

# Amateur Radio

SERVING AMATEUR RADIO SINCE 1945

JANUARY 1991 \$2.95

CANADA \$3.95

# CQ

Including  
**HAM  
RADIO**

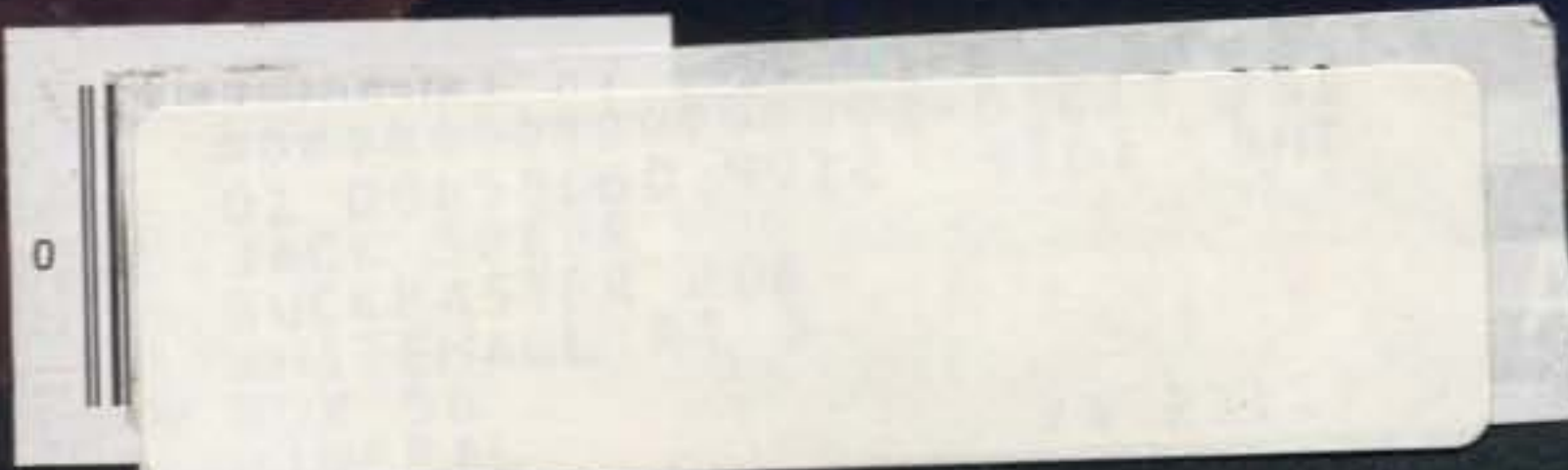


**CQ Reviews: The Cushcraft  
AR-270 Antenna ... page 22**

**Classic Wire Antennas ... page 32**

On The Cover: Ken Wolff, K1EA

AMATEUR'S JOURNAL



# KENWOOD

## We just made the competition obsolete

No competition class transceiver is even in the same ball park as the TS-850S

You'll find a superior inter-modulation dynamic range of 108 dB throughout the entire 100 kHz to 30 MHz range.

Kenwood's TS-850S is the only transceiver to feature Digital Signal Processing (DSP) – in both transmit and receive modes (with the optional DSP-100). This feature provides such greatly enhanced signal purity and richness that you'll want to experience it, to fully appreciate it.

Other advanced technology in the TS-850S includes 10 Hz step dual VFOs, multi-mode scanning, full and semi break-in CW, superior interference reduction, keyer, dual noise blanker, 100 memory channels, and RIT/XIT. Microphone supplied.

The Kenwood TS-850S. All band. All mode. One year warranty. In a class by itself!

### Key options

**DSP-100** Digital Signal Processor. **AT-300** 160 - 10 m external antenna tuner. **AT-850** 160 - 10 m internal antenna tuner. **DRU-2** Digital record-

ing unit. **IF-232C** Computer interface. **PG-2X** DC cable. **PS-52** Power supply. **SO-2** TCXO. **SP-31** Matching external speaker. **VS-2** Voice synthesizer. **YG-455C-1** 500 Hz CW filter for 455 kHz IF. **YG-455CN-1** 250 Hz CW filter for 455 kHz IF. **YK-88C-1** 500 Hz CW filter for 8.83 MHz IF. **YK-88CN-1** 270 Hz CW filter for 8.83 MHz IF. **YK-88SN-1** 1.8 kHz SSB filter for 8.83 MHz IF.

KENWOOD U.S.A. CORPORATION  
COMMUNICATIONS & TEST EQUIPMENT GROUP  
P.O. BOX 22745, 2201 E. Dominguez Street  
Long Beach, CA 90801-5745  
KENWOOD ELECTRONICS CANADA INC.  
P.O. BOX 1075, 959 Gana Court  
Mississauga, Ontario, Canada L4T 4C2



Kenwood meets or exceeds all specifications. Contact your dealer for a complete listing of specifications and accessories. Specifications are subject to change without notice. Complete service manuals are available for all Kenwood transceivers and most accessories. \*One year warranty in the U.S.A. only.

