoming bees and block those not having the smell from that hive. And they mean business. You should see them march up and down at the entrance always on the alert, always doing their duty."

Possibly it was our difficulty in following the Local's words, but we were at the point of total exasperation. "This all might be interesting," we protested, "but it is hardly believable. And what is the point? We are interested in DX here, not bees. Seems that the only time we note bees is when we barbeque and they quickly show up. But most of what you say is meaningless. Just a bunch of assorted information that means little. Very little!"

Maybe it was because we were hearing about things that we did not understand, but our outburst hardly cooled the Local at all. He just smiled and moved even closer, as if he had to hold our attention. "First," he said, "what you get at your barbeque is probably a yellowjacket, which is a wasp and carnivorous. Honey bees are different—gentle, industrious, organized, and fascinating to watch, and very important to many parts of our agriculture. If you would just listen, I think I may have something that will interest you." So we listened.

"You may find it interesting," the Local continued, "to know that bees are sensitive to the Earth's magnetic field. And while the Earth's magnetic field may run with a count as high as 50,000 gamma, a charge of as little as 300 gamma can be noted by the bees. An example of this sensitivity is that bees confined in a cylinder without light, drafts, or reference to topographical features will build honey comb with reference to the local magnetic field. The magnetic field also affects the waggle run that the foraging bees do in their dance to show the distance and direction of nectar-bearing plants. The waggle run is approximate to the Earth's magnetic lines of force. Us a Helmholtz coil to change the diurnal fluctuations in the Earth's magnetic field and you will change the waggle run. That shows something, doesn't it?"

"Interesting," we commented, "but what's the significance?" This one had come prepared. He even smiled at our question.

WE SHIP WORLDWIDE

Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:
212-925-7000
Los Precios Mas Bajos en Nueva York . . .

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.
Saturday & Sunday 10 to 5 P.M.
Monday-Friday 9 to 6:30 PM Thurs. to 8 PM
Come to Barry's for the best buys in town.

ONV Safety belts-in stock

ICOM

IC-R71A, 751A, 745, 28A/H, 38A, 48A, Micro2/4, R-7000, IC-761, IC-375A, 275A/H, 3200A, 475A/H, 735, IC-900

Ring in the New Year
With the best of Barry's New Gear

KENWOOD

TS440S/AT, R-5000, R-2000, TS-940 S/AT, TM 221A/421A, TM-2570A/50A/30A, TR-751A, Kewood Service /Repair, TH 21/31/41 BT, TS-711/811A, TM3530A, TH205AT, TH215A, TW-4100A, TM-321A, TS-140S,TS-680S

Antennas
A-S
Cushcraft
Hy-Gain
Hustler
KLM
METZ
Mini-Products
MULTIBAND
Mosley
MODUBLOX
TONNA

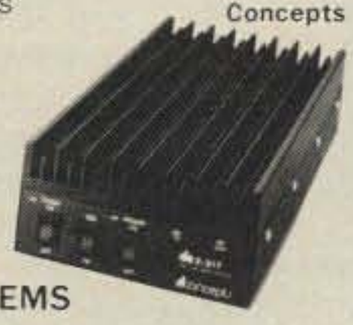
YAESU
FT-23/73/33/727R
FT-2/1/709R/H
FT-1903/1123
FTH-2005/7005

ICOM
IC2AT/12AT
ICO2AT
IC-03/04AT
IC-A2/U16

Land-Mobile H/T
Midland/Standard
Wilson Maxon
Yaesu FTC 1123, FTC 1143
ICOM IC-M5 (Marine) M700
Tempo M-1

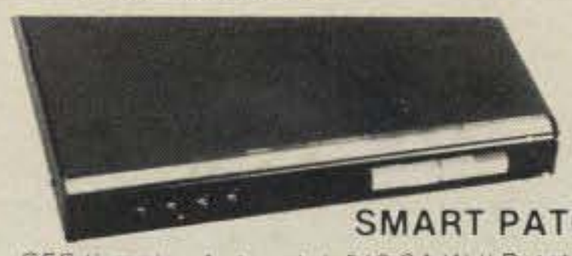
Budwig ANT. Products
NEL-TECH DVK-100 Digital Voice Keyer
FLUKE 77 Multimeter
Media Mentors—
Amateur Radio Course $99.95

RF Concepts

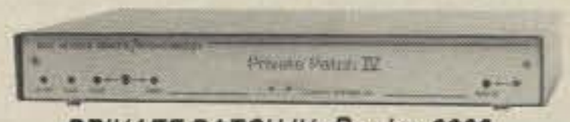


YAESU

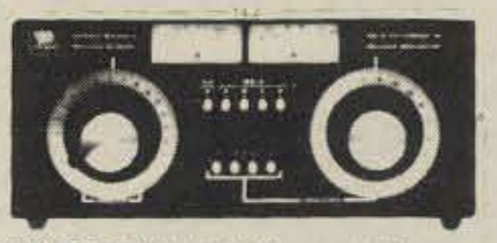
FT-767GX, FT-757GXII, FRG-8800, FT-736, FRG-9600, FT-211/711RH, FT-2700RH



SMART PATCH
CES Simplex Autopatch 510-SA Will Patch FM Transceiver To Your Telephone Great For Telephone Calls From Mobile To Base Simple To Use. 510SA/510SAII



PRIVATE PATCH IV, Duplex 8000



NYE MBV-A 3 Kilowatt Tuner

VoCom/Mirage/Alinco
Tokyo Hy-Power/TE SYSTEMS
Amplifiers &
5/8λ HT Gain
Antennas IN STOCK

AMERITRON AMPLIFIER AUTHORIZED DEALER

Computer Interfaces Stocked: MFJ-1270B, MFJ-1272, MFJ-1224, AEA PK-87, PM-1, PK-232 W/FAX

Yaesu FTR-2410, Wilson
ICOM IC-RP 3010 (440 MHz)
ICOM IC-RP 1210 (1.2 GHz)
ICOM IC-RP 2210 (220 MHz)

SANTEC
ST-222/UP
ST-20T
ST-442/UP
HT-7

MFJ-989B

Soldering Station,
48 Watts, $68
MICROLOG-ART 1, Air Disk, SWL, Morse Coach

Ten-Tec Tuner 229B

KANTRONICS
UTU, KAM, UTU-XT, KPC 2400, KPC IV

HEIL EQUIPMENT IN STOCK

EIMAC
3-500Z
572B, 6JS6C
12BY7A &
6146B

SANGEAN Portable Shortwave Radios

Tri-Ex Towers
Hy-Gain Towers & Antennas, and Roters will be shipped direct to you FREE of shipping cost.

AEA 144 MHz
AEA 220 MHz
AEA 440 MHz
ANTENNAS

BIRD
Wattmeters & Elements In Stock

Complete Butternut Antenna Inventory In Stock!

DIGITAL FREQUENCY COUNTERS
Trionyx, Model TR-1000, 0-600 MHz

AMP SUPPLY STOCKED
Long-range Wireless Telephone for export in stock

BENCHER PADDLES, BALUNS, LOW PASS FILTERS IN STOCK

MIRAGE AMPLIFIERS
ASTRON POWER SUPPLIES
Saxton Wire & Cable, Int'l Wire

New TEN-TEC
Corsair II, PARAGON, Century 22, Argosy II

MAIL ALL ORDERS TO: **BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012 (FOUR BLOCKS NORTH OF CANAL ST.)**

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol"
BARRY INTERNATIONAL TELEX 12-7670
MERCHANDISE TAKEN ON CONSIGNMENT FOR TOP PRICES
Monday-Friday 9 A.M. to 6:30 P.M. Thursday to 8 P.M.
Saturday & Sunday 10 A.M. to 5 P.M. (Free Parking)
AUTHORIZED DISTS. MCKAY DYMEK FOR SHORTWAVE ANTENNAS & RECEIVERS.

Subways: IRT/LEX-"Spring St. Station"
BMT-"Prince St. Station"
IND-"F" Train-Bwy. Station"

Bus: Broadway #6 to Spring St.
Path—9th St./6th Ave. Station.

Commercial Equipment Stocked: ICOM, MAXON, Midland, Standard, Wilson, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters. . .

We Stock: AEA, ARRL, Alpha, Ameco, Antenna Specialists, Astatic, Astron, B & K, B & W, Bencher, Bird, Butternut, CDE, CES, Collins, Communications Spec. Connectors, Covercraft, Cushcraft, Daiwa, Dentron, Digimax, Drake, ETO (Alpha), Eimac, Encomm, HeilSound, Henry, Hustler (Newtronics), Hy-Gain, Icom, KLM, Kantronics, Larsen, MCM (Daiwa), MFJ, J.W. Miller, Mini-Products, Mirage, Newtronics, Nye Viking, Palomar, RF Products, Radio Amateur Callbook, Rockwell Collins, Saxton, Shure, Telex, Tempo, Ten-Tec, Tokyo Hi Power, Trionyx TUBES, W2AU, Waber, Wilson, Yaesu Ham and Commercial Radios, Vocom, Vibroplex, Curtis, Tri-Ex, Wacom Duplexers, Repeaters, Phelps Dodge, Fanon Intercoms, Scanners, Crystals, Radio Publications.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED
COMMERCIAL RADIOS stocked & serviced on premises.
Amateur Radio Courses Given On Our Premises, Call
Export Orders Shipped Immediately. TELEX 12-7670

ALL SALES FINAL

The WPX Program

Mixed

1303	W3FDU	1304	JR1VAY

SSB

1915	IK2DUU	1917	JR1VAY
1916	G4SDJ		

CW

2471	DL4FN	2474	W8LRY
2472	ON7CS	2475	JA4TF
2473	N2AZS	2476	YB2IA

WPNX

231	KA3LOC

VPX

252	OH2-612

Endorsements

Mixed: 450 JR1VAY, VE7OR. 500 JR1VAY, VE7OR. 550 KA6SWI, JR1VAY, VE7OR. 600 KF4FP, KA6SWI, JR1VAY, VE7OR. 650 VE7OR. 700 G4OBK, W9IL. 750 W9IL. 800 W9IL. 850 W9IL. 900 K9BQL, KS3F, I1ZEU. 950 I1ZEU. 1000 I1EEW, I1ZEU. 1050 YU1FD. 1100 YU1FD. 1150 YU1FD. 1200 YU1FD. 1400 I8RFD. 1450 I8RFD. 1500 I8RFD. 1550 I8RFD, SM3EVR. 1600 I8RFD, WA4QMQ, N4UH. 1900 I2PJA. 1950 I2PJA. 2000 I2PJA. 2050 I2PJA. 2100 I2PJA. 2500 W4BQY.

S.S.B.: 350 NG9L, IK2DUU, G4SDJ, JR1VAY. 400 NG9L, IK2DUU, G4SDJ, JR1VAY. 450 NG9L, IK2DUU, G4SDJ, JR1VAY. 500 KT1H, NG9L, IK2DUU, G4SDJ, JR1VAY. 550 KF4FP, IK2DUU, G4SDJ, JR1VAY. 600 IK2DUU, G4SDJ, JR1VAY. 650 IV3MJR, IK2DUU, G4SDJ. 700 G4SDJ. 750 G4SDJ. 950 I1EEW. 1000 IK5ACO. 1100 ZP5JCY, I0PSB. 1150 CX9CO, ZP5JCY. 1200 CX9CO, ZP5JCY. 1250 ZP5JCY. 1300 ZP5JCY. 1350 ZP5JCY. 1400 ZP5JCY. 1450 ZP5JCY. 1500 ZP5JCY. 1550 WA4QMQ, NJ0C. 1800 W4BQY. 1900 I2PJA. 1950 I2PJA. 2000 I2PJA. 2050 I2PJA. 2100 I2PJA

CW: 350 DL4FN, G4SSH, ON7CS. 400 G4SSH, K9BQL, ON7CS, JG2LGM. 450 OZ4RS, G4SSH, ON7CS. 500 G4SSH, ON7CS. 550 G4SSH, ON7CS, PA3BFH. 600 G4SSH, ON7CS, PA3BFH, KJ8M. 650 PA3BEJ, ON7CS, PA3BFH. 700 NF5Z, PA3BEJ, ON7CS, PA3BFH. 750 JH2TPI, PA3BFH. 800 JH2TPI. 850 WA4QMQ. 950 OK3FON, OH3TQ. 1000 OK3FON, OH3TQ. 1050 W1WAI, OH3TQ. 1100 W1WAI, OH3TR. 1850 W4VQ. 1900 W4VQ. 1950 W4VQ. 2000 W4BQY, W4VQ.

10 Meters: OE1KJW, JR1VAY
15 Meters: HI8LC, JR1VAY
20 Meters: WDX4KEF, HI8LC
40 Meters: HI8LC, PA3BFH
80 Meters: WDX4KEF, PY2DBU
160 Meters: ONL-4003

Asia: JR1VAY
So. America: ONL-4003
Europe: DL4FN, OZ4RS, JR1VAY
Oceania: JR1VAY

Award of Excellence Plaque Holders: I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, 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, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, AB90, FM5WD, I2DMK, W4BQY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: DK5AD, W3ARK, LA7JO, W4VQ, K6JG, W4CRW, N4MM, SM0AJU, KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BUS, NN4Q, G4BUE, LU37L/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, K9BG, AB90, FM5WD, SM0DJZ, VE3XN.

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.

One of the greatest joys in DXing is to volunteer as a QSL manager. It really holds your attention. Here is JA1HQG, Ang Arisaka, working on a pile of joy—QSLs for XU1SS. Look at the cards; look at that log. Look at that stack of greenbacks. Look at the smile on Ang's face.

"I thought you would be one who would understand," he said, and we were hard put not to bridle at the presumption in his voice. "But I have been running some experiments and thought you'd like to hear about them. So far, nothing definite but a lot of promise. DX promise, and I am sure that something will work out eventually."

That was what made us apprehensive. Something would be worked out in this world of absolutes and we would not be ready for it. There was a worry that we might be like one of those who were loud in their defense of the a.m. mode when SSB was starting to flourish. We feared we might not understand the new techniques and the new knowledge, all this tending to make us reluctant to relinquish the old. Something told us that it might be best to listen. We did.

"It started last summer," the Local said, "when the XYL told me that she seemed to notice some disturbance at the bee hive in the backyard when we were operating. As the hive was directly under the elements of the beam, I checked to see if there might be a connection. Early on I found that researchers had determined that bees in hives located under power lines tend to show abnormal behavior and irritability. With the backyard bee located under the beam, I thought I might have a problem. That's what got me started."