KENWOOD  
...pacesetter in Amateur Radio

# KENWOOD

## TM-731A/631A 144/450 and 144/220 MHz FM Dual Banders

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

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

### Optional Accessories:

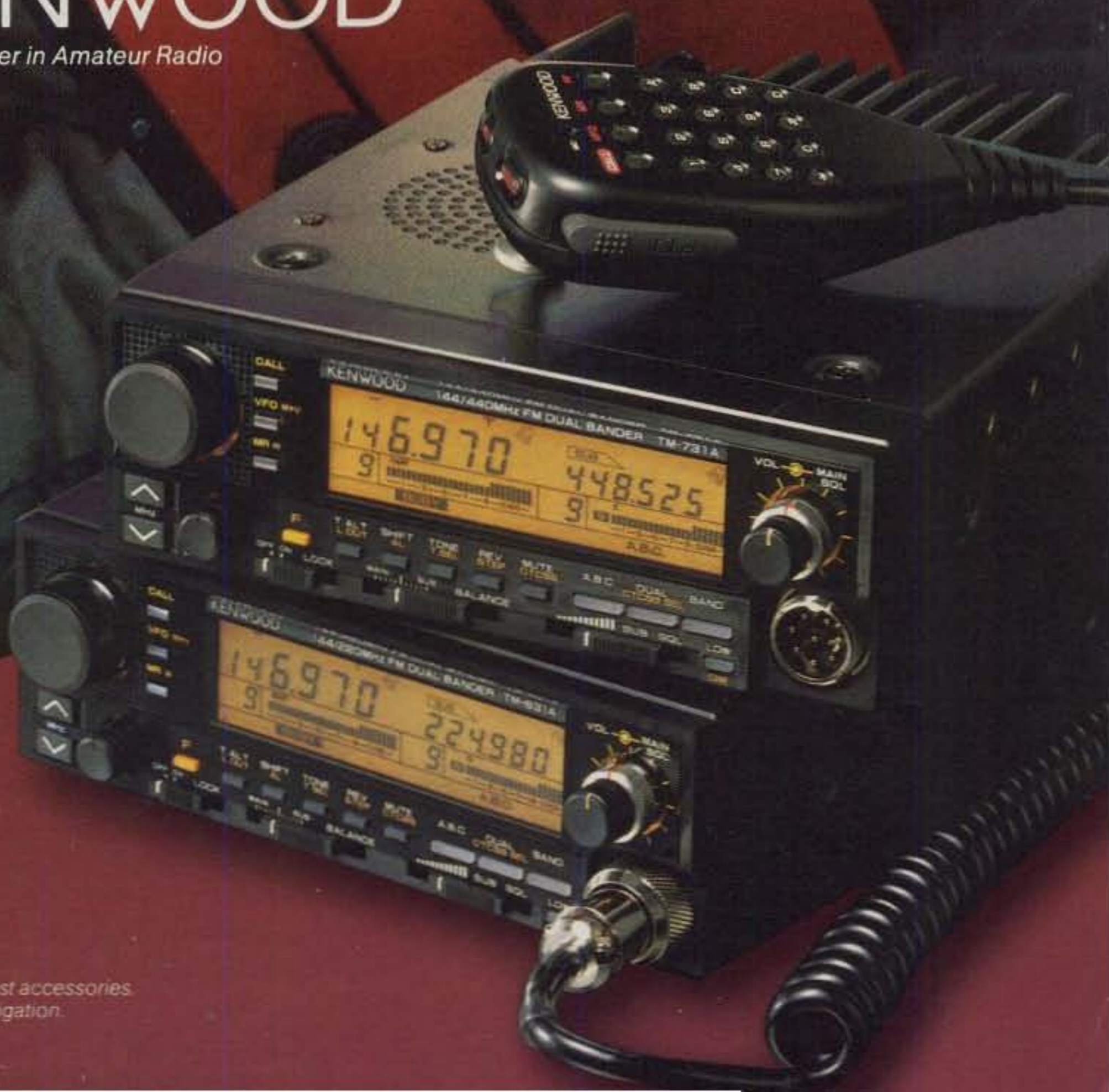
- **PG-4H** Extra interface cable for IF-20 (for three to four radios)
- **PG-4J** Extension cable kit for IF-20 DC and audio
- **PS-430** Power supply
- **TSU-6** CTCSS decode unit
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **SP-41** Compact mobile speaker
- **SP-50B** Deluxe mobile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

KENWOOD U.S.A. CORPORATION  
COMMUNICATIONS & TEST EQUIPMENT GROUP  
P.O. BOX 22745, 2201 E. Dominguez Street  
Long Beach, CA 90801-5745  
KENWOOD ELECTRONICS CANADA INC.  
P.O. BOX 1075, 959 Gana Court  
Mississauga, Ontario, Canada L4T 4C2

## KENWOOD

...pacesetter in Amateur Radio

# “Dynamic Duals”



# KENWOOD

## Compact Champion!

### TH-27A/47A

#### 2 m and 70 cm Super Compact HTs

Here is a great new addition to Kenwood's HT family – the all new TH-27A for 2 meters and TH-47A for 70 cm! Super compact and beautifully designed, these pocket-sized twins give you full-size performance.

- **Large capacity NiCd battery pack supplied.** The standard battery pack is 7.2 volts, 700 mAh, providing extended transmit time with 2.5 watts. (TH-47A: 1.5 W.)
- **Extended receive coverage.** TH-27A: 118–165 MHz; TH-47A: 438–449,995 MHz. TX on Amateur bands only, (TH-27A modifiable for MARS/CAP. Permits required. Specifications guaranteed for Amateur bands only.)
- **Multi-function scanning.** Band and memory channels can be scanned, with time operated or carrier operated scan stop.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Built-in digital clock** with programmable timer.
- **Dual Tone Squelch System (DTSS).** Compatible with the TH-26AT Series and the TM-941A Triple bander, as well as other Kenwood series transceivers, this selective calling system uses standard DTMF to open squelch.
- **Five watts output** when operated with PB-14 battery pack or 13.8 volts.
- **T-Alert for quiet monitoring.** Tone Alert beeps when squelch is opened.
- **Auto battery saver, auto power off function, and economy power mode extends battery life.**
- **DTMF memory.** The DTMF memory function can be used as an auto-dialer. All characters from the 16-key pad can be stored, allowing repeater control codes to be stored!

- **41 memories.** All channels store receive and transmit separately for "odd split."
- **DC direct in operation.** Allows external DC to be used (7.2 – 16 volts). When external power is used, the batteries are being charged. (PB-13 only.)

#### Optional accessories:

- **BC-14:** Wall charger for PB-13, 14
- **BC-15:** Rapid charger for PB-13, 14
- **BH-6:** Swivel mount
- **BT-8:** Six cell AA Alkaline battery case
- **HMC-2:** Headset with VOX and PTT
- **PB-13:** 7.2 V, 700 mAh NiCd pack
- **PB-14:** 12 V, 300 mAh NiCd pack
- **PG-3F:** DC cable with filter and cigarette lighter plug
- **PG-2W:** DC cable
- **SC-30:** Soft case
- **SMC-31:** Standard speaker mic
- **SMC-32:** Compact speaker mic
- **SMC-33:** Compact speaker mic with controls
- **WR-2:** Water resistant bag.



- **Automatic offset selection (TH-27A).**
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **CTCSS encode/decode built-in.**
- **Supplied accessories:** Rubber flex antenna, battery pack, wall charger, belt hook, wrist strap, dust caps.