Having noted in some publications recent reference to low-frequency radiation from high-voltage transmission lines, we were following all that the Local was saying. Maybe we might learn something after all.

"I did a lot of research about honey bees. The research about them being a bit sensitive to the magnetic lines of force got my attention. I got to thinking that there might be something that could work to my benefit. Actually, I did try something, but I am not sure yet about any benefits." This was getting more interesting. Never scoff at a new idea. Sometimes new knowledge brings new countries, or maybe even something better.

The Local continued. "In a bee colony there is a screen between that portion of the hive used by the queen for egg-laying and the upper parts of the hive. The screen is called a 'queen excluder' and keeps the queen out of the upper sections of the hive, this being the area from which honey is taken. The screen is made of parallel wires spaced to allow passage of the worker bees but too close for the larger queen to get through. Maybe I was thinking right, maybe it was just plain luck, but when I ran a wire to ground the queen excluder, I found a grounding radial for the tower. When I grounded the excluder to the radial, something happened. It was quickly noted that when strong signals were coming in on the beam, the bees would adjust their flight path in the direction the beam was pointing. But then I noted that even when the signal was not strong enough for me to read, the bees did. I checked by leaving the beam pointed in the direction from which the bees indicated a signal was coming, and sure enough, within a half hour or so I would hear a DX station. And with the new sunspot cycle just getting on the up-curve, I found I could anticipate DX coming through on 15 and 10 meters. I would just check the bees, note their responses, and listen in the indicated directions." The Local paused, the glory of this discovery affecting his emotions. "I was on to something," he said agitatedly. "I was on to something and then I blew it. Blew it completely." He was not able to continued.

We really were listening to this one. More than one great advance in amateur radio has come unexpectedly, and we were not going to let this one get by us. This was beginning to sound as though there really was something to

The WAZ Program

15 Meter Phone

248	W7AHX	249	N2KW

20 Meter Phone

625	JA1AUJ	627	I1TBE
626	G3SNN	628	N2KW

20 Meter CW

267	K5BDX	269	W1BFT
268	W6ENZ	270	N2KW

All Band WAZ

SSB

3142	W7LK	3145	JR1MOO
3143	JA2NNF	3146	PA0RNO
3144	JF7DZA	3147	IK2AWT

Phone/CW

6165	NN5G	6174	JM1GYG
6166	HA9PP	6175	G3AEZ
6167	ON5BI	6176	AA4NJ
6168	DL1HBT	6177	WB1CNM
6169	I3BQC	6178	KN4KWD
6170	WD9ACQ	6179	PA0UGB
6171	W4OMY	6180	JH1ILX
6172	JH1ORA	6181	HA8XX
6173	ON7CS	6182	WL7K

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. 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 C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

5 Band WAZ

Standings as of October 1, 1987

New recipients of the 5 band worked All Zones:

K8NA
JA6LCJ

The top 10 contenders for 5 Band WAZ are:

1. N4WW, 199
2. K6YRA, 199
3. W8UVZ, 199
4. K9CEB, 199
5. DJ9ZB, 199
6. SP6JCY, 199
7. W2YY, 198
8. K7UR, 198
9. K9GX, 198
10. G4BWP, 198

435 Stations have attained the 150 Zone level.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. 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.

all of the Local's experimentation. We waited for him to continue.

The Local finally got his emotions under control and continued with his story. "I decided to experiment a bit further. I put a second bee excluder on the hive. The first excluder was just above the brood chamber, while the second was at the top of the hive. There were two screens mounted horizontally and with about 3 feet between them. The effect on the bees was even more pronounced. But it was on the higher frequencies that the arrangement really shined; possibly I was getting closer to resonance or something. I could change the flight paths of the foraging bees by swinging the beam, and I was finding stuff on the higher frequencies that others did not even suspect was on. You would be surprised at what I was hearing and working!"

We were already surprised at his story but thirsting for more. We wanted the full story. "Where did you get all this information anyhow?" we asked." That stuff about the voltages and electrolytic condensers, the dipoles and circuit breakers. You didn't just make it up, did you?" Maybe it was not a good question and for a moment we almost lost the chance to look into the future. Finally the Local cooled.

"I'll tell you where I got it," he rasped, and he really had not cooled down all the way. "You can find that voltage and magnetic information in an encyclopedia on bees. Specifically, *The Illustrated Encyclopedia of Beekeeping*. Find a copy and check page 244. That section was written by Professor R.S. Pickard, B.S., Ph.D., who heads the bee research in the Zoology Department of the University of Cardiff in Wales. That's where I got the starting information." The Local stopped to hold his breath and to note what devastation had been wrought by his harsh words. We were wounded but still had some questions to ask.

"But all that about the beam and the towers and the screens. That's your own idea, isn't it?" The Local acknowledged that it was.

"All I'm doing is trying to tell you my experiences," he went on, "in the hope that you would understand and help. That's what I thought, but maybe I was wrong."

We were silent for a moment, thinking that

Here is Yang Guang, the operator at BY8AC. If you look at the wall, you can easily see what kind of QSLs he likes.

no one, and especially a DXer, would ever be wrong thinking like this one did. But we were also thinking of the possibilities if all of this were a valid premise, and we wanted to be among the first to enjoy the benefits. We had to know more. "What else happened?" we asked. It was then we began to suspect that something might not have gone right.

"Well," the Local continued slowly, "things did seem to be working so well that I thought I might even improve the setup. Remember, I had hooked into the ground system. I wondered what would happen if I used the center conductor in the coax, so I made up a coupler hooking the screens to the center conductor. There was even more improvement, and I was sure that I had stumbled onto something. After all, how many DXers are beekeepers? I was sure that I was going to clean up, not only the DX but also the big contests. I would know where the DX was or was going to come from. It would be a definite edge." The Local paused, his shoulders slumping a bit, and he sadly said, "I had it all and I blew it." It was all he said for a moment.

We wanted to know more and we were anxious, but we waited. A DXer knows what it is to be disappointed. You learn early when you work a rare one and then are told "not in the log!" Finally the Local was able to again speak.

"Maybe it all was just too much," the halting words came, "but I had tried to anticipate any problems. I had a working model of the coupler and included was provision to decouple the screens in the hive when I was transmitting. Everything went fine. I really was flying, and then one morning I heard Sam, W6TSQ, holding court on 15. Without thinking, or remembering to decouple the screens, I called Sam. My call to Sam was followed almost immediately by a call from the XYL that something was wrong at the hive.

"It was as though I had turned the hive into a microwave oven. There was little left but melted wax, honey running out of the hive, and barbequed bees. Not only had I destroyed the hive, but I had lost my DX edge. It was a compound tragedy!"

We did not know what to say. "But can't you rig up another hive," we suggested, and the Local shook his head. "I had only the one. I will have to wait until late Spring to start another. I will lose four or five months of top DXing. And that's the worst part of all. Absolutely the worst!"

We tried to help, possibly to draw his attention from his troubles. "You mentioned the matter of the bees having electrical potential," we said. "But how about the magnetic information? Where did you get that?" And while we could share his grief, we also had to think of the future. Someone had to carry on the great work, right?

"Oh that was in a paper written by Dr. Pickard along with a couple of others, a D. Hepworth and a K.J. Overshott. It was published in 1981 in the *Journal Apiculture Res.*, whatever that means. It was entitled 'Effects of the Periodically Intermittent Application of a Constant Magnetic Field on the Mobility in Darkness of Worker Honeybees.' " We were even more believing.

Later we checked with a biochemist down in the Silicon Valley. Guess what he told us. "It is not known to what extent bees use their sensitivity to electric, magnetic, or electromagnetic stimuli in their everyday life. The exact biological mechanisms by which bees respond to these stimuli are also unknown, though a physical explanation regarding the bee as a passive charge-sensitive object could explain many of the observed phenomena. In this event the fields would directly influence the semiconducting properties of the cell membranes and the transport of ions fundamental to biochemistry."

We were stunned. We were stunned even more when he told us he was familiar with Dr. Pickard's work. "Actually, I've known it since it was first published back in 1977," he told us. "I've just been waiting for the time to do some work in that area myself." Then he asked for the call and address of the Local. What do you think of that? And do you think we gave it to him? Ha!

The next time we encountered the Local he was strangely reluctant to talk about things. All we learned was that the bee encyclopedia was authored by a professor at Cornell, first published in England, then in the States. We also learned that its code is ISBN 0-525-24243-0 and its Library of Congress catalog number is #84 72176. Maybe the Local did not learn all the answers, but we were thinking that we might be able to carry things a bit further. It would be appreciated, however, if this information and these concepts are kept to yourself. There might not be enough bees to go around, you know.

International Awards Directory

DX types who keep watching *CQ*'s Awards column will find the new *International Awards Directory* helpful. Ted Melinosky, K1BV, has published the first edition and plans to make it an annual effort.

In looseleaf form, the directory has information and rules for some 680 awards. The first edition runs some 170 pages. You can get more information from Ted Melinosky, K1BV, at 525 Foster Street, South Windsor, CT 06074-2936. Actually, you can get it by first-class mail for less than $15, and an SASE to Ted will bring all the glowing details. If you like awards, you will want this directory.

A DXer in Crete

One can always learn something by knowing what it is to be a DXer in a DX spot. Recently, a note came through from John J. Parrish, SV0FA, stationed with the USAF in Crete. His home call is KA8DYT. John tells of some of his experiences.

"Last night I raised my 'resurrected' 20 meter dipole antenna between two pipe supports,

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 317. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K4CEB	317	W6ID	311	K8PYD	305	N5FW	294	K1VHS	282
N4JF	317	K4XO	311	N4KG	305	K8LJG	292	I8WY	281
W9DWQ	317	N6AR	311	AB4H	304	W0HZ	292	WA4DAN	281
W6PT	316	DJ1XP	311	W0IZ	303	WD9IIC	292	K2OWE	281
ON4QX	316	DL1PM	311	WA8DXA	302	N5DX	291	N4AH	281
K9MM	316	DL3RK	310	YU2TW	301	YU1HA	291	W1WAI	281
N4PN	315	K1MEM	310	I3OBO	301	WA4JTI	290	K7ZR	280
DL7AA	315	OK1MP	310	K3UA	301	W1WLW	289	I5XIM	280
N6AV	315	AA6AA	309	W6SN	300	W4BV	289	W2LZX	280
K6LEB	315	DL8CM	309	WB4RUA	300	N8MC	289	W9NUF	280
W3GRS	314	W9BW	309	W0SR	300	WA2HZR	286	HB9AFI	279
W8KPL	314	N4MM	309	DL6QW	300	NN4Q	286	IT9QDS	279
K6JG	314	DL1PM	308	W7CNL	299	K9BWQ	286	W9WAQ	278
N6CW	313	W9RY	308	K3FN	298	F6CRT	285	DL1QT	277
K9AB	313	W4OEL	307	K9IW	298	K4CXY	284	W9SC	277
SM6CST	313	SM3EVR	307	EA2IA	298	W6YQ	283	KA3R	276
K6EC	312	W1NG	306	DJ7CX	297	G2GM	282	K4SE	275
W4BQY	312	K9QVB	306	WD9IIX	296	JH1VRQ	282	KQ9W	275
W2FXA	312								

SSB

K2FL	317	EA4LH	313	K3UA	307	G4CHP	300	W9TA	289
K6WR	317	OZ8BZ	313	KR9O	306	WZ4I	300	AI9U	288
W6EUF	317	N6AW	313	N4KE	306	WB5TED	300	OK1AWZ	288
VE3MR	317	W8PCA	313	WA0DCQ	306	I2ZGC	300	KI3L	287
DL9OH	317	N2SS	313	KC8EU	306	WA2MID	300	EA3KW	287
I8AA	317	VE7WJ	313	KB5FU	306	NW5K	300	AB9E	287
DJ9ZB	317	K4XO	313	K8CMO	306	WB6GFJ	300	W5LLU	287
W4UG	317	K9BWQ	313	XE1OX	306	JH1VRQ	300	G3XTT	287
N4JF	317	F2MO	312	NY5L	306	PY2DBU	300	XE1MDX	287
I0ZV	317	K8PYD	312	K2JLA	306	WA0TKJ	299	WD9GOV	287
VE1YX	317	W0SD	312	EA1QF	305	I6PLN	299	N8BJQ	286
DJ1XP	317	K9RF	312	NA5W	305	KA8T	299	N3ARK	286
W4EEE	316	K4MQG	312	KZ8Y	305	DJ7CX	298	KS0Z	286
KD8VM	316	I8ACB	312	NS7Z	305	K9SM	298	K9MNT	285
I0AMU	316	K9HDZ	312	K8VFV	305	I8LEL	298	KB5RF	285
F9RM	316	LA7JO	312	W8IMZ	304	JH4PRU	298	KD8V	284
TI2HP	316	OE2EGL	312	XE1J	304	EA9IE	298	WB3HAZ	283
KS2I	316	LU3YL	312	VE7HP	304	XE1NI	298	VE3MV	283
YV1KZ	316	DL6KG	312	W4UNP	304	KC8YM	298	IN3ANE	283
ZL1AGO	316	W8JXM	312	W6NLG	304	K5DUT	297	ZP5JCY	283
W9JT	316	W4SSU	311	CT1UA	304	HP1JC	297	K4JLD	283
VE3GMT	316	K6EC	311	VE7DX	304	YU7KV	297	CX4HS	283
4Z4DX	316	I4LCK	311	W6BCQ	304	XE1OW	297	AE5B	282
W4DPS	316	W0SR	311	WA4DAN	304	K2JF	297	G4GED	282
K6YRA	316	W1LQQ	311	WB3DNA	304	WB3GPR	296	AI9R	282
W3AZD	316	W7FP	311	XE1KS	303	KQ9W	296	TG9EP	282
ZL3NS	316	N6OC	311	W2LZX	303	KB3KV	296	N1ALR	282
W4NKI	316	IV3YRN	310	KB0U	303	W4BQY	296	KC2FC	282
ZS6LW	316	DK2BL	310	K0GT	303	I0SGF	296	F6BFI	281
W9DWQ	316	AA6AA	310	K1MEM	302	K7LAY	295	N2CIC	281
OK1MP	316	WA4JTI	310	N5FG	302	W0IYR	295	K9TI	280
PY1APS	316	9H4G	310	W6FET	302	KK0C	295	ZL1BOQ	280
VE2WY	315	AB9O	310	W2FGY	302	W6MFC	295	G4FAM	280
XE1AE	315	W7OM	310	K9HQM	302	KA9ABC	295	KU9Z	280
W3GRS	315	W2CC	310	I3OBO	302	VE3XO	295	VE6PW	280
W0YDB	315	WA4WTG	310	K9UAA	302	W0ULU	295	KA3HXO	280
I8YRK	315	N4PN	309	KP4EOF	302	I8ZTE	294	KB5DN	279
N6AR	315	K1UO	309	AI8M	302	WD0BNC	294	EA6DE	279
I4ZSQ	315	W6DN	309	WB4UBD	302	I5BDE	294	JH8NYK	279
I8KDB	315	ZL1BIL	309	N5FW	302	K1VHS	294	KX5V	279
W9BW	315	WD9IIX	309	I5EFO	302	WB3CQN	294	K4BYK	278
K9LKA	315	SM4CTT	309	W6BCQ	302	SM6CST	294	VE3IUE	278
N4WF	315	KB8DB	309	I2MQP	302	W4UW	294	KB8O	278
K9MM	315	VK4VC	308	WD8PUG	302	KE4HX	294	KG9N	278
OZ5EV	315	YV5AIP	308	WB4NDX	301	K4SE	293	G4ADD	278
N7RO	315	N6AV	308	WA3HUP	301	KC8JH	293	WB6OKK	278
N4MM	315	AI8S	308	VE3FJE	301	AI5I	293	KB7VD	278
W2SUA	315	N4KG	308	W8ILC/QRPp	301	K4LR	293	WB0UFL	277
OE3WWB	315	K8NA	308	K4CXY	301	W9NUF	293	W4PTT	277
YU1AB	315	W1NG	308	W9OKL	301	AG9S	293	KB0SY	277
OZ3SK	314	G4CHP	308	YU2TW	301	KD5ZM	293	I8XTX	277
YV5DFI	314	W9RY	308	N4CRU	301	WA4LOF	292	N0AMI	276
K6JG	314	KU9I	308	KZ0C	301	AC0A	292	N7ASL	276
CT1FL	314	I8KCI	308	N8BKF	301	VE3FEA	292	WA6DTG	276
W0SFU	314	VE3MRS	308	KZ2P	301	VP9CP	292	WA4OPW	276
VE3XN	314	W6SN	308	KE3A	301	W8LKG	292	KC2RS	276
YS1RRD	314	I4EAT	308	WT4T	301	SV1JG	292	WA9IVU	276
K8LJG	314	VE4SK	307	NN4Q	301	WA2FKF	292	K0HQW	276
W3GG	314	WB1DQC	307	YV1AJ	301	VE3IPR	291	I8INW	275
I2LLD	314	I0MBX	307	K3LUE	301	N5AWS	291	WB1EAZ	275
K9AB	314	KV2S	307	K8ZZU	301	W4JFE	291	VE7BSM	275
K5OVC	314	WD8MGQ	307	K9OVB	300	DU9RG	291	K8NWD	275
W9SS	314	KB9OC	307	I1POR	300	VE3CKP	290	VE5FX	275
ON5KL	313	VK3JF	307	KB9KD	300	KB2HK	290	WA9RCQ	275
EA2IA	313	K9IW	307	KB3OQ	300	VE3DLR	290	KE4VU	275
W8ILC	313	NJ2C	307	VE4AT	300	JA5PUL	289		

This is Bob Kelley, W0BW, the Iowa DX catcher. Bob is in the top echelon of the Honor Roll, his count being 316/363. In the insurance business in Fort Dodge, W0BW is working for any major award that he has not yet nailed down. The photo was taken just after he nailed another for his CW Honor Roll.

these being salvaged from the discards when the MARS station replaced its antennas. Anyhow, I hooked up the TS-430S and started tuning the band. At 1945Z I heard Andy, UQ1GWC, calling for check-ins with the Roundtable DX Net. Not having ever been in a net, I listened a bit and then checked in.

"Andy recognized and welcomed me. I quickly told him that I had never been in a net before, but he assured me that I would catch on quickly. Also, that I would get plenty of training because many stations need Crete for DXCC.

"Andy was not exaggerating. Immediately many stations were calling. The bulk of my signal reports were five-seven to five-nine. How did it feel? I was 10 feet tall, the center of attention, and stations from Brazil, the States, England, and Bolivia told me that things were going well and my simple setup was performing nicely.

"It was evident that even being 'semi-rare' on 20 meters can bring a lot of attention, and it all made me feel good. Unfortunately, orders came in October to transfer me to Germany, and there I will be heard, probably with a DA2 call.

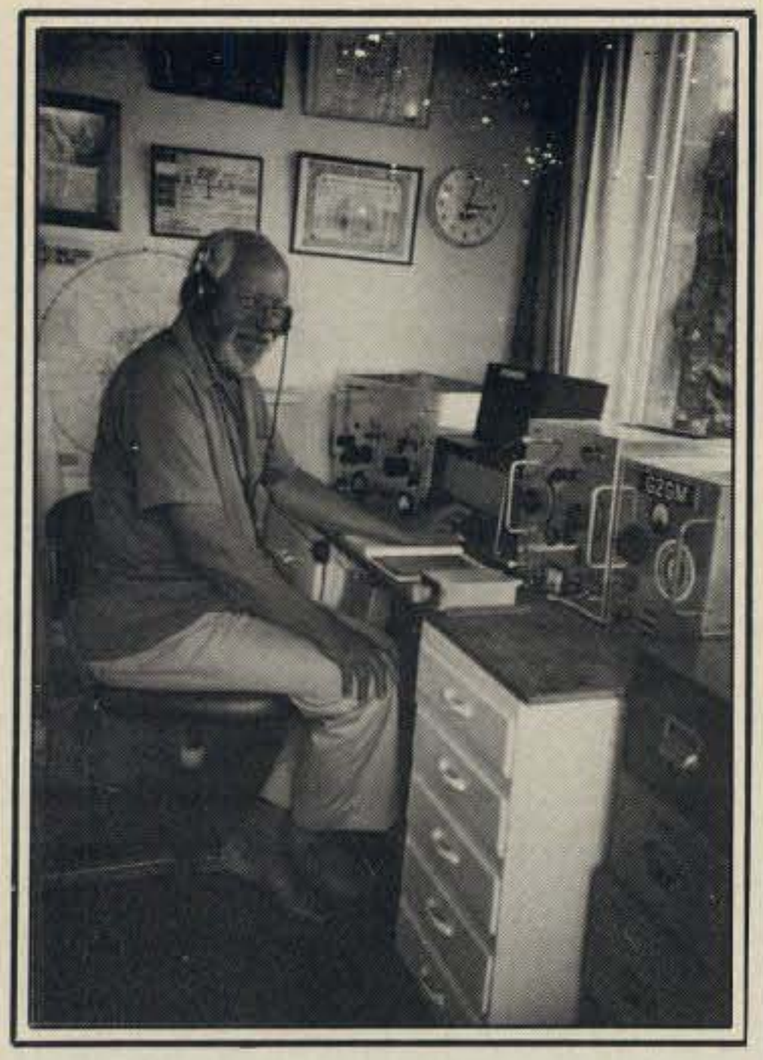
"In some ways this was my introduction to DXing and I really am now addicted. I am planning to work toward some awards, to upgrade my U.S. license, and perhaps to try a few DXpeditions in the Spring. I will be traveling with my unit, and there will be chances for more 'semi-rare' operations.

"I would like to meet more DX stations on the Roundtable Net. It is open every evening at 1930Z at 14175 kHz. Look for me there.—John J. Parrish, SV0FA/KA8DYT"

Often one hears the question "How does one get started in DXing?" It may be hard to remember, but the initial contacts can be a foreboding hurdle. As SV0FA found out quickly, however, there is a lot of excitement for a new DXer working the first ones, though they may not be rare. And there will always be a welcome.

Carl Keske, W8DMD

One of the top DXers, Carl Keske, W8DMD, passed away last Fall. The 1986 Honor Roll listing had Carl in the rarified area that takes longevity, unflagging interest, and a lot of listening. It showed him at the 316 country level. There was nothing higher. His total countries worked was 363.



This is Don Cawley, G2GM, on the Isle of Wight. Back in 1932 he was G5FC and joined the Royal Naval Wireless Auxiliary. He has been tied in with them since. Some say he might be the longest in service with the RNARS. Note that he operates barefoot. Shows what DXing experience does for the Deserving. They know the good life.

W8DMD lived in Cleveland. Harold Babbit; N8EKS, reports that his QTH is being sold and that this true-blue DXer will be remembered by many who worked him over the years.

WAZ

LZ2DF is the fourth to qualify on 160 for the plaque. JR2CFD has the first application in for the 14 MHz RTTY Award. It took five years (1982–87) to come up with the required cards. There is an on-going check of the cards submitted for qualification in the WAZ Award program, W4KA noting the need for attention to ensure the integrity of the award.

French Indian Ocean Islands

Jim Smith, VK9NS, in the Heard Island DX Association bulletin notes that Jean, FR5ES, returned to Reunion a couple of months back and by this time might be headed to the outer islands for more DX activity. Jim says to watch for him to show from Tromelin, Glorioso, and Europa. Jean is consistent in his operating schedules, showing at 7005 kHz most days from 0300Z. He also QSYs to 14220 kHz or 14195 kHz for activity on 20. Last summer Jean was active from Juan de Nova. His QSLing is handled by F6FNU. With the improving conditions you might want to listen for Jean. Possibly sometimes overlooked, the south Indian Ocean is for many W/Ks halfway around the world. Long path or short path, it is sometimes hard to note any difference. Some say that there is not, but the propagation does vary.

It might be noted that F6CZB was due to arrive on Amsterdam Island, and Dany is often found checking to see how things are on 80 and 160. Plans were to work most bands with some listening for QRP activity at 14104 kHz. You can QSL via F6EYS.

CQ DX Awards Program

SSB

1559	KE4VU	1562	I8CNT
1560	HK6BER	1563	WA4WIN
1561	DJ1XP	1564	SM6WAQ

CW

708	DJ1XP	710	W9WAQ
709	N8GG		

SSB Endorsements

310	DJ1XP/317	300	K8ZZU/301
310	VE1YX/317	275	SM6CST/294
310	OK1MP/316	275	K1VHS/294
310	PY1APS/316	275	AI9U/288
310	N4MM/315	275	CX4HS/283
310	OE3WWB/315	275	ZP5JCY/283
310	W2SUA/315	275	N2CIC/281
310	N2SS/313	275	KA3HXO/280
310	K9HDZ/312	275	KE4VU/275
310	WA4WTG/310	250	IK8CNT/257
300	W6SN/308	150	HK6BER/151
300	I8KCI/308	28 MHz	K9HDZ
300	NJ2C/307	28 MHz	K8ZZU
300	KC8EU/306	3.5/7 MHz	K8ZZU

CW Endorsements

310	DJ1XP/311	275	K1VHS/282
310	OK1MP/310	275	W9WAQ/278

Total number of active countries is 317. 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 s.a.s.e. 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.

QRP

Try asking someone what QRP means, and you will get some strange responses. The *ARRL Handbook* of a half-century back had nothing special to say about QRP. Everyone back in those days considered himself a QRPer, some more so. Recent manuals have indicated that the term is somewhat generic for transmitting with less that 10 watts input, 5 watts output. Some even go further, claiming the mantle of QRPp for power down to 1 watt. But in a burst of sagacity, the manual notes that QRP is a relative term when a reasonable antenna system is used. Also noted, 10 watts and a good antenna can be quite effective.

Some might wonder how a DX station can sift out the QRP operator from the normal needy DXer. Five watts and an outstanding antenna system often will work more than a kilowatt with a miserable antenna system. And just because you hear a loud signal does not necessarily mean it is loud in a DX area. Verticals tend to radiate equally in all directions.

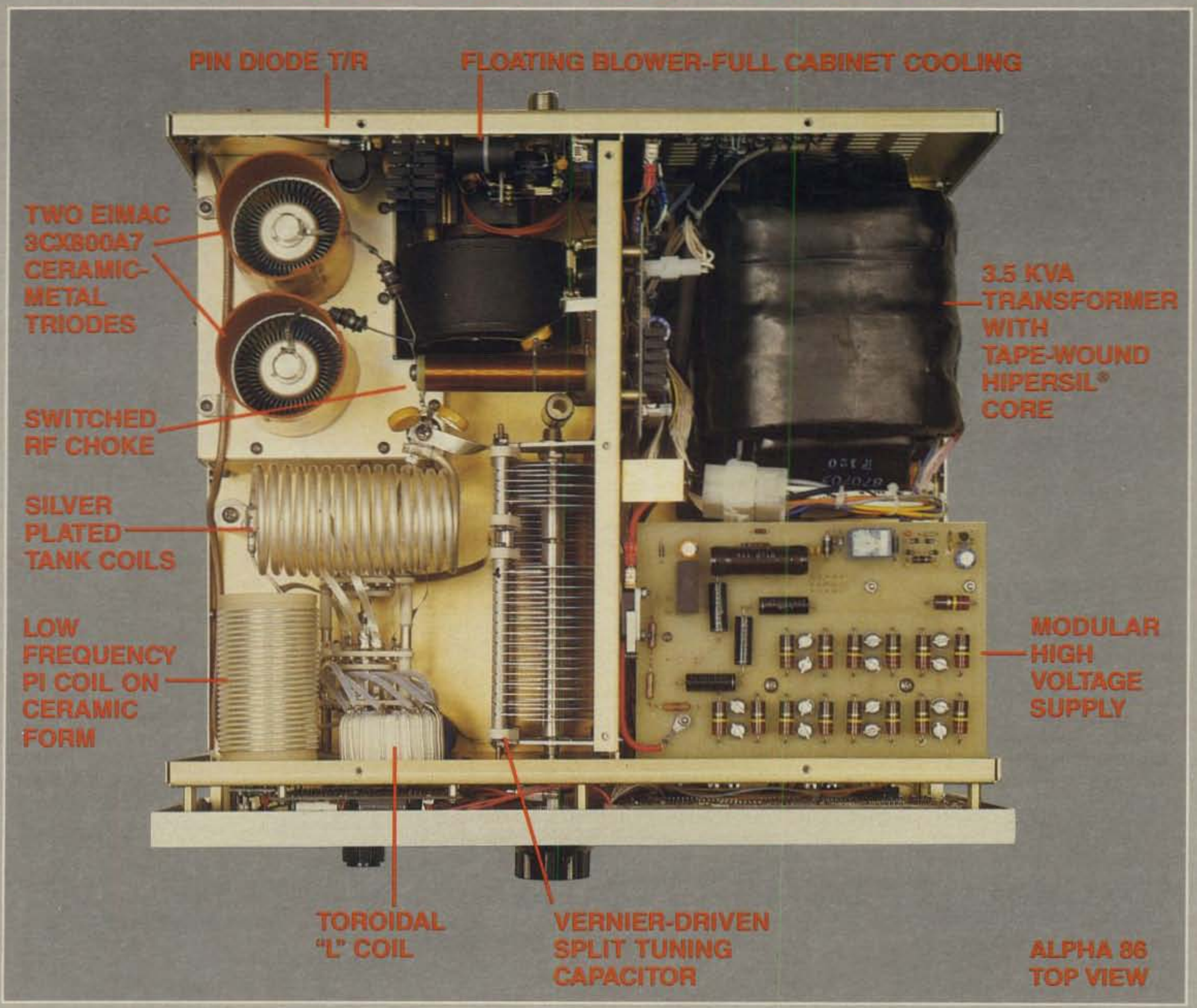
The belief has endured that a DXer should always give special attention to his antenna. Only the best will do. Power is nice, but an array of monobanders is better. Power without a good antenna can be useless. A beautiful antenna with low power can be amazing.