KENWOOD U.S.A. CORPORATION  
COMMUNICATIONS & TEST EQUIPMENT GROUP  
P.O. BOX 22745, 2201 E. Dominguez Street  
Long Beach, CA 90801-5745  
KENWOOD ELECTRONICS CANADA INC.  
P.O. BOX 1075, 959 Gana Court  
Mississauga, Ontario, Canada L4T 4C2

# KENWOOD

...pacesetter in Amateur Radio

# MASTHEAD

## EDITORIAL STAFF

Alan M. Dorhoffer, K2EEK, Editor  
 Gail M. Schieber, Managing Editor  
 Terry Northup, KA1STC, Associate Editor  
 Lew McCoy, W1ICP, Technical Representative  
 Robert D. Wilson, WA1TKH, Technical Advisor  
 Peter O'Dell, WB2D, Special Projects Editor

## CONTRIBUTING STAFF

John Dorr, K1AR, Contest Calendar  
 Chod Harris, VP2ML, DX  
 Dave Ingram, K4TWJ, OSCAR & Antiques  
 George Jacobs, W3ASK, Propagation  
 Dorothy H. Johnson, WB9RCY, Awards & USA-CA  
 Frederick O. Maia, W5YI, FCC Correspondent  
 Bill Orr, W6SAI, Radio Fundamentals  
 Buck Rogers, K4ABT, Packet Radio Editor  
 Karl T. Thurber, Jr., W8FX, Antennas & Software  
 Bill Welsh, W6DDB, Novice

## AWARD MANAGEMENT

Jim Dionne, K1MEM, WAZ Award  
 Dorothy H. Johnson, WB9RCY, USA-CA Award  
 Norman Koch, K6ZDL, WPX Award  
 Billy Williams, N4UF, CQ DX Award

## CONTEST MANAGEMENT

Steve Bolia, N8BJQ, WPX Contest Director  
 Larry Brockman, N6AR, WW DX Contest Director  
 Robert Cox, K3EST, WW DX Contest Director  
 John Dorr, K1AR, WW DX Trophies & Certificates  
 Roy Gould, KT1N, RTTY Contest Director  
 Donald McClenon, N4IN, 160 M Contest Director


## BUSINESS STAFF

Richard A. Ross, K2MGA, Publisher  
 Dorothy Kehrwieler, General Manager  
 Arnie Sposato, N2IQO, Advertising Manager  
 Tracy Parbst, Sales Assistant  
 Frank V. Fuzia, Controller  
 J. Craig Clark, NX1G, Circulation Director  
 Catherine Ross, Circulation Manager  
 Melissa Kehrwieler, Data Processing  
 Carol Minervini, Data Processing  
 Karen Nauth, Customer Service

## PRODUCTION STAFF

Dorothy Kehrwieler, Production Manager  
 Elizabeth Ryan, Art Director  
 Barbara Terzo, Artist  
 Pat Le Blanc, Phototypographer  
 Florence V. Martin, Phototypographer  
 Linda Romanello, Typesetting  
 Hal Keith, Illustrator  
 Larry Mulvehill, WB2ZPI/VK5AAY, Photographer

A publication of

 CQ Communications, Inc.  
 76 North Broadway  
 Hicksville, NY 11801-USA.

Offices: 76 North Broadway, Hicksville, NY 11801.  
 Telephone: 516 681-2922. FAX (516) 681-2926. CQ  
 (ISSN 0007-893X) is published monthly by CQ Com-  
 munications Inc. Second Class postage paid at  
 Hicksville, NY and additional offices. Subscription  
 prices: Domestic—one year \$22.95, two years \$43.00,  
 three years \$63.00; Canada/Mexico—one year \$25.00,  
 two years \$47.00, three years \$69.00; Foreign—one  
 year \$27.00, two years \$51.00, three years \$75.00; For-  
 eign Air Mail—one year \$80.00, two years \$157.00,  
 three years \$234.00.

U.S. Government Agencies: Subscriptions to CQ are  
 available to agencies of the United States govern-  
 ment, including military services, only on a cash with  
 order basis. Requests for quotations, bids, contracts,  
 etc. will be refused and will not be returned or pro-  
 cessed. Entire contents copyrighted CQ Communi-  
 cations Inc. 1991. CQ does not assume responsibility  
 for unsolicited manuscripts. 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:** Far and away the most widely used contest logging program in the world is the work of this man, Ken Wolff, K1EA of Harvard, Mass. All contesters owe you a debt of gratitude Ken. Thanks! (Photo by Larry Mulvehill, WB2ZPI)



JANUARY 1991

VOL. 47, NO. 1

## FEATURES

AN AUTOMATIC BEAM-AIMER FOR THE HD-73 ANTENNA ROTATOR.....	L.B. Cebik, W4RNL	11
AMATEUR RADIO AND DIEGO GARCIA	Walter Schulz, VQ9TD/K3OQF	18
CQ REVIEWS: THE CUSHCRAFT AR-270 144 MHZ/440 MHZ DUAL-BAND VERTICAL.....	John J. Schultz, W4FA	22
HOW TO BUILD (AND USE) A FRUGAL, EASY TO BUILD HF PACKET TUNING INDICATOR.....	Fred Dahnke, WB6IQV	24
A NEW LOOK AT SOME CLASSIC WIRE ANTENNAS	John J. Schultz, W4FA	32
A RECYCLED MICROPHONE STAND....	Bob Cashdollar, NR8U	36
HOW TO BUILD (AND USE) AN AUDIO MILLIWATT METER	J. Frank Brumbaugh, KB4ZGC	40
ANTENNAS & ACCESSORIES: OPEN FORUM	Karl T. Thurber, Jr., W8FX	48
WORLD OF IDEAS: HF MOBILING UPDATE	Dave Ingram, K4TWJ	54
WASHINGTON READOUT: WARC-92 TO THREATEN HAM BANDS.....	Frederick O. Maia, W5YI	60
RADIO FUNDAMENTALS: LONG LIFE FOR YOUR AMPLIFIER TUBES.....	Bill Orr, W6SAI	68
BILL'S BASICS: PRINTED MATERIAL, PART III OF IV	Bill Welsh, W6DDB	72
PACKET USER'S NOTEBOOK: PACKET RADIO IS EASY!	Buck Rogers, K4ABT	76
<b>ANNOUNCING: THE 35TH ANNUAL CQ WORLD-WIDE WPX CONTEST</b> .....		82
CQ SHOWCASE: NEW AMATEUR PRODUCTS.....		84

## DEPARTMENTS

AWARDS: STORY OF THE MONTH—MICHAEL J. SHEEHAN, KB1GN.....	Dorothy Johnson, WB9RCY	46	
DX: THE MOST WANTED COUNTRIES BY DXERS	Chod Harris, VP2ML	88	
CONTEST CALENDAR: HOW TO IMPROVE YOUR CONTEST SCORE, CONTESTS FOR JAN. AND EARLY FEB.	John Dorr, K1AR	98	
PROPAGATION: 1990 IN REVIEW, SHORT-SKIP CHARTS FOR JAN. AND FEB.....	George Jacobs, W3ASK	112	
ZERO BIAS.....	4	OUR READERS SAY.....	109
ANNOUNCEMENTS.....	9	HAM SHOP.....	116

Looking back, 1990 was a DXer's paradise. Maybe it has happened before and I never noticed it, but it seemed like there was at least a DXpedition a week out there stirring up the bands. One week in November you had your choice of Malpelo, Banaba, and Juan Fernandez, or all of the above. The only ones who weren't as elated as you over this plethora of opportunity were your immediate family and your co-workers, who thought you were making up these names and were going slightly around the bend. People have lived their entire lives comfortably and at ease, never realizing that there actually is a geographical entity called Banaba.