There has long been a feeling that everyone is a QRPer. Everyone believes in his own immortality. Every DXer believes he is a QRPer. Why? Let's just say it is one of the eternal enigmas. QRP is a state of mind.

So what does it mean? Use it as the list of Q-signals reads and it means "Shall I decrease transmitting power?" or without the interrogative it becomes "Decrease transmitting power."

QRO frequently is the Q-signal that DXers love. Go for the gusto!

BIG GUN



The NEW ALPHA 86 — HEAVY ARTILLERY IN A ONE CUBIC FOOT PACKAGE!

- 1.5 kW RF output, no time limit, all modes
- Complete HF coverage from 1.8 MHz
- Truly quick and easy tune-up
- Fast, silent T/R and full break-in
- ETO's exclusive 3 YEAR limited warranty

$2,995 delivered

Sales AND service now factory direct!
For details and illustrated brochure, call or write:

EHRHORN TECHNOLOGICAL OPERATIONS, INC.

P.O. Box 888, Canon City, CO 81212 (303) 275-1613

CIRCLE 130 ON READER SERVICE CARD

Some DX Notes

XU1SS continues to show though his QTH during the last year has been the area of hostilities. Seth is often heard operating the station 14165 kHz after 1200Z Monday through Thursdays and often shows at 14220 kHz on Sundays. Because of limited finances, QSLing can be a burden and a bit of help is appreciated. The QSL route is via Keo Piseth, Box 19-74 Nonthabury, 11000 Thailand. Thailand itself continues to be a bit rare, but Jim Smith on his DX Net notes that HSØA and HSØB have been joined by HSØC. Problems with the Thai telecommunications authorities appear to have been reconciled and activity is allowed every weekend, Friday to Sunday. More improvement is expected to come, but remember that the Thailand stations as well as XU1SS usually are a day ahead, being beyond the international dateline.

Some months back *Inside DX* noted that YU2NA would be in Angola until this March. He has been promised a license and even might be heard. Keep in mind that there has been almost nonstop military fighting in Angola for some years, and any activity could be a sometimes thing. Very little has been heard from the former Portuguese colony since 1979.

The joint USSR/Canada Arctic expedition is scheduled for February to May. This is a trip from the islands on the Siberian Arctic coast to the North Pole. Ten watt transceivers will be used on 40 and 80 by the expedition for communications back to base. Base will be using KW stations; this may help in locating the frequencies. It also may help if you are looking for WAZ Zone 2.

W4FRU is the QSL Manager for ZD9BV. They communicate on QSL business at 21265 kHz at 1755Z usually on Thursday. ZD9BV is on Tristan da Cunha. On weekends Sierra Leone is often found on 40 meters. Watch for 9L1GG who is frequently heard usually after 0600Z.

IK8AUC is returning QSLs for SU1SK, the problem being trying to find out who he is, no identification as a foreign visitor to Egypt being found. Suez Slim! Another one for which some are wondering is 3V8AQ, who gave IK8DYD as QSL Manager. Thomas Jones, K6TS, who worked both, is a bit glum about the prospects for these two. The W6GO/K6HHD QSL Manager List agrees that SU1SK is Slim, but it was still showing IK8DYD as the route for 3V8AQ a couple of months back.

If you worked T77E in San Marino, you can QSL Alvaro via IØMWI. But if you find yourself idling in T32, maybe even VK9, you might think of I96 and then to I94. All of these are spots named in the directions to the Mallard Pub for meetings of the Southeast Michigan DX Assn. The directions include DX prefixes so that things are more easily understood, if you are a DXer. All you have to know is your beam headings or reciprocals. If that does not help you head directly to the pub, you might be interested to know that the club bulletin is named "The Long Path." But be assured, no DXer needs the long path to the local pub. Not since Jameson of Jameson's Irish whiskey acquired Marchese Guglielmo Marconi as a son-in-law.

The Redwood Empire DX Association, the custodian of the Redwood Empire Award, has a new slate of officers, all DXers, naturally. Doug Bender, WAØJRB, is the president; Bruce Butler, W6OSP, vice-president; Bill Miner, W6GH, and Han Alvarnez, W6ZQK, executive board members; and secretary/treasurer Chod Harris, VP2ML. VP2ML will be remembered as the only VP2M who publishes a worldwide DX bulletin. The *DX Bulletin*, of course! Sometimes these things are a bit hard to understand.

If you are looking for assistance with your QSLing, try the DX QSL Associates of Vienna, Virginia. They offer faster and more effective means for getting a needed QSL. They offer insight and information, foreign mint stamps, supplies. Brian Treadwell, WV4V, heads the operation. For information send an SASE to DX QSL Associates, 434 Blair Road N.W., Vienna, VA 22180.

Although we write this in October, by the time you read it the solstice will be at hand and 1988 will be ready to burst upon you. But rain or shine, Frank Anzalone, W1WY, points the way to the action. Check his Contest Calendar and you will find that the Hungarian DX Test is near, the *CQ* WW 160 Meter CW Test is looming, and this will take you right into the French CW Test. A few of Frank's listings will warm you up for the *CQ* WW SSB WPX Test the last weekend in March.

Listen for the first to call "CQ DX" in the coming year. Usually you will hear it one minute after midnight on New Years. Definitely it will be heard before five minutes have passed. And it is all DXing. The best of times in the best of efforts. And with the best of sunspot cycles headed up. Rejoice! The Great Days of DXing are near. Watch from the rooftops at dawn. Listen for the signal out of the east. These Days of DX will never come again.

73, Cass, WA6AUD

DX Ten Years Back

Things were upscale for the needy DXer back in January 1978. A Clipperton effort was firming with F5II, F6AQO, F6BFH, and F9JS joining with HB9AEE and HB9AHL. There were other possible operators, and this one finally ended the long need for Clipperton for many of the Deserving. YU1NZT was reported on the way to Baghdad and would sign YI1BGD. 4U1UN was due to show the first week in February with advance warnings being that the ARRL would not consider it for new country status, some sticking to the belief that 4U1ITU was a mistake which should not be repeated. A Laccadive operation was reported as due, but nothing firm. VE3FXT was ready to put Bophuthatswana on the air.

There was rumor of a new one in the Caribbean. Better than a noonday soap opera, this rumor was strung out for some months. Will it? Won't it? Is it or isn't it? It was, but it took a couple of months to find out what it was, and with Clipperton and Iraq looming, the rumor could not hold center stage. Not until it came on the air, that is.

The Republic of South Africa was back even then noting that Walvis Bay was part of South Africa and had been part of the homeland since 1910. Southwest Africa did not come until South African control in 1922. You should not find that as anything new; they are still arguing. Frank Turek, DL7FT, was winding up an operation in Southern Sudan signing ST0RK. PY7AAI was due on from Fernando de Noronha, and ZS2MI was holding a regular Saturday schedule from Marion Island.

QSL Information

All of the following was compiled with a lot of listening by W9LNZ.

C3ØBBE to OH3TY
C3ØCAN to DF6EJ
C53FC/5U7 to KA1DE
CO5GV to W3HNK
CS8UW to WA3HUP
EI2VNO to NN5O
HD8CQ to KT1N
HX1HVI to FF6URA
IAØKM (Sept. 87) to IØIJ (SSB)
IAØKM (Sept. 87) to IØJW (CW)
IAØKM (all other) to IØIJ
J79MD to N4CRU
J6DX to W8UMD
J79MD to N4CRU
KA2HH/JD1 to K3LTV
KG4GN to AA6AC
KL7LF/KH3 to KL7VZ
KP4FI to NP4NX
N3JT/HKØ to W2GHK
N4FD/V47 to W4MGX
OH2BDA/OHØ to OH2BDA
P4ØA to KA1XN
SU1SK to Suez Slim
T32BE to WC5P
T77E to IØMWI
T77Q to IV3SUS
TJ1CH to F6FNU
TL8DN to N2AU
TU4BR/5U7 to KN4F
V44KI to NØDH
VP2E/N3JT to W2GHK
VU4ADR to K2ON
VU4NRO to K2ON
V31A to K5RX
V31ET to K5RX
V31JS K5RX
W3WKP/VP9 to W2WKP
WY5LU/KH3 to N5DAS
YBØDPO to YCØDPO
YEØS to YBØDOG
ZK1XO to KA1NLE
ZL7TZ to CBA
ZP5PX to W3HNK
4KØE to UA1AFM
5T5NU to F6FNU
8P6RE to KC3EK
9H3DX to DF2UU
9QØDH to KC4NC
9Y25VU to W3EVW
9Y4Z to NQ4I
CEØGHO to IK8EOY, Sergio Caldarola, Via Napoli, 81043, Capua, Italy
CT3EU to Dick King, Box 1, Norwich, NR2 1PL, England
EP2DL to Dave, Box 17845-151, Teheran, Iran
DX Bulletin to Box 60, Fulton, CA 95439
KA2M/HC5 to Box 640, Stony Brook, NY 11790
SV/Mt. Athos (9/87) to SV2SV, EPBE Club, Box 10483, Thessaloniki, Greece
QRZ DX Bulletin to Box 832205, Richardson, TX 75083
T77E to Stefano Ciprani, Via Q.Majorana N. 118, 00152, Roma, Italy
T5GG to Box 62, Mogadishu, Somalia
TA4B to P.O.B. 88, Aydin, Turkey
WA5FFK/HR5 to Box 303, San Pedro Sula, Honduras
XU1SS to Keo Piseth, Box 19-74, Nonthabury, 11000 Thailand
ZB2IP to Box 392, Gibraltar
ZF2JI to John Attaway, Box 205, Winter Haven, FL 33883
ZK2JT to Box 37, Niue Island, via New Zealand

"I convinced my club to buy an ACC repeater controller, and I'm glad I did"

Our group decided to upgrade our repeater system and I was the one asked to investigate.

We've always tried to have the best system around so it was time to make some changes. We needed a control system that was reliable, easy to hook up, cost-effective, and something that would free the technical guys for more interesting projects than just keeping the equipment running.

Everyone in the club put a few bucks into the pot and it was ours!

We've found the voice messages and telemetry make using the repeater more fun. The convenience of remote programming and automatic scheduled operation is remarkable. Not to mention the most sophisticated autopatch ever designed for amateur use. Later we added the Digital Voice Recorder for personalized IDs, bulletin boards, and voice mail.

ACC's products are state-of-the-art commercial quality and built to last. Workmanship so solid even the military uses them.

What impresses me even more, though, is the support we get from the staff at ACC – both before and after the sale. And they protect our investment through simple plug-in software and hardware upgrades . . . new features and capabilities that keep our club on top.

I feel good about recommending Advanced Computer Controls' repeater controllers. After all, it's *my* club's money that was spent and *my* reputation that was on the line.

acc advanced computer controls, inc.

2356 Walsh Avenue • Santa Clara, California (408) 727-3330

CIRCLE 131 ON READER SERVICE CARD

Ham Shop

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are 60 cents per word. Boldface words are $1.20 each (specify which words). Minimum charge $2.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Non-commercial ads free to CQ subscribers, as space permits, maximum 3 lines each. All ads must be typewritten double spaced. Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

HOMEBREW PROJECTS. SASE for lists. WB2EUF, Box 708, East Hampton, NY 11937.

POST CARD QSL KIT. Converts Post Cards, Photos, to QSLs! Stamp brings circular. K-K Labels, P.O. Box 412, Troy, NY 12181-0412.

SCHEMATICS: Radio receivers 1920's/60s. Send Brand-name, Model Number, SASE. Scaramella, P.O. Box 1, Woonsocket, RI 02895-0001.

ATLAS RADIO is here to repair the Atlas 180, 210X, 215X, 350XL RX/TX Series of equipment. Complete replacement parts, manuals, updates, service available. Please call or write for more information. Watch for new models coming. Export inquiries invited. Atlas Radio Company, Inc., Post Office Box 763, Lynbrook, NY U.S.A. 11563. Telephone number (516) 678-3904. Thank you.

HAM Programs for IBM-PC, C-128, C-64, VIC-20, Plus/4, TI99/4A, Apple. Send legal SASE. EPO SOFTWARE, 7805 N.E. 147th Ave., Vancouver, WA 98682.

SURPLUS PARTS! Must make room in house. GRAB BAG specials $2.00. Send SASE or call (916)-363-7462. A. Hesse, 322 Mather Blvd., Mather AFB, CA 95655.

FLORIDA QTH with Antenna Farm: 3 bedroom, 2 bath, 1650 sq. ft. in excellent condition, $85,500. W4AFS, Pompano Beach, FL 305-782-4898.

RANGE BOOSTER FOR HAND-HELDS! We've got the simplest, most inexpensive way to increase the reception range of your hand-held transceiver or scanner. Just replace that "rubber duckie" antenna with a Universal Full-Length Antenna from Grove. Standard BNC base; adjustable from 7 to 46 inches. *Guaranteed* to increase range; instructions included. Order ANT-8, only $12.95 plus $1.50 US shipping from Grove Enterprises, P.O. Box 98 CQ, Brasstown, NC 28902. Mastercard, Visa, COD call 1-800-438-8155.