Some of the DX bulletins are hinting at some major DXpeditions for this month, and one can only imagine the "in" countries for 1991. If you have any money left over after the holidays, you might think in terms of ordering one of the new updated National Geographic Society's atlases. This atlas shows every smidgen of land capable of supporting a name. In real life we may not be the technocrats we think we are, but we sure can learn geography in a hurry, especially if there's a QSL involved.

Before the deadly serious among you (who really are technocrats) climb all over me telling me there's more to amateur radio than working DX or being able to play geographic leapfrog, spouting exotic prefixes for bits of earth barely above sea level at high tide, let me take you back a few years. Now if you're about the median age, you might try to recall the time just prior to your entry into amateur radio. Maybe you were 13 or 14, impressionable and ready for some sort of adventure. There it was, a magazine ad showing something called an SW-54. It looked like a radio. It was a radio—only different. For about \$50.00 (all the money in the world) you could actually (for real, no fooling) listen in and follow along with Thor Heyerdahl aboard the *Kon Tiki* as he sailed from Peru to Tahiti. Thor, the *Kon-Tiki*, the SW-54, and if you were real lucky a Philmore aerial kit put you in touch with the world of SWLing and the excitement of the whole world. Amateur radio was the logical extension of this dream.

That pubescent enthusiasm caused many of us to memorize countless questions and diagrams from forgotten license manuals (which are now collectors' items) and spend hours listening to W1AW or Ameco code records (78 RPM). The diagrams showed tubes no longer available, or at best ones which may show up at a hamfest fleamarket these days. It didn't matter, because the world was waiting for us.

Some of us fell in love with the technology and the potential for greater areas of electronic expression—which frontiers could be pushed in which direction, never knowing enough, and being able to design and build anything. I know this and can understand some of the beauty in a unique design or an element of theory. How-

ever, my mind now sees it as a weigh station—a means to an end, not the end itself. My mind sees the end as that distant contact, crackling in the night, and my imagination takes me back to the deck of the *Kon Tiki* where Thor and I are lashing things down as the waves break over the bow.

The key words describing amateur radio for me and some of my friends who became amateurs at the same time are imagination and adventure, the adventure being someplace far away. Later on another group came into amateur radio via the ranks of CB. I'm sure that they too followed somewhat the same process, listening in and becoming captivated by some of what they heard. They too had an active imagination fueled by whatever time they had spent communicating on Citizen's Band. At the height of CB activity in this country about 28 million people became instantly southern, complete with accent and idiom. The jargon if analyzed would place all in the long-haul trucking business where anything social involved a truck-stop and a coffee break. We all dream.

These days, as amateurs it's become extremely hard to get a consensus of what the dream is. The dream is what sold us and what should be the concept to sell amateur radio to future generations. These days we're caught up in form over function where the form is ever changing. What we do has remained relatively the same and has the same attraction now as it always had. How we do it has continually changed and will continue to change. What we do is communicate between points A and B. How we do this and by which mode changes. The hardware becomes more and more sophisticated and we can avail ourselves of more and more options, but we still communicate between point A and point B. If the truth be known, what is ever important over any time span is where point B is (how far away) and who is there (are they reliable enough to send a card?).

Point B is the dream, the sizzle that sells the steak, and the frenzied pile-ups that we all complain about but wouldn't miss for anything. Poor Thor Heyerdahl wouldn't stand a chance today. TV coverage has changed the quality of imagination. TV would have made him get a better boat and clean up his act, more in line with Jacques Cousteau and the *Calypso*, so that a possible series could emerge. These days celebrities and astronauts (even explorers) appear almost daily on TV, so the mystery of who they are is lost to the imagination. We see them all the time, coming into our homes, talking, if you will, right at us. Some brave soul who decides to climb Mt. Everest by himself can turn around to see 37 cameramen from various networks chronicling his every footstep for the 6 o'clock news.

So whatever direction technology takes us, whatever frequencies we have now or are likely to have after this or any other WARC, it will

still boil down to communicating between point A and point B. It's not how we do it that's really important, not how facile or technologically sophisticated, but the mere fact that point B still holds that mysterious fascination for us even if we're not quite sure where it is. It's the magic of imagination and the totem of the QSL.

If we want to attract young people to amateur radio then we have to figure out a way to teach them about imagination and the endless possibilities of magic. A youngster can be completely fascinated with a video game without ever thinking about the hardware of the game or how it works. It's the game that's important. It's much the same as you or I using a telephone. We're not particularly interested in how the phone works, only that our call gets through.

These days there's probably a significant number of people buying shortwave receivers to listen in on what's going on in the Middle East. Some of them probably go as far as buying camo-fatigues and learning military jargon. Imagination, square one. Youngsters naturally have an active imagination until we make them serious and productive members of society. Somewhere in there is the hope for the next several generations of amateurs. It's the quality that most of us had at one time and some of us still have.

I can expect to receive doom and gloom letters over this telling me that I am missing the point of what our mandate is or should be. If the mandate is to continually upgrade, then upon achieving Extra status the amateur can sell all his equipment and get out of the hobby. There's no further place to go. On the other hand, perhaps the mandate means that the amateur must be able to communicate effectively and efficiently on every band and mode available to his current license class. I know and fully accept that there is no documentation supporting my thesis that you are supposed to have a good time and enjoy what you're doing or that amateur radio is fun.

I know that some amateurs will resort to exhausting studies of propagation, extremely sophisticated digital forms of communication, pinpoint antenna tracking techniques to crack the ZA barrier. I know that it will be satisfying in and of itself and that a QSL card is unnecessary and that it really doesn't mean much more than overcoming a slight technical hurdle. Jumping up and down, gloating, gleeful noises aside, there is no fun and elation in overcoming this slight technical obstacle. After all, we knew it could be done, so what's the big deal?

If you are one of those who insists on jumping up and down with glee and sporting an ear-to-ear grin as you wave that "unmasked" for QSL, do your best to avoid youngsters until you calm down. This effusive spirit might cause them to try to find out how they can get in on the good time, too.