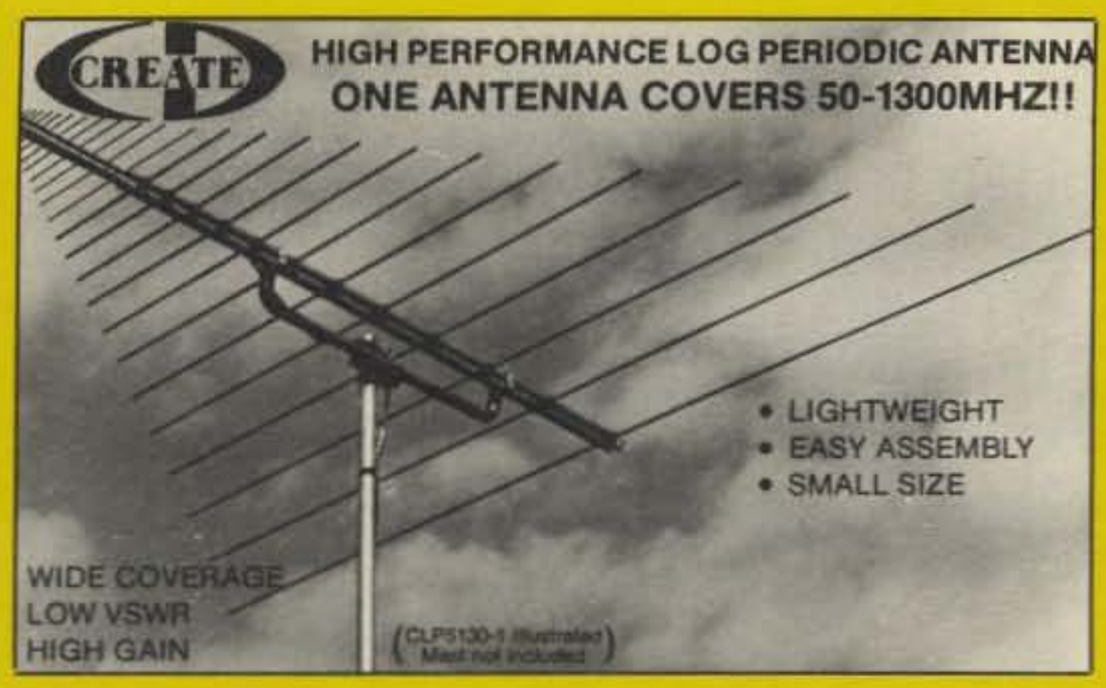
NEW QUICK CHARGE "AA" NiCads ten for $11.00 plus shipping. "AAA" NiCads just $1.65 each. Amphenol PL-259 connectors just 80 cents each. R. Richard, 1787 Village Green Drive, Clairton, Pennsylvania 15025 (412-655-7494).

"HAMLOG" COMPUTER PROGRAMS. 17 modules. Full features. Auto-logs, 7-band WAS/DXCC. Apple $19.95. IBM, Kaypro, Tandy, C-128 $24.95. KA1AWH, PB 2015, Peabody, MA 01960.

HAMS: USE AIRMAIL POSTAGE not IRCs. Many countries, monthly bargains. List. Large SASE. William Plum, 12 Glenn Road, Flemington, NJ 08822.

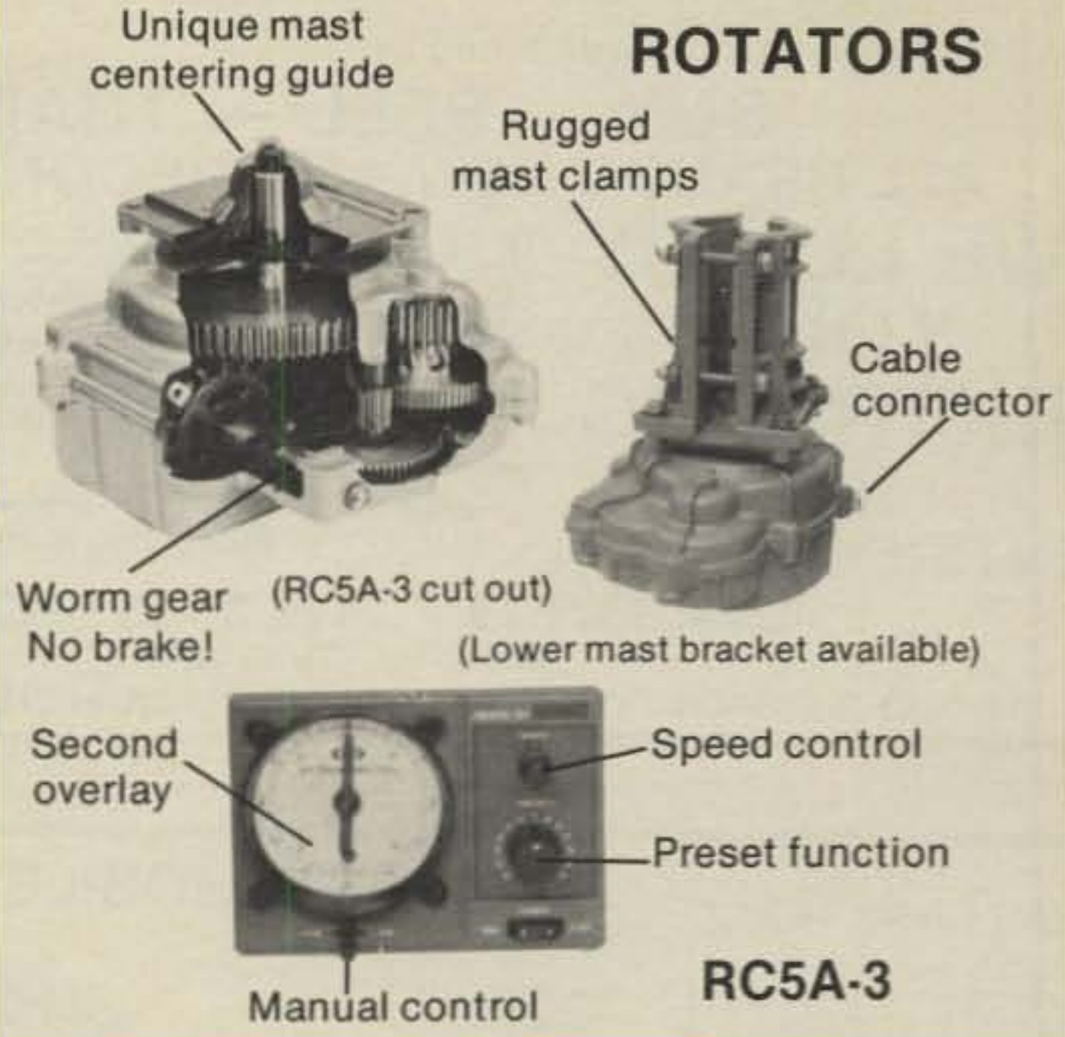
FOR SALE: Two Model 35 ASR with paper winders. One model 28 ASR. Radio set TRC-8. WA4SGW (919) 488-0682.

FOR SALE: 900 MHz preamps and power amps. Write or phone for information. W2WHK, 210 Utica St., Tonawanda, NY 14150 (716-692-5451).



CLP5130-1 50-1300 MHz 25 el. 500W 6′ Boom $199 UPS
CLP5130-2 105-1300 MHz 20 el. 500W 4′6″ Boom $119 UPS

Operate on 6m, 2m, 1¼m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are precut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.



RC5-1	10 sq. ft.	**$229**
RC5-3	10 sq. ft. preset	**$299**
RC5A-2	25 sq. ft.	**$373**
RC5A-3	25 sq. ft. preset	**$436**
RC5B-3	35 sq. ft. preset	**$736**

(All rotators are UPS shippable)

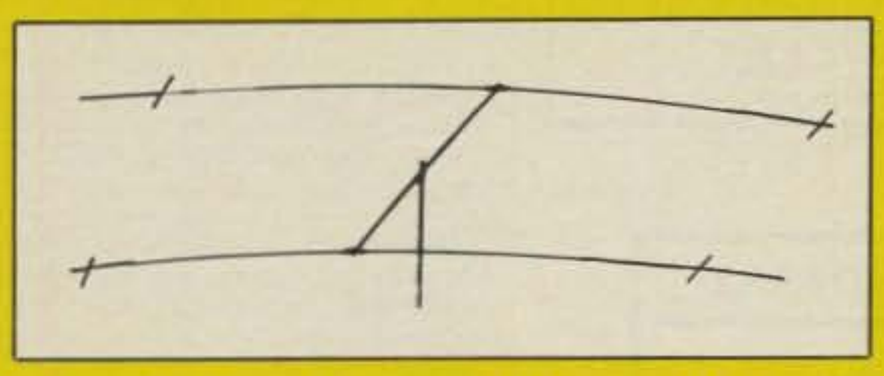
See Lew McCoy's Review In August 1987 Issue Of CQ.

CREATE

Creative Design Co., LTD.®

CV-48 is a ruggedly built 40 and 75 meter vertical. Overall length of 40′8″ means full size performance on 40m. Antenna comes with radial system. An optional adaptor for 80m is available. Handles 2KW PEP.

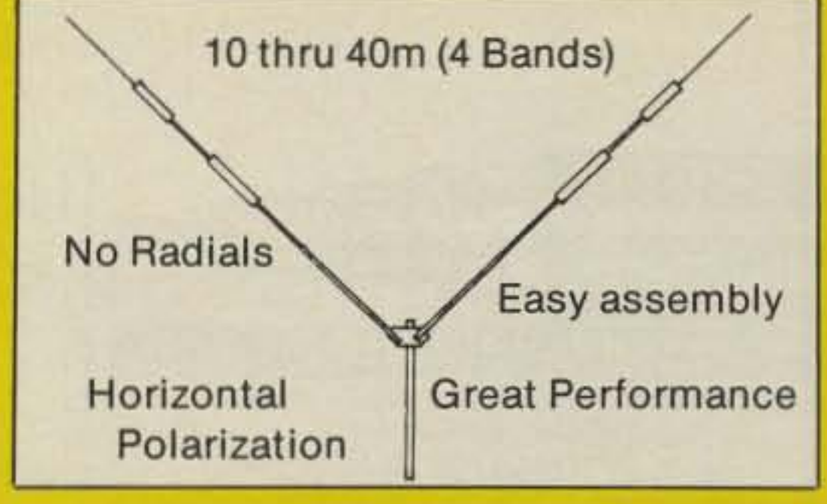
CV-48 $251 UPS AD-385 (adaptor) $63



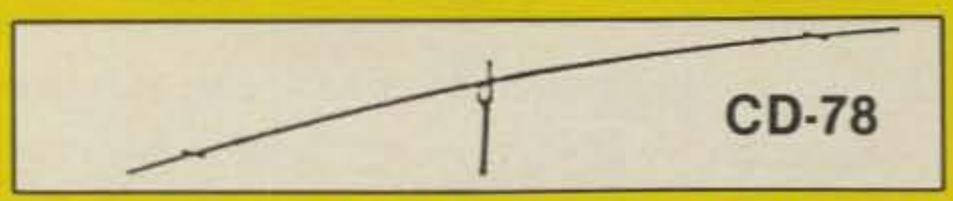
Unique 2 element phased arrays offer excellent gain and front to back ratio compared to standard parasitic antennas.

AFA75-1	**75 meters 29′6″ boom**	**$1842**
AFA40	**40 meters 16′8″ boom**	**$ 344**

730V-1



The 730V-1 is a V-dipole consisting of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. **$148 UPS**



Rotatable dipole for 3.5 MHz and 3.8 MHz is 58 feet long. Tuning unit allows operation on 3.5 MHz.

$418 UPS

Prices do not include shipping.

ALSO AVAILABLE: ROOF TOWERS • MONOBANDERS • TRIBANDERS • TOWERS • DUALBANDERS • COMMERCIAL

All Create Antennas Are Manufactured With High Quality, Heavy Duty, Precision Aluminum Tubing For Easy Assembly And Long Life.

TO ORDER CALL
1-800-255-7020, or in CA 818-888-4950

(Specifications and prices subject to change without notice or obligation) **FAX 818-888-5112 TELEX 697-4899**

Orion HI-Tech

ORION HI-TECH
P.O. Box 8771
Calabasas, CA 91302

CIRCLE 178 ON READER SERVICE CARD

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information $1.00 (refundable with order). Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned, weekday net, 14.260 MHz, 1:00–3:00 PM Eastern. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $21.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. $2.00 minimum order. W6LS, 2814 Empire, Burbank, CA 91504-3297.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504-3297 brings data sheet.

CLANDESTINE CONFIDENTIAL NEWSLETTER. Latest info on secret broadcasters. Six issues $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, Rt 11, Box 499 #1201 South, Birmingham, AL 35210.

HAVE AM CAPABILITY? Join SPAM (Society for Promotion AM). Membership is free. For free info send SASE to: SPAM, c/o F. Dunlap, WA5TWF, 14113 Stoneshire, Houston, TX 77060.

HAM RADIO REPAIR! Tube through solid state. Robert Hall Electronics, Box 8363, San Francisco, CA 94128 (408-729-8200).

HAM TRADER YELLOW SHEETS. In our 26th year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate—no long wait for results. Send #10 SASE for sample copy. $12 for one year (24 issues). P.O.B. 2057, Glen Ellyn, IL 60138-2057.

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog $2. CBCI, Box 31500CQ, Phoenix, AZ 85046.

DXPEDITION to Montserrat only $300/week. Details: VP2ML, Box 4881Q, Santa Rosa, CA 95402.

COMMODORE CUSTOM CHIPS for C64/128 Computer/Peripherals at low prices, 24 hour delivery: 6510—$9.55, 6526—$9.95, 6567—$14.75, 6581—$12.85, PLA—$12.50, All 901 ROMS at $10.95 each, and many others. "THE COMMODORE DIAGNOSTICIAN," a complete chart for fixing Commodore computers, etc. An absolute must, $6.95 pp. HD Power Supply for C64—$27.95. Send for complete chips/parts catalog. VISA/MC. Kasara Microsystems, Inc., 36 Murray Hill Drive, Spring Valley, NY 10977. Phone 1-800-642-7634, 800-248-2983 (outside NY) or 914-356-3131.

DIGITAL AUTOMATIC DISPLAYS for FT-101's, TS-520's (DG-5 clone), Collins, Drake, Swan, Heath, and all others. Six ½" digits. 5" wide by 1¼" high metal cabinet. Reads receive and transmit frequencies. Send $2.00 for information and receive a $30.00 discount. Includes comparison of the simple "BCD" readouts, found in new radios, against our very accurate "Calculating Frequency Counter" readouts. Please be specific. GRAND SYSTEMS, Dept. D, POB 3377, Blaine, Washington 98230.

LEARN CODE on your IBM-PC (or compatible), or Commodore C64/128. CODE-PRO takes you from no knowledge to proficient copy. $10 plus $2 S&H. Specify computer. TRIO TECHNOLOGY, Dept. 863, P.O. Box 402, Palm Bay, Florida 32906.

CODE CIPHER MACHINES WANTED! Historian buys code/cipher devices, espionage radios, manuals, etc.! All periods! Melton, Box 5755, Bossier City, Louisiana 71171 (318-798-7319).

MARCO: Medical Amateur Radio Council, Ltd. operates daily and Sunday nets. Medically oriented amateurs (physicians, dentists, veterinarians, nurses, physio-therapists, lab technicians, etc.) invited to join. Presently over 550 members. For information, write MARCO, Box 73's, Acme, PA 15610.

CONVERT YOUR CB (SSB type) to transceive any ham frequency with the flick of a switch—4 types of kits available. Send $2.00 for details to: J & J Electronics, 12008 Riverhills Drive, Tampa, Florida 33617.

"SCHOOL RADIO PROGRAM" needs your help. Donation of transmitter and receiver greatly appreciated. J.H.S. #50, 183 South Third Street, Brooklyn, NY 11211. A. Krantzberg will pick up. Call (718) 387-4184.

QSL CARDS. 100 for $8. Fast Service. Free Samples. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072.

Ham Lab Project. Want Several Pieces HP G-382A Variable Attenuator. Will consider any repairable condition. K6GOX, P.O. Box 10, O'Neals, CA 93645 (209) 868-3548 collect.

HELP please. Junior High School radio program needs your donations of unwanted equipment, parts, books, etc. Please contact G. Skloot, KE2N, Junior High School, 180 320 Beach 104 Street, Rockaway Park, New York 11694.

CODE PROGRAMS. Apple/C-64. 37 Modes. LARESCO, POB 2018, 1200 Ring Road, Calumet City, IL 60409 (1-312-891-3279).

CABLE TV CONVERTERS. "NEW" Zenith flash, Scientific Atlanta, Jerrold, Oak, Zenith, Hamlin. Many others. **"NEW" VIDEO HOPPER "The Copy Killer", Visa, M/C & AMEX 1-800-826-7623.** B&B Inc., 10517 Upton Circle, Bloomington, MN 55431.

ATTENTION WRITERS: Manuscripts wanted on a wide variety of communications and monitoring subjects. SASE brings want list or send your suggestions, resume, credits. Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

COMMODORE REPAIR. Largest Authorized Service Center in the country. Low prices on all computers (e.g., C64—$39.95 parts/labor) 72-hour turnaround. Kasara Microsystems, Inc., 36 Murray Hill Drive, Spring Valley, NY 10977. Phone 1-800-642-7634, 800-248-2983 (outside NY) or 914-356-3131.

C128 HAM CONTEST AND LOGGING SOFTWARE. Fast sort and list of contacts. SASE for description; $24.95 for programs. Dave Kirk, KY3J, 1914 Yardley Road, Yardley, PA 19067.

ATTENTION!!! Any amateur radio operators interested in forming a new type of amateur radio club. For information please send $2.00 to cover postage to KA3RET, P.O. Box 96, Uniontown, PA 15401.

QSLs, QSLs, RUSPRINT QSLs: Quantities of 100, 200, 300, more. Full color Old Glory and Cartoon, also Parchment, Golden Eagle, and others. SASE appreciated. Rt. 1, Box 363-CQ, Spring Hill, Kansas 66083.

SUPERFAST MORSE CODE SUPEREASY. Subliminal cassette, $10. LEARN MORSE CODE IN 1 HOUR. Amazing new super-easy technique, $10. Both $17. Moneyback guarantee. Free catalog: SASE. Bahr, 2549-D7 Temple, Palmbay, FL 32905.

CHASSIS, CABINET KITS. SASE. K3IWK, 5120 Harmony Grove Road, Dover, PA 17315.

ANOTHER DAY with *an empty mailbox?* Improve your QSL returns with Secrets of Successful QSL'ing by Gerry L. Dexter. *This complete guide to reception reporting and QSLing SWBC,* Utility, ham, and medium-wave stations covers everything from basics to advanced techniques. Just $9.95 plus $1 s/h, $2 s/h foreign orders, U.S. funds only. Order now from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

WANTED: BOOKS, Pre-1925 Radio, Pre-1900 Electricity and Telegraph, Pre-1940 Television, Books, Magazines, or any other literature. Jim Kreuzer, N2GHD, 6270 Clinton, Elma, NY 14059 (716-681-3186).

TENNATEST ** ANTENNA NOISE BRIDGE.** Outperforms others. Accurate. Costs less. Compare 1–40 MHz $44.00; 1–150 MHz $72.00. Satisfaction guaranteed. Send stamp for details. W8URR, 1025 Wildwood Road, Quincy, MI 49082.

AZDEN SERVICE by former factory technician. Fast turnaround. PCS-300 NiCads $34.95. Southern Technologies Amateur Radio, Inc., 10715 SW 190 St. #9, Miami, FL 33157 (305-238-3327).

rf enterprises

• We Specialize In Antennas & Towers. • We Ship Worldwide.

TEN-TEC

Model 585 PARAGON
NEW! 200W Full featured HF Transceiver.

OTHER TEN-TEC PRODUCTS:
Model 561 Corsair II
Model 425 Titan Linear Amplifier
Model 579 Century/22 - 50W CW Transceiver
Model 229B 2KW Antenna Tuner
Model RX-325 General Coverage Receiver
Model 2510 Satellite Station
Model TT-920 VHF Aviation Transceiver

Full line of filters, power supplies and accessories in stock.

ASTRON POWER SUPPLIES

Rack Mount and Speaker Models In Stock!

RS-4A	$36.95	RS-7A	47.95	RS-12A	67.95
RS-20A	84.95	RS-35A	129.95	RS-50A	186.95
RS-20M	102.95	RS-35M	146.95	RS-50M	206.95
VS-20M	119.95	VS-35M	169.95	VS-50M	224.95

TUNERS

TEN-TEC 229B (SPECIAL: $269.)

MFJ 989B (SPECIAL $289)

AMERITRON

AMP SUPPLY

NYE VIKING
MB-V-A

AMPLIFIERS

MIRAGE
AMERITRON

RFC 2-317

concept
TEN-TEC

AMP SUPPLY

LK-500ZB

TOKYO HIGH POWER

SANTEC FM-240 & FM-270

SANTEC ST-20T

ALPHA DELTA DELTA-4 SWITCH

BENCHER

WELZ

TR-110
AMP-SUPPLY
MONOBAND TRANSCEIVER

ANTENNAS

cushcraft

RF ENTERPRISES HOLIDAY SPECIAL!

THE CUSHCRAFT "A4-SS"

We're offering the Cushcraft A4, 4-element, triband beam **with** the stainless steel hardware kit for **$319.00**
Own one of the best tribanders in its class (with stainless steel added) and save.

A744 Add-on Kit With Stainless: $79.00
Limited quantity. Order now!

Contact us for all your Cushcraft needs.
We've got what you want — when you want it.

hy-gain

Tribanders
TH7DXS, TH5Mk2S, Explorer-14, TH3Jr

Monobanders
204BAS, 205BAS, 115BAS, 105BAS

VHF & OSCAR BEAMS
VERTICALS: HF & VHF
Call For Prices!
Complete Telex/Hy-Gain Inventory

BUTTERNUT

HF6V	$115.00	HF2V	$112.00
RMK II Kit	49.95	STR II Kit	29.95
TBR-160S Coil	47.95	SC-3000 Antenna	54.95

KLM

KT34A	$395.00	KT34XA	$585.00

Monobanders: 80-10 Meters!
Full Line VHF/UHF Antennas!

Mosley

TA-33	$249.00	TA-33Jr	199.00	CL-33	284.95
TA-40KR	89.95	PRO-57	479.00	PRO-67	619.00

ALPHA DELTA

DX-A.....$46.95 DX-DD....69.95 DX-KT....27.50
NEW! DX-CC All band dipole.....$79.95

HUSTLER

6BTV	$127.95	5BTV	106.00
G6-144B	86.95	G7-144	114.95

Complete HF Mobile Systems. CALL!

Larsen TONNA

ROTORS

TELEX		KENPRO	
HDR-300	CALL	KR-400/-400RC	$149.00/174.95
T2X	CALL	KR-600/-600RC	234.95/249.95
HAM IV	CALL	KR-500/-500B	189.00/259.95
CD 45 II	CALL	KR-2000/-2000RC	449.95/479.95
AR-40	CALL	KR-5400A/-5600A	315.00/399.00

ALLIANCE HD-73.....$109.00 U110.....$49.95

TOWERS

HY-GAIN

Crank-up, self-supporting, galvanized steel towers. SS rated at 9 ft; HD at 16 ft.

HG-37SS, HG-54HD — **CALL Free Shipping** — HG-52SS, HG-70HD

ROHN

Self-supporting: Ratings: HDBX at 18 ft, HBX at 10 ft, BX at 6 ft.

HBX 40	CALL	HDBX 40	CALL
HBX 48		HDBX 48	
HBX 56		BX 64	

Galvanized steel with base and rotor plate.
Today's best buy. Freight additional.

GUYED TOWERS: Complete and ready to install.
25G, 45G, 55G & all accessories.
Call for current pricing.

FOLD-OVER TOWERS:

FK2548	CALL	FK2558	CALL
FK2568		FK4544	
FK4554		FK4564	

Prices 10% higher in western states.

ROOF TOWERS & CLIMBING BELTS.....Call!

TOWER HARDWARE

Guywire: 3/16EHS / ¼ EHS, per ft.	$0.15/0.18
CCM Cable Clamps: 3/16 / ¼	0.39/0.49
Turnbuckles: 3/8" E & E/E & J	6.95/7.95
½" E & E/E & J	12.95/13.95
Thimbles: ¼" (3/16 & ¼" cable)	0.39
Earth Anchor: 4 ft. Screw-in	13.95
Preformed "Big Grips": 3/16 & ¼	2.49/2.99
Guy Insulators: 500 D/502	1.69/2.99

PHILLYSTRAN GUY SYSTEMS

HPTG-2100/-4000/-6700 Cable	0.24/.40/.67
Cable Ends: 9901LD/9902LD	7.95/9.50
Socketfast Potting Cmpd	14.50

WIRE & CABLE

BELDEN COAX

9913 low loss	$0.44/ft.	RG-8X (9258)	0.19
RG-213/U (8267)	0.42	RG-11A/U (8261)	0.39
RG-8/U (8237)	0.34	RG-58A/U (8259)	0.14
RG-8/U (8214)	0.37	RG-59/U (8241)	0.15

450 Ohm Ladder Line	0.10
450 Ohm Open Wire Line (500' Spool)	$80.00

COPPERWELD ANTENNA WIRE

Solid: 12 ga	0.10	14 ga	0.08
Stranded 14 ga	0.10		

Plus Wide Selection, Baluns, Insulators, Accessories

ROTOR CABLE

Std (6-22, 2-18)	0.19	Hvy (6-18, 2-16)	0.35

Others in stock.

AMPHENOL CONNECTORS

PL-259: std/silver/teflon	0.89/1.25/1.45
UG-21B (8261) Type N Male	2.95

T's, angles, adaptors, jacks, & BNC in stock!

COAX AVAILABLE IN PRECUT LENGTHS WITH CONNECTORS ATTACHED.

ANDREW HELIAX & CONNECTORS

½" LDF4-50A.....$1.75 7/8" LDF5-50A.....$4.00

THANK YOU.....To our customers around the world who are now our friends. We express our gratitude to you for allowing us to serve you this past year. We wish you the happiest of holidays & many fine QSO's in 1988.
Ralph - KØIR George - ADØS

VISA MasterCard Discover Optima

RETURNS REQUIRE AUTHORIZATION & SUBJECT TO RESTOCKING CHARGE

Prices subject to change without notice.

Minnesota residents add 6% tax.

Shipping additional except as noted.

TO ORDER:
1-800-233-2482
INFORMATION, TECHNICAL, MINNESOTA & DX:
218-765-3254
TELEX:
4933032 RFE UI

rf enterprises
HCR Box 43
Merrifield, MN 56465
(Located at Junction of 3 & 19)

CIRCLE 41 ON READER SERVICE CARD

FOR SALE: Trimm "Featherweights" very high impedance magnetic headphones, like-new cond., $18 plus postage. Replacement cloth-covered headphone cables, $2 ea. plus postage. Lash, 19 E. 157 St., So. Holland, IL 60473.

WANTED: BC-1016 Undulator Unit, YAESU FT-225RD w/memories and YAESU memory option for FT-625RD. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883.

FOR SALE: James Biddle Cat. #21159 Megger, $395. Ballantine Mod. 300 AC Voltmeter, $20. Heath V-6 Vacuum Tube Voltmeter, $25. Heath Smoke-Burglar Alarm, Heath S-2 Electronic Switch, converts single trace oscilloscope to dual trace, $20. Heath T-3 Visual-Audio Signal Tracer, $30. Hewlett-Packard Mod 400C AC Voltmeter, $20. Industrial Instruments RN-1 Resistance Bridge, $20. Cornell-Dubilier Capacitance Decade, no manual, $10. Phillips PC-200-M-1 120 VAC to 12 VDC, 20 amp output converter/charger, $20. Antenna specialists M-103 AM/CB Whip, $5. Q-Tran Balun for dipole antenna, $12. Master Mobile Bumper Spring & Quick Disconnect, $5. Most with manuals. U pay shipping. T.K. Brown, RDI Box 225, Forksville, PA 18616.

J-38 and other J-SERIES keys wanted. State model, condition, and prepaid price. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: Parts for Hallicrafters SX-28. Manual and or schematic for Heath DX-20. Q.R. Galbraith, K5TVC, 4303 Kingsway Dr., Farmington, NM 87401.