73, Alan, K2EEK

# OVER 45,000 PK-232s SOLD!

The AEA PK-232 multi-mode data controller remains the most widely used radio data controller **anywhere**. More hams own the PK-232 than *any other* radio data controller. And AEA's hard-earned reputation for quality and service keeps them coming back. The '232 gained its popularity with features like these:

## STATE-OF-THE-ART TECHNOLOGY.

Since its introduction in 1986, the PK-232 has been updated **six times** to continue bringing you the breakthroughs. Six updates in four years! And even the very first PK-232 is upgradable to the latest model, with a relatively inexpensive user-installed kit. If you want a state-of-the-art multimode controller, you want the PK-232 MBX.

## ALL DIGITAL OPERATING MODES.

The PK-232 MBX includes all authorized amateur digital modes available today...Packet, Baudot, ASCII, AMTOR/SITOR (including the **new** 625 recommendation) and Morse code, as well as WEFAX (receive and transmit). Other features include the PakMail 18K byte maildrop system with automatic normal and **reverse** forwarding, NAVTEX reception, KISS protocol support, binary file transfers and more. Also included is the TDM (Time Division Multiplex) mode for SWLing that few others have. No other multi-mode has all these features.

## SUPERIOR FILTERING

The 8-pole Chebyshev filter in the PK-232 was designed from the ground up to work on HF and VHF. We didn't just add some firmware to a Packet modem to create our multi-mode. Our modem was **proven** superior by tests in Packet Radio Magazine over *all the others tested*. Read the fine print! You just can't beat the PK-232 for performance, quality and integrity. 45,000 PK-232 owners can't be wrong!

## INNOVATION

The PK-232 has been the one to follow for technology advances. It was the *first* radio data controller with weather-fax, the *first* with Host mode, the *first* with NAVTEX, the *first* with Signal Identification, the *first* with TDM, the *first* with AMTOR v.625, the *first* with a WHYNOT command, etc, etc. AEA has always strived to "Bring You The Breakthrough," and while others have tried to imitate, only one can be the best.



The only data controller **designed from the ground up** to be a true multi-mode, the PK-232's tuning and status indicators work in all modes, not just packet. Make sure the multi-mode you buy isn't just a converted Packet TNC. There's only one number 1!

## HOST MODE

Many superior programs have been written specifically for the PK-232 in Host mode language: **NEW PC-Pakratt II** for IBMs and compatibles, updated MacRATT for Apple Macintosh, and ComPakratt for Commodore C-64 and C-128 computers.

## SIGNAL ANALYSIS.

The first multi-mode to offer SIAM (Signal Identification and Acquisition Mode) was, of course, the PK-232MBX. Indispensable to SWLers, SIAM automatically identifies Baudot, ASCII, AMTOR/SITOR (ARQ and FEC) and TDM signals, then measures baud rate and polarity. Once the PK-232MBX is "locked on" to the signal, a simple "OK" command switches to the recognized mode and starts the data display. You're even ready to transmit in that mode if applicable. The PK-232MBX makes SWLing easy and fun, not difficult and frustrating.

## REPUTATION

The PK-232MBX has helped AEA establish its hard-earned reputation for producing high quality amateur radio products. Anyone can **say** they have a good reputation, so it pays to ask around. Listen on the HF bands and see which multi-mode is getting *used*. You owe it to yourself to get the best possible value for your money. Don't settle for less!

*Watch for the DSP-1232 and 2232 coming soon!*



**AEA Brings You a Better Experience.**  
Advanced Electronic Applications, Inc.

2006-196th St. S.W./P.O. Box C2160 Lynnwood, WA 98036 (206)775-7373.

Prices and specifications subject to change without notice or obligation.

© Copyright 1990 by AEA, Inc. All Rights Reserved.



# ALINCO ELECTRONICS INC.



## DR-590T(NEW)

### VHF/UHF Twin Band Mobile

144-147. 995Mhz(RX137—173. 995Mhz)  
 440-449. 995Mhz(RX410—469. 995Mhz)  
 45W Hi, 10W Mid., 5W Low on VHF  
 35W Hi, 8W Mid., 5W Low on UHF

Cross Band Repeater Function Simultaneous Receiving and Scanning on both Band

Front Control Panel is detachable. Remote Control will be available (Option)  
 MAFS and CAP Modifiable (permit required)



## DR-570T

### Set your sights for dual!

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

## DR-110T & DR-410T

### Tiny 2M Power From Alinco!

DR-110T, this 2M Alinco, enters the nineties a proven winner with the "reputation" of best value. The DR-110T packs a powerful 45W on 2M and sports all the features you expect in today's transceivers. Tuning is a snap with the multi-functioned easy-to-see keyboard, 14 memory channels, subtones, scan, multi-colored LCD readout, reverse, are a few of the many features of the DR-110T. The mobile of the future-today! DR-410T available for 70 cm.



## DR-510T

### Best Dual Value on the Market!

The Alinco DR-510T has most of the outstanding features of its sister the DR-570T, including 14 memory channels, cross band duplex and cross band repeat. The multi color LCD display, and simple tune control panel makes simplicity the key word. The DR-510T with 45/35 watts is the best, featurepacked dual bander on the Amateur market today. See the DR-510T along with the other Alinco "Magnificent" ones at your favorite dealer today!

## DR-112T (NEW)

### Full Featured 2M Power Pack.

The DR-112T is a "True FM" full-power (45 watts) transceiver. The backlit LCD display is ideal for bright or dim lit conditions. And, as with most Alinco products, the control panel is engineered to be "User friendly" and still offer a full range of features.







# ALINCO ELECTRONICS INC.

## DJ-560T (NEW)

### Full Featured Twin Band Handy

We packed almost all of the features you would find in a full sized mobile Twin Bander into this compact HT. The DJ-560T has key board entry, CTCSS encode built in, several scanning modes, 40 memories, fully programmable, Autodialer, Dual Display (2 Meter & 70 Cm). The DJ-560T is sitting on top of the mountain.



## DJ-100T & DJ-120T & DJ-200T

### Best 2M Micro Value

The Alinco DJ-100T/DJ-120T is "Magnificent" for its tiny size, but stands up to the competition with power and capability. 10 memory channels store offsets and subtones. Has LCD readout with call channels and reverse at your fingertips. 500 mah battery with direct DC to DC is standard. 3W on standard battery, 6W on optional battery leaves the competition in the dust! DJ-200T for 220 MHz.