WANTED: Round S-Line, 51S1, aluminum tower sections. Sell 2.2 kHz, 6-pole, 9 MHz SSB filters $20. T.N. Colbert, WA8MLV, Burton, OH 44021.

DUMMY LOAD KIT, 100 watt noninductive 52 ohm air-cooled good to 450 MHz $15.95 p.p. Maximilian Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: Hy-Gain TH7DX, Drake L-7, Bird 43, Kenwood TH-215A, ICOM IC-560, GC-4 Clock, Passport Radar Detector. K@MK 218-865-6541.

TEKTRONIX Oscilloscope Probes, new, big di$count, SASE for list. Sell or trade for: Linear amplifier parts, vacuum capacitors/relays. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

SELL: Yaesu FT-208R car adapter/charger, input 13.8 volts, output 18.8 volts, 1 A, lealther case for Yaesu FT-208R, both for $45.00. You ship. Joseph Schwartz, K2VGV, 11 Windham Loop, Staten Island, NY 10314 (718-698-8069).

SOLAR POWERED? Wind powered? Collecting data for the first edition of the Solar powered handbook. Need your input. Send to Michael Bryce, WB8VGE, 2225 Mayflower, Massillon, OH 44646.

KENWOOD 930S, AT, 500 Hz filter $1100. 530S, 240 VFO $500. A3 $80. Rohn 58 ft Model 25 tiltover $300. Homebrew amps. W1WAI 617-443-9867.

HOMEBREW projects list SASE. WB2EUF, Box 708, East Hampton, NY 11937.

CENTRAL ELECTRONICS 100V transmitter, broadband, no tune up, self-contained scope. Prefer to swap for other ham equipment. John Somers, 93-25 Beechwood, Crisfield, MD 21817.

FOR SALE: TET 2-element 40M beam, u pick up. 1-219-278-7808, KD9TY, Ken Wolfe, Box 134, Buffalo, IN 47925.

572B tubes, used, good, wanted. John Larsen, W6TBA, P.O. Box 1721, Niland, CA 92257.

ATLAS 180 (160–20M) $200. CX7-B (completely up-dated) $1000. Henry 3K $1400. W1FBG, 603-964-6658.

CANADIAN ham license tags needed for my collection—Ontario, NWT, and Labrador (VO2). Willard Prentice, W3VBM, 2419 Chetwood Circle, Timonium, MD 21093.

NCL-2000 Factory inventory special parts list or National Radio Co. equipment manuals list. SASE. Maximilian Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

FOREIGN TELEGRAPH, wireless, and ham keys wanted. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: ICOM IC-25A. Joe Adinolf, WB6ZWS, 1028 Fairview Rd., Ojai, CA 93023.

FOR SALE: HB-620 (Scananyalzer), perfect cond, $95 or O.B.O. C. Beerup, 253 E. 1st Ave., Mesa, AZ 85202 (602-835-1255).

NATIONAL HRO-60 coils wanted: AA, AB, AC, AD, E, F, G, H, J, & power transformer. S. Cromwell, 33815 133rd Ave. S.E., Auburn, WA 98002, phone 206-833-7298.

WANTED: McIntosh Tube-type audio equipment. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385 (414-545-5237).

WANTED: Kenwood DG-5 Digital Display for TS-520S, and Volmax Speech Processor. Call Jim, N9GGN, at (414) 963-8628 evenings or weekends.

NEED: Manual/Copy/Borrow for copy for Heathkit QF1, Q-Multiplier. Bob May, Box 453, Jonesboro, TN 37659.

LOW-BAND GE Portamobil wanted. Tube or solid-state. Jim, 121 Hilton, Elgin, IL 60120.

SALE: Heath SB102, SB600, HP23B & mic $275. SB610 Scope $85. All w/manuals, exc. cond. Joe, POB 22193, Tampa, FL 33622 (813-972-1340 after 6 pm).

WANTED: TEN-TEC DELTA and/or ARGOSY II, absolutely mint cdx only. Write VE7EHD or call 604-265-3175.

HAWAII (OAHU) HAMS: Wanted to buy tower or tower sections reasonable. Sell Mosley tri-bander, asking $100. Warren, KH6WM, 487-1863 6–8 pm.

CURTIS EK-430 Iambic Keyer, $55. Morse MVD-1000 Video Display Terminal, $80. MFJ 1020 Active Antenna, $35. WANT: Kenwood R-1000/2000, DM-81, KB-1, Dentron CM-1, 572B tubes. AA6EE, 16832 Whirlwind, Ramona, CA 92065 (619-789-3674).

FOR SALE: Drake AC4/MS4, $75. Autek QF1, $50. McElroy, KZ4P, (516) 283-2147.

NEED: Following tubes 3A3C, 13GF7, 10JT8. What do you need in trade? N4ZB, 1420 Mount Vernon Drive, Holiday, FL 33590.

SMALL GROUP of amateurs with little resources want to get repeater on air. Need repeater, duplexers, 500 ft. hardline, antenna. Need equipment donations. D. Pickard, Rt. 4 Box 386, McComb, MS 39648.

WANTED: Crystal filter for Swan 500, 5.1 to 2.7 only. W5UBS, 613 So. 14th. Quincy, IL 62301.

WANTED: RF transmitter Board for a Regency HR-2A. Tom Richison, K5FRI, 905 Terrawood Place, Coweta, OK 74429.

HALLICRAFTERS HA-5 VFO: Need manual and/or schematic. A. McGinnis, WA2DTQ, 55 Patton St., Iselin, NJ 08830.

FOR SALE/SWAP: Brand new IBM PC Junior. 64 KB with 64KB expansion, 3 joysticks, TV connectors, extras. Want an IC-730 or Commodore station. Also have a TI994A for sale/swap for Century 21. Call 718-852-8965 eves. KD2TK.

WANTED: National SW-3 RCVR. K7BTB, P.O. Box 875, Parks, AZ 86018 (602-635-2117).

FOR SALE: Heath Cantenna Dummy Load $20, new replacement power transformers $10 small, $20 large. 7 2 9 miniature tubes at $1.00 each, octals and loctals $2.00 each. Indicate your needs. Levy, 2833 Junction Hwy #15, Kerrville, TX 78028 (512-367-4741).

WANTED: Speaker for Hammarlund HQ-145 receiver, HQ-145 for parts. Knight T-50 CW transmitter. Public Domain programs for 64/128. Don Trayes, WB4CVH, 38 Elmwood Place, Goose Creek, SC 29445.

TEN-TEC ARGOSY 525 with 8 pole 2.4 kHz filter (220), audio CW filter, noise blanker, crystal calibrator, mobile mount & model 1125 circuit breaker, $465. Charles Bright, 4115 Buckley Ridge Ct., St. Louis, MO 63125.

ICOM IC-745, PS-35, HM-12, $725. IC-730, FL-30, HM-7, $425. Zenith ZT-1 personal terminal, new, $85. K1LEC, N. Springfield, VT 05150-0073 (802-886-8121).

KENWOOD BS-5 Pan Display for SM-220 Scope, 3.395 MHz input, $50. WD8ICX, 216-863-1057.

NCL-2000 SPECIAL LOW PRICE spare parts. Also National Radio equipment manuals. SASE for complete listings. Maxmillian J. Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: TS-520S, CK-2, 200W tuner, 572B tubes. MFJ-1020 Active Antenna, $35. Pagel VHF Counter, $75. AA6EE, 619-789-3674.

HY-GAIN EXPLORER-14 with 40 meters, HD-73 rotor, 50 foot tower, 2 meter beam, all cables, $800. You take down. Located in Anniston, Alabama. Call CPT Austin, 612-349-5976 office, 612-681-1773 home.

YAESU FRG-9600 Scanner, 100 programmable frequencies, 60–905 MHz AM/FM, SSB with video board, excellent condition, $450. Vic Woconish, N8TN, 143 Longford Avenue, Elyria, OH 44035 (216-365-6672).

WANTED: Clean general-coverage receiver current design. K3UKW, Tony Musero, 1609 So. Iseminger St., Philadelphia, PA 19148 (215-271-8898).

WE WOULD LIKE TO HEAR from fellow hams who are Chrysler product enthusiasts. Write VE7WPC, WPC Club, Vancouver Island Region, 3528 11th Avenue, Port Alberni B.C. Canada V9Y 4Y7.

ROSS'$$$$ USED January SPECIALS: KENWOOD TS-830S/W YG-455C $769.90, TS-830S/W-YG-455C $769.90, TS-700A $309.00. YAESU FC-757AT $209.90, FT-2700RH $399.90, FT-ONE $1099.90, FT-980 $989.90. ETO 374A $1795.90, 76 $1299.90. Phone or send SASE for USED ITEMS LIST. OVER 8,777 NEW ham items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. Ross Distributing Company, 78 South State, P.O. Box 234, Preston, Idaho 83263 (208-852-0830).

AMPLIFIERS FOR SALE: Clipperton "L" and Amp Supply LK450. In factory-original condition. Used for product evaluation. No warranties. Written bid only to Ameritron, 9805 Walford Ave., Cleveland, OH 44102.

CLEANING HAMSHACK: Ham equipment, test equipment, manuals, radio parts, optics, and antique radios/parts. Send business SASE for list. W6IEG, P.O. Box 1244, Oakhurst, CA 93644 (209-683-8430).

SALE: Excellent condition, IC-720A XCVR/G.C. RCVR $470. C. Hays, 3675 Estates Dr., St. Louis, MO 63033.

NEW LORAD 80-channel 25-watt high-band scanning VHF-FM Digital Transceiver $200. New Uniden Washington AM-SSB Base CB with "extras" and power mic $150. Money orders only, no checks. R.D. Carter, Box 418, Vass, NC 28394.

ROSS'$$$$ NEW SPECIALS (January only): KENWOOD TM-221A $354.90, TS-940S $1789.90, TS-140S $764.90, TS-440S $929.90. ICOM IC-761 $2129.90, IC-28A $339.90, IC-U2AT $269.90. YAESU FT-980 $1299.90, FT-2700RH $489.90, FT-270RH $329.00, FRG-7700 $399.90. ALL L.T.O. Phone or send SASE for pricing on popular items. Over 8772 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. Preston. We close at 2:00 Saturdays & Mondays. Ross Distributing Company, 78 South State, P.O. Box 234, Preston, Idaho 83263 (208-852-0830).

WANTED: Vacuum Capacitors, vacuum relays and Eimac power tubes, sockets and chimneys. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

SELL, COLLECTORS ITEM: Radio Physics Course by Alfred E. Ghirardi, Second Edition—1942. Like new condition $35.00. You ship. Joseph Schwartz, K2VGV, 11 Windham Loop, Staten Island, NY 10314 (718-698-8069).

SCHEMATIC/SERVICE MANUAL needed for SBE Model SB-144, 2 meter XCVR. Can you help me? KA1IMO, Nils Anderson, 346 Elm St., Gardner, MA 01440 (617-632-1987).

FOR SALE: Mint Hallicrafter HT-37 with SX-101A receiver and Johnson Match Box $265 for all, pick up only. Johnson 3KW TR switch $45. Johnson 6 & 2 meter 1200W SSB CW/FM amplifier $550. Leonard Duschenchuk, WA2KHK, 255 Stewart Avenue, Bethpage, NY 11714.

NEW POWER TRANSFORMERS heavy-duty $10.00 to $20.00 each. Tubes miniature 7 & 9 pin @ $1.00 each. Octals and loctals @ $2.00 each. HT 37 exciter mint $100.00 Central Electronics 100V @ $160.00. Eldico 100F 100 watt exciter, $150.00. M. Levy, W5QJT, River Front Village #15, 2833 Junction Hwy, Kerville, TX 78028.

WANTED: General Radio 1211B unit oscillator. Condition and price to K4OQK, 5770 Kayron Dr. N.E., Atlanta, GA 30328, or (404) 255-8001.

FOR SALE: ICOM VFO, Model 21, matching VFO for the ICOM 2 meter base/model rig. Never used, mint cond. Box and all papers. $75.00. George F. Mitzel, NO2V, 1607 Highland Ave., Westville, NJ 08093 (609-848-1934).

KENWOOD AT-130 antenna tuner, $95. MC-50 mic, $35, both plus UPS. All like new with cartons and manuals. KD9OR, 219-636-2332.

WANTED: BC-1016 Undulator Unit, YAESU FT-225RD w/memories, and YAESU memory option for FT-625RD. C.T. Huth, 229 Melmore St., Tiffin, OH 44883.

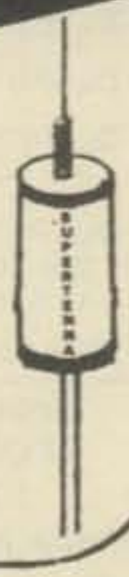
SELL COLLINS wing KWM2/312B5 package; 75S3B all mods, 51J4 with three filters; all in mint condition. Price negotiable. If interested call 904-878-8361. A. Prose Walker, W4BW, 1087 Tung Hill Dr., Tallahassee, FL 32301.

WANTED: Info on GE TX tuning unit TU-8-4 dated 8-3-39. Also AM Hi-Pwr Amplifier 500w Prox. Bob De Miranda, WB6UBD, 10214 Orange Grove, Whittier, CA 90601 (213-699-2869).

WANTED: Heights or Universal Aluminum tower sections, 51S1, mint, round S-line, TV-506. SELL: 9 MHz 6-pole SSB crystal filters $20. Tim Colbert, WA8MLV, Burton, OH 44021.

WANTED: Dentron/Drake/Kenwood Antenna Tuner, Kenwood DM-81 meter, Dentron CM-1 tuned input. FOR SALE: Kenwood R-1000 DC Kit, $5. Kenwood spinner knob, $4. Yaesu speaker, $20. AA6EE, 16832 Whirlwind, Ramona, CA 92065 (619-789-3674).

WANTED: Heathkit HA-10, Clipperton L or Yaesu FL-2100 amplifiers, working or not. Send condition and price to Richard Thorne, WB5M, 12204 Leesville Rd., Durham, NC 27703.



Please send all reader inquiries directly.

YAESU 707 plus 600 Hz CW Filter plus Power Supply Murch #UT-2000B Trans Match. Mint condition. Any reasonable offer. Eve. 718-225-7078.