## DJ-500T

### Power-Packed Dual Handil

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



## DJ-160T & DJ-460T

### 2M H/T is here! And wow!

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



CIRCLE 1 ON READER SERVICE CARD

**ALINCO ELECTRONICS INC.**

438 AMAPOLA AVE., LOT 130, TORRANCE, CALIFORNIA 90501  
TEL: (213) 618-8616 • FAX: (213) 618-8758

**NEW  
DUAL BAND RINGO**

# Cushcraft

## AR-270 (2m/70cm)

*The engineering hams at Cushcraft bring to you an all new computer aided design.*

AR-270 uses the latest technology to give excellent gain and low angle radiation in a durable all aluminum antenna. It is a perfect choice for FM simplex, repeater or packet radio. Enjoy the full performance of your dual band radio with this exciting new antenna.

- Excellent gain
- Broadband, minimum VSWR
- All aluminum - reduces static build-up
- No painted surface to chip peel or crack
- UV stabilized insulators
- Precision wound coils won't detune
- SO-239 connector
- Less than 4 feet high
- DC ground for lightning protection
- Mounting flexibility
- Rust free stainless steel hardware
- RF de-coupling eliminates TVI
- Amazing performance

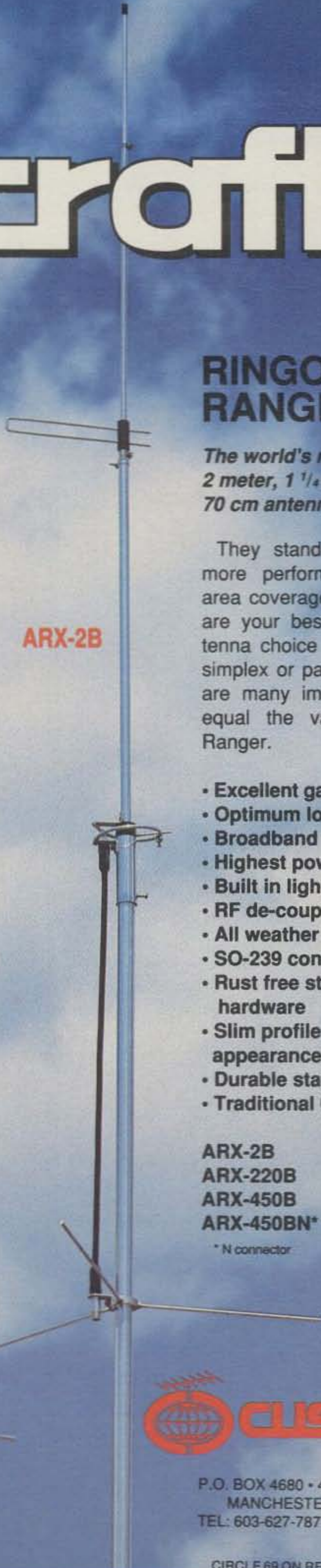
AR-270 144-148 MHz  
435-450 MHz



ARX-450B



AR-270



ARX-2B

## RINGO RANGERS

*The world's most popular 2 meter, 1 1/4 meter and 70 cm antennas.*

They stand tall to give you more performance and wider area coverage. Ringo Rangers are your best single band antenna choice for FM repeaters, simplex or packet radio. There are many imitations, but none equal the value of a Ringo Ranger.

- Excellent gain and bandwidth
- Optimum low angle radiation
- Broadband with low VSWR
- Highest power rating
- Built in lightning arrester
- RF de-coupling radials
- All weather performance
- SO-239 connector
- Rust free stainless steel hardware
- Slim profile for better appearance
- Durable static free aluminum
- Traditional Cushcraft value

ARX-2B 135-160 MHz  
ARX-220B 220-225 MHz  
ARX-450B 435-450 MHz  
ARX-450BN\* 435-450 MHz

\* N connector

AVAILABLE THROUGH  
DEALERS WORLDWIDE



P.O. BOX 4680 • 48 PERIMETER ROAD  
MANCHESTER, NH 03108 USA  
TEL: 603-627-7877 • FAX: 603-627-1764

CIRCLE 69 ON READER SERVICE CARD

# ANNOUNCEMENTS

## •Searching for Merchant Seamen WW II-

The merchant seamen of WW II have been granted Veterans Status by the Department of Defense because of a campaign by the Combat Merchant Mariners WW II. Benefits await these seamen. For more information, contact Combat Merchant Mariners WW II, 14 Castle Drive, Spring Valley, NY 10977 (914-623-8484).

•**WV7T/9 Special Event** - The Great Lakes Naval Training Center ARC will sponsor special event station WV7T/9 from 0000Z January 5 to 2359Z January 6 celebrating the club's third anniversary. Operation will be in the lower 50 kHz of the General and Novice phone bands. QSL to Great Lakes ARC, Bldg. 153, Camp Berry, Great Lakes, IL 60088-5705. Include the operator's name and personal call-sign. (SASE not required.)

•**19th Annual Midwinter Swapfest, Milwaukee, WI** - This swapfest will be held on Saturday, January 12 at the Waukesha Co. Expo Center Forum from 8 AM to 2 PM. Table reservations may be made in advance or at the door (advance reservation deadline January 4). Amateur exams starting at 9 AM. Sponsored by the West Allis Radio Amateur Club. For tickets or information write with SASE to WARAC Swapfest, P.O. Box 1072, Milwaukee, WI 53201.

•**MMRA Fleamarket, Westboro, MA** - The Minuteman Repeater Assn. will hold their fleamarket on Saturday, January 12 from 9:30 AM to 2 PM at the Westboro Senior High School, Westboro, Massachusetts. Vendor space requests should be sent in by January 1. Talk-in on 449.925, 223.94, and 146.61 MHz. For more information, contact Andy Morrison, N1BHI, 508-481-3878, or Ralph McNall, WB2DCL, 508-366-2404.

•**W8WVM Special Event** - The West Virginia Wesleyan College ARC will operate W8WVM on January 13 from 1700-2300Z to celebrate the 100th anniversary of West Virginia Wesleyan College, Buckhannon, West Virginia. Suggested frequencies: 7.270, 21.350, 28.350. For special QSL, send your QSL and SASE to West Virginia Wesleyan College Special Event, P.O. Box 65, Buckhannon, WV 26201-0065. For more information, contact Richard Clemens, 103 Barbours St., Buckhannon, WV 26201 (304-472-1651 or 304-472-3029).

•**KB0DAV Special Event** - Duluth, Minnesota area hams will operate KB0DAV from January 15-21 to commemorate the eighth annual John Beargrease Sled Dog Marathon. Operation will be ongoing throughout the race, SSB and CW 10 through 80 meters. For QSL send QSL and SASE to BARC (Beargrease Amateur Radio Coalition), P.O. Box 500, Duluth, MN 55801.

•**Winterfest '91, Monterey, CA** - Amateur radio demonstrations (TV, satellite, computers, Morse code, etc.) and a fleamarket are part of the Naval Postgraduate School ARC's Winterfest '91 to be held on January 19 from 8 AM to 3 PM at the Monterey Fairgrounds Salinas Room, Monterey, California. Free admission. For more information, contact Pat 408-649-4444 (days) or Doug 408-663-6117 (evenings).

•**W8NJH Special Event** - The Stu Rockafellow ARS will celebrate its 30th anniversary and operate W8NJH from 0100Z January 19 to

0100Z January 21 from the Plymouth International Ice Festival, Plymouth, Michigan. CW: 3.725, 7.125, 14.050, 21.125, and 28.125. SSB: 3.875, 7.240, 14.250, 21.325, and 28.400. For a certificate send number 10 SASE to Stu Rockafellow ARS, 201 S. Main, Plymouth, MI 48170.

•**Southfield, MI Swap & Shop** - The Southfield High School ARC will hold their 25th annual Swap & Shop on January 20 at Southfield High School, Southfield, Michigan from 8 AM to 3 PM. Tables must be reserved in advance. For more information, contact Robert Younker, Southfield Senior High School, 24675 Lahser Road, Southfield, MI 48034 (313-746-8675).

•**Yonkers, NY Hamfest** - The Metro 70 cm Network will sponsor their hamfest on January 20 from 9 AM to 3 PM at Lincoln High School, Yonkers, New York. VE exams. Talk-in on 440.425, 445.425T, PL 74.4 Hz, 146.910R/146.310T. Table reservations by January 10 (\$10 minimum); at the door \$20. For more information, contact Otto Supliski, WB2SLQ, 53 Hayward St., Yonkers, NY 10704 (914-969-1053).

•**Citrus County Hamfest, Crystal River, FL** - The 11th annual Citrus County Hamfest, sponsored by the Sky High ARC, will take place on January 26 at the National Guard Armory, Crystal River, Florida. Opens at 9 AM. Talk-in on 146.355/955. Tables by telephone reservations only from 9 AM to 9 PM (Ed Gaudet, K4BRC, 904-746-2371, or Phil Crawford, WB8D, 904-489-6179. SHARC Hamfest, 9 S. Davis St., Beverly Hills, FL 32665).

•**Hamfest '91, Villa Park, IL** - The Wheaton Community Radio Amateurs will hold Hamfest '91 on Sunday, January 27 at the Odeum Expo Center, Villa Park, IL. All fleamarket tables must be reserved (call 708-231-2428). Talk-in on 145.39/79, 224.14/2.54, 444.475/9.475 (carrier access during hamfest). Ladies programs, forums, fleamarket, commercial exhibits. Handicap accessible. For more information, contact WCRA, P.O. Box QSL, Wheaton, IL 60189, or call 708-629-8006.

•**Winterfare Computers and Ham Radio** - The Columbia, Pennsylvania Area ARC will hold their hamfest and computer show at the Columbia Markethouse, Columbia, PA on Sunday January 27 from 8 AM to 3 PM. VE exams. Talk-in on 146.715/115. For more information, contact the Hamfest Committee, Columbia Area ARC, P.O. Box 574, Columbia, PA 17512 (SASE), or call 717-684-5603.

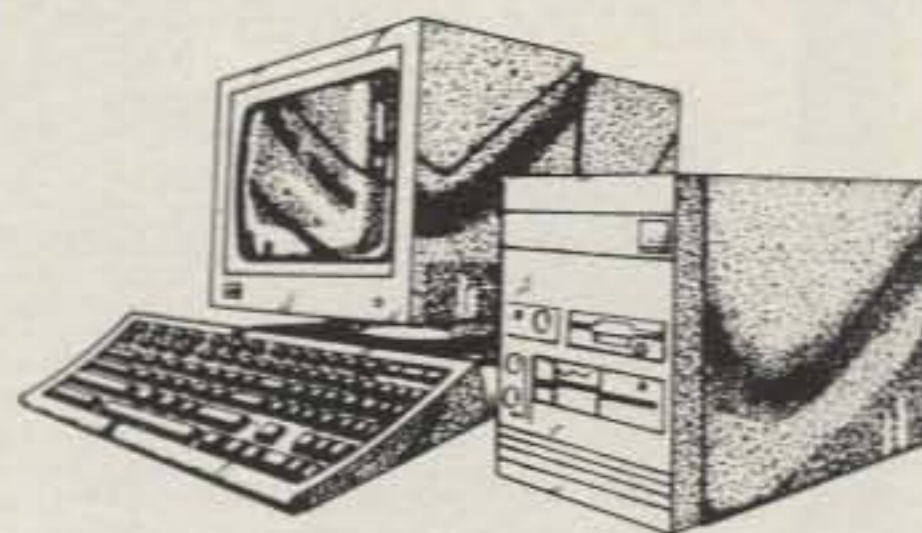
•**Niagara Peninsula ARC Big Event** - Niagara Peninsula ARC's hamfest/dinner-dance will be held on February 2 at the C.A.W. Hall, St. Catharines, Ontario. Talk-in on 147.24/84. For more information (including hamfest table reservations) write to NPARC Inc., P.O. Box 692, St. Catharines, Ontario, Canada L2R 6Y3, or call 416-562-4891. (Dinner-dance tickets available only in advance.)

•**42nd International DX Convention** - This popular annual event will be held at the Holiday Inn Hotel, Visalia, California, from April 12-14. Since this is such a popular event, make your plans early! For further information, contact Steve Stephenson, W6MKM, 230 W. 42nd Ave., San Mateo, CA 94403 (415-341-0757).

STOCK  
SERVICE  
SUPPORT

The **Sierra Technologies 386 SX Advanced Mini-Tower Computer** operates at 16 MHz providing reliable high-speed performance for the most demanding user...contest logging to packet radio.

*It does it all!*



**Sierra Technologies** stands behind their products with factory service. Additionally, the technical support staff will handle call-in problems. A one year parts and labor guarantee is provided on your purchase.