WANTED: SW3, RME69, early HRO. Dean Manley, KH6B, 2058 Ainaola Dr., Hilo, HI 96720.

TELESCOPE CELESTRON Super C-8 plus, Starbright coatings, eyepieces, drive, case, heavy-duty adjustable tripod, piggy-back mount, right-angle finder, star diagonal, wedge, manual, like new, $1150. Gerry Skloot, 2923 Mandalay Beach Road, Wantagh, NY 11793 (516-221-3535).

WANTED: Diagram and parts list for a power supply for a modem, model Intertel MCS/Option Remote 200S. Tom Richison, K5FRI, 905 Terrawood Place, Coweta, OK 74429.

NEED THE FOLLOWING: Please state price and/or condition in correspondence. Two (2) Transistors MRF 455A; One (1) Antenna Tuner MFJ-962, 949C, 941D or 989; Five (5) Tubes 7868; Ten (10) Lamps #12 6V for Bogen PA Amps; One (1) each Bandswitch for Panasonic RF-2800 Receiver #RSR 98W or equivalent; One (1) Printer and Disk Drive for the Tandy Color Computer II Model 26-3127 and One (1) each Z-80/CPM and Modem Board for the Apple IIe Pro System. Mike Adams, Haney Vo-Tech Center, 3016 Hwy 77, Panama City, FL 32405 (904-769-2191).

HAWAII (OAHU) HAMS: I still need a guyed tower or tower sections. Warren, KH6WM, P.O. Box 431, Aiea, HI 96701, or (808) 487-1863.

WANTED: Hallicrafters HA-5 VFO in good working condition. C. Hays, 3675 Estates Drive, Florissant, MO 63033.

FOR SALE: Midland 13-500 Mobile Rig, 144–148 mike and manual $85. DMP 100 Printer manual R/S $100. R/S Programmable Scanner $150. More info send SASE to: P.O. Box 518, Whitehouse, FL 32220.

COLLEGE BOUND: Must clean out shack. Radios, tubes, mags, etc. SASE brings list. KX0Y, Chris Huntley, 11721 Eureka Rd., Edinboro, PA 16412.

WANTED: McIntosh tube-type audio equipment. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385 (414-545-5237).

WANTED: Schematic diagram for Palomar Mod. 350Z amp. Will pay for copying and mailing costs. Also Swan WM2000 SWR/Watt meter. KA6UDO, B.L. McCutchen, 7570 Butte Ave., Sutter, CA 95982, or (916) 755-1056 collect.

DOW-KEY Coax Relays DK-60-G-2C. Ex. cond., $20 each plus postage. Teller CK or MO only. E. Erickson, 343 Catherine St., So. Amboy, NJ 08879-1810.

WANTED: ICOM IC-25A Transceiver. Joe Adinolf, WB6ZWS, 1028 Fairview, Ojai, CA 93023.

FOR SALE: Yaesu PA-2 Mobile Adapter and Charger for FT-207R, mint, $30 or will swap for NC-2 Drop-in Charger. Weston 3" round 0–5 DC amp meter $8.00, shipping included. Robert Bradley, W9WGD, 1002 Forest Rd., La Grange Park, IL 60525.

KENWOOD HT TR-2500, charger, mike, PL unit, & mobile MS-1 $200. Clem Duval, W8VO, 33727 Brownlea, Sterling Heights, MI 48077.

HAWAII HAMS (Oahu): Looking for tower or tower sections, reasonable. Warren, KH6WM, (808) 487-1863.

SELL: Mint ICOM 471A with PS-25/EX-310 installed, AG-1 mast preamp, $700. Marty Yoskowitz, K2EV, 4 Hereford Lane, New City, NY 10956 (914-638-3855).

SB200: Requesting info on use of 811 tube. J. Larson, W6TBA, P.O. Box 1721, Niland, CA 92257.

TRADE: RARE Fantasy books (as "King In Yellow," "Zothique," "Hounds of Tindalos," etc.) for anything electronic. N4ZB, 1420 Mount Vernon Drive, Holiday, FL 33590.

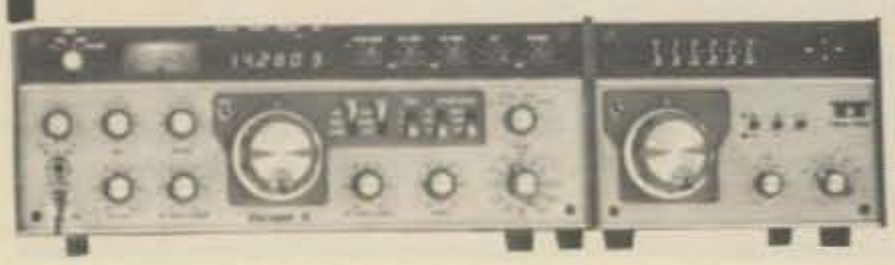
GENERAL ELECTRIC Low-Band Portamobil Wanted. Jim, 121 Hilton, Elgin, IL 60120.

FOR SALE: Mint TS-820, Low Air Hours, $400. C. Hays, NT0W, 3675 Estates Dr., St. Louis, MO 63033.

TRADE CB rig Lafayette, Astatic D-104 mic, SWR/Pwr unit with sm supply; Wawasee scope/wattmeter/counter/SWR bridge unit, like new, for good condx Kenwood Twins 599. Write Ken Winters, KV2I, 703 Charles Road, Phillipsburg, NJ 08865.

SELL: Spectrum Communications SCR1000 2m repeater. Wacom Duplexer WP-639. Operational, crystals, manuals, schematics, clean. $1850. Milton Onaga, KH6US, P.O. Box 6122, Kahului, Hawaii 96732-8922.

FOR SALE: Used books in like-new cond.: 1st Class Radiotelephone License Hdbk, $11; TV Production Hdbk, $11; Sound System Engineering, $11; Using Op Amps, $4. H. Lash, 19 E. 157 St., So. Holland, IL 60473.



CIRCLE 72 ON READER SERVICE CARD

Advertiser's Index

We'd like to see your company listed here too. Contact Arnie Sposato, KA2TYA, at 516-681-2922 to work out an advertising program tailored to suit your needs.

MISSOURI RADIO CENTER

102 N.W. Business Park Lane, Kansas City, MO 64150 816-741-8118

Call Toll Free — 9am - 6pm Mon. - Fri., 9am - 2pm Sat.
In Missouri Call — 816-741-8118

1-800-821-7323

TRADE INS ACCEPTED
MasterCard — VISA — Discover

AEA | ALINCO | ASTRON | ALPHA-DELTA | ANTENNA SPECIALISTS | B & W | BENCHER | BUTTERNUT | CUSHCRAFT | DAIWA | HUSTLER

YAESU | WELZ | VIKING | VANGORDON | TEN-TEC | SANTEC | RFCONCEPTS | QUATRON | NYE | MIRAGE/KLM | MFJ | LARSEN

Dependable Service At The Right Price . . . Everytime

KENWOOD

TS440S "DX-CITING"

- 100% Duty Cycle
- 100 Memories
- Direct Keyboard Entry
- Optional Built-in AT

On Sale Now, Call for Price!

YAESU

FT-767GX HF/VHF/UHF BASE STATION

- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

ICOM

IC-761 NEWEST HF SUPER RIG

- 160-10M/General Coverage Receiver
- Built-in Power Supply and Automatic Antenna Tuner
- SSB, CW, FM, AM, RTTY
- QSK to 60 WPM

ALINCO

ALD-24T DUAL BAND MOBILE

- 140-149.995 MHz/ 440-450 MHz
- 25 Watts on Both Bands
- Crossband Full Duplex
- 21 Memory Channels
- CTCSS Encoder/Decoder, Standard

KENWOOD

TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

YAESU

NEW!

FT-736R VHF-UHF BASE STATION

- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz • 100 Memories

ICOM

IC-735 COMPACT HF TRANSCEIVER

- All HF Band/General Coverage Receiver
- 12 Memories/Frequency and Mode
- USB, LSB, AM, FM, CW
- 100 Watts Output
- Includes HM-12 Scanning Mic

concepts

2m and 220 MHz Amplifiers
GaAsFET Receive Pre-Amps
and High SWR Shutdown Protection

MODEL		SALE PRICED
	144 MHz	
2-23	2 in/30 out	
2-217	2 in/170 out	
2-117	10 in/170 out	
	220 MHz	
3-22	2 in/20 out	
2-211	2 in/110 out	
3-312	30 in/120 out	
	CALL	

KENWOOD

TM-221A

- 2m FM Mobile Transceiver
- 45W Output w/HiLo Switch
- 14 Multi-Function Memories
- TM-421A Available For 440 MHz

YAESU

FT-757 GX/II
"CAT SYSTEM"

- All Mode HF Transceiver
- Dual VFO's
- Full Break-in CW
- 100% Duty Cycle

ICOM

IC-900 SIX BANDS IN ONE MOBILE

- Remote Controller, Interface A Unit, Interface B Unit, Speaker, Mic and Cables
- Six Band Units to Choose
- 10 Memories Per Band
- Programmable Band Scan
- Fiber Optic Technology

MFJ

NEW!

MFJ-931 ARTIFICIAL GROUND

- Eliminate RF Bites, RF Feedback, TVI/RFI
- Creates Artificial RF Ground with Random Wire
- Improves Radiation Pattern
- RF Ammeter Makes Tuning Easy
- Only **$79.95**

KENWOOD

TH-315A
FULL FEATURED
220 MHz HT

- Covers 220-225 MHz
- Ten Memory Channels
- 2.5 Watts of Power (5 Watts Optional)
- Built-in CTCSS Encoder
- TH-215A, 2 Meter TH-415A, Covers 440-449.995 MHz

YAESU

FT23/73R

- Super "Mini" HT's
- Zinc-Aluminum Alloy Case
- 10 Memories
- 140-164 MHz, 440-450 MHz
- 2W Battery Pack or Optional 5W Pack

ICOM

IC-μ2AT
IC-μ4AT
MICRO HT'S
FOR 2M, 440

- Pocket Size HT Fun
- Ten Memories
- LCD Readout
- Wideband Coverage
- Up to 3 Watts Output
- 32 Built-in Subaudible Tones

PK-232 (PAKRATT)

Data Controller With 6 TRX/RX Modes

PACKET	ASCII
MORSE CODE	AMTOR
BAUDOT (RTTY)	WEATHER FAX

- All You Need is a RS-232 Compatible Computer or Terminal and Your Radio

HAM NET $319.95

HYGAIN | ICOM | KANTRONICS | • MOST ORDERS SHIPPED SAME DAY • | KDK | KENPRO | KENWOOD

CIRCLE 68 ON READER SERVICE CARD

HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

Of course, you've probably noticed a similarity to its predecessor, the FT-757GX. That's purely intentional. And now its performance is even better.

With new features like memory storage of operating mode. Slow/fast tuning selection. Automatic step-change according to mode. IF notch filter. 10 memories. And VFO to VFO scan.

Plus you get an iambic electronic keyer. Woodpecker noise blanker. 600-Hz CW filter. AM and FM modes. AF speech processor. And 25-kHz marker generator. All at no extra charge.

Three microprocessors. Dual VFOs. Single-button VFO/memory swap. Receive coverage from 500 kHz to 30 MHz. Transmit coverage from 10 to 160 meters, including WARC bands. All-mode coverage (LSB, USB, CW, AM and FM). 100-watt RF output.

QSK operation. Massive heatsink and duct-flow cooling system for continuous RTTY operation for up to 30 minutes.

Computer Aided Transceiver (CAT) System for computer control via optional interface (software is available from your Yaesu dealer).

Of course, the FT-757GX/II offers the kinds of options you'd expect from Yaesu, too. Including standard and heavy-duty power supplies, automatic antenna tuner, and more.

So no matter where you work the DX, take along Yaesu's FT-757GX/II. The full-featured HF rig you'll have a real field day with.

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100.

Prices and specifications subject to change without notice.

CIRCLE 58 ON READER SERVICE CARD

ICOM HAS ALL YOUR BASES COVERED

ICOM has your winning lineup for fixed, portable, and mobile operations on today's hottest amateur bands. Slide into the winner's circle with ICOM's deluxe "75" series transceivers, with a team committed to excellence from VHF to UHF communications. Each compact all-mode unit delivers maximum performance, reliability, and ease of operation. It's a championship lineup!

All "75" series transceivers are an FMer's dream rig with 99 tunable memories, 4 scan modes, odd offsets, Packet compatibility, scanning mic and DDS system for data input. SSB/OSCAR delights include dual VFOs, PBT, Crystal-resonant IF Notch, Noise Blanker, and semi/full CW break-in. The glamorous "75" units provide ultimate mobiling flexibility.

SUPER SCANNING

Monitor all of today's action with four scanning modes: spectrum, programmable, mode, and memory. 99 memories in five seconds!

2 METERS. ICOM's 25-watt **IC-275A** VHF leader receives 138.0-174.0MHz including the public service, marine, and weather bands, and transmits 140.1-150.0MHz. Includes AC supply. The **IC-275H** is 12-volt DC-powered, produces 100 watts output, and will operate with external AC supply. Two of ICOM's heavy hitters!

220MHz. The 25-watt output **IC-375A** receives 216.236.0MHz, transmits 220.0-225.0MHz, and includes AC supply. A genuine masterpiece!

440MHz. Enjoy topnotch 430.0-450.0MHz operation w the 25-watt **IC-475A** featuring AC supply, or go high power using the 75-watt, AC/DC-powered **IC-475H** "super rig."

6 METERS/10 METERS. Join the fun of sunspot cycle 22 openings with the superb 10-watt **IC-575** It receives 26-56MHz, transmits 28-29.7MHz, a 50-54MHz, and includes AC supply. The **IC-575A**, a true superstar!

IC-575A
6 Meter/10Meter Transceiver

IC-475A/H
440MHz Transceivers

IC-375A
220MHz Transceiver

IC-275A/H
2 Meter Transceivers

ICOM HAS ALL YOU BASES COVERED! M the unbeatable lineup of ICOM equipment a your local ICOM dealer.

ICOM

ICOM America, Inc.
2380-116th Ave. N.E., Bellevue, WA 98004
Customer Service Hotline (206) 454-7619
3150 Premier Drive, Suite 126, Irving, TX 75063
1777 Phoenix Parkway, Suite 201, Atlanta, GA 3
ICOM CANADA, A Division of ICOM America, In
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T

CIRCLE 129 ON READER SERVICE CARD