### What You Get

**Sierra Advanced 386 SX 16 MHz Mini-Tower Computer**

- 1 MB of 80 ns Dynamic Random Access Memory (DRAM)
- 40 MB Hard Disk — IDE 28 ms Access Time
- 5¼" 1.2 MB High Density Floppy Drive
- 3½" 1.44 MB High Density Floppy Drive
- 2 Serial, 1 Parallel, 1 Game Port
- Clock / Calendar
- Floppy / Hard Drive Controller Card
- Enhanced 101 Click Keyboard
- 14" Super VGA Monitor 1024 x 768, .29 dot pitch. Tilt Swivel Stand.
- 16 bit VGA Card with 512K memory

Amateur Net: **\$1895\***

Call to Order **1-800-543-2237**

Free Shipping on prepaid and credit card orders

**Sierra**  
TECHNOLOGIES GROUP

143 John Sims Parkway

Valparaiso, FL 32580

Tech Support 1-904-729-3447

See Review in November 1990 *CQ Magazine*

\*Prices Subject to Change Without Notice

CIRCLE 10 ON READER SERVICE CARD

January 1991 • CQ • 9

WORLDWIDE DISTRIBUTION



# HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

Call for Holiday Specials!

## 10 STORE BUYING POWER!

ICOM IC-765 **Take an ADDITIONAL \$25 OFF** our already low, low price



100W GENERAL COVERAGE RECEIVER  
HF ALL BAND TRANSCEIVER  
Maximum Operation Flexibility

**SALE! CALL FOR PRICE**

ICOM IC-781 **Take an ADDITIONAL \$50 OFF** our already low, low price



THE ULTIMATE  
150 W, ALL BAND  
HF TRANSCEIVER

**GREAT PRICE!**

ICOM IC-901 **Take an ADDITIONAL \$10 OFF** our already low, low price

FIBER OPTIC  
MULTI-BAND  
TRANSCEIVER



2 METER AND 440 MHz  
EXTRA-LARGE MULTI COLOR LCD  
HM14 TOUCH TONE MICROPHONE

**CALL FOR PRICE**

ICOM **Take an ADDITIONAL \$10 OFF** our already low, low price  
IC-275A/275H, 138-174 MHz  
IC-475A/475H, 430-450 MHz



A Models 25 WATTS H Models 100 WATTS

**LOW PRICE!**

### COAST TO COAST



NEW STORE!!  
Now in Denver!

**HRO=**  
Rapid deliveries from  
the store nearest you!

ICOM **Take an ADDITIONAL \$5 OFF** our already low, low price



IC-32AT  
Dual Band  
Hand Held

IC-2GAT  
2 Meter HT  
7 WATT

IC-2SAT, 2 MTR  
IC-3SAT, 220 MHz

IC-4GAT  
440 MHz  
5 WATT

IC-4SAT, 440 MHz  
IC-24AT, Duo-Band

(2 SAT shown)

ICOM IC-2400A/3220  
2m/440 MHz / 2m/440 MHz

**Take an ADDITIONAL \$10 OFF** our already low, low price



IC-2400A shown

VHF/UHF DUAL BAND  
FM TRANSCEIVER

ICOM IC-229H  
2 METER MOBILE



50 W/20 Memories/Small Size  
Extended RX Coverage, 118-174 MHz

**GREAT PRICE**

ICOM IC-725 **Take an ADDITIONAL \$15 OFF** our already low, low price



100W GENERAL COVERAGE RECEIVER  
HF ALL BAND COMPACT TRANSCEIVER

**GREAT PRICE**

**FREE Shipment!**

most items over \$100 UPS surface



**Bob Ferrero W6RJ**  
President/Owner

**Jim Rafferty N6RJ**  
VP - National  
Sales Manager

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

**ATLANTA, GA 30340**  
6071 Buford Highway  
(404) 263-0700  
Larry, WD4AGW, Mgr.  
Doraville, 1 mi. north of I-285

**BURLINGAME, CA 94010**  
999 Howard Av.  
(415) 342-5757  
Rich, WA9WYB, Mgr  
5 mi. south of SFO on 101

**NEW STORE!!**  
**DENVER, CO 89231**  
8400 E. Iliff Ave., #9  
(303) 745-7373  
(800) 444-9476

**OAKLAND, CA 94606**  
2210 Livingston St.  
(415) 534-5757  
Rich, WA9WYB, Mgr  
I-880 at 23rd Ave. ramp

**PHOENIX, AZ 85015**  
1702 W. Camelback Rd.  
(602) 242-3515  
Gary, WB7SLY, Mgr.  
East of Highway 17

**SALEM, NH 03079**  
224 N. Broadway  
(603) 898-3750  
(800) 444-0047  
Paul, NW1U, Mgr.  
Exit 1, I-93; 28 mi. no. of Boston

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

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

**WOODBIDGE, VA 22191**  
14803 Build America Drive  
(703) 643-1063  
(800) 444-4799  
Curtis, WB4KZL, Mgr.  
Exit 54, I-95, South to US 1

**CALL TOLL FREE NOW! Toll free in California!**

WEST 1-800-854-6046 MID-WEST/COLORADO 1-800-444-9476 SOUTHEAST 1-800-444-7927 MID-ATLANTIC 1-800-444-4799 NEW ENGLAND 1-800-444-0047

Toll free, incl. Hawaii, call routed to nearest store - Or call direct to your local store -

Phone hours, 9:30 AM to 5:30 PM. AZ, CA, CO, GA, VA residents, add sales tax. Prices, specifications, descriptions, subject to change without notice.

STORE WALK-IN HOURS: 10AM-5:30PM • CLOSED SUNDAYS

**Set it and forget it. W4RNL shows us how to automate our HD-73 rotator.**

# An Automatic Beam-Aimer For The HD-73 Antenna Rotator

BY L.B. CEBIK\*, W4RNL

**W**ith its modest price and sizable load capability, the Alliance HD-73 has been very popular with amateurs. Alliance no longer manufactures or markets the HD-73. Recently the rights to the HD-73 were sold to Philips ECG, who will now manufacture and market the rotator. I would expect to see them once again on dealers' shelves by the time you read this. Like many rotators in its class, it requires manual operation. The operator holds down the switch until the beam reaches the desired heading. Having built and used an automatic beam-aiming accessory for an old CD-44, I longed for the convenience of a similar item for the HD-73. In addition, if there are sightless amateurs using HD rotators, they could benefit from an easy-to-use and reliable rotator control with tactile calibration markings.

The completed unit now has the following features:

- A single "set-and-forget" directional control;
- Relatively simple, reproducible circuitry using common components;
- A safety interlock with the HD-73 to prevent improper operation of the rotator;
- Noncritical construction; and
- Minimal modification of the HD-73 control unit.

## The Circuit Idea

Set-and-forget automatic rotator controls are not new. The least expensive TV antenna rotators use electro-mechanical systems to achieve this goal. Heavier rotators such as the HD-73, the CD-44/45, and the Ham-M/IV use switches that the operator must hold down until the beam reaches its proper direction. There must be a better way!

\*1434 High Mesa Drive, Knoxville, TN 37938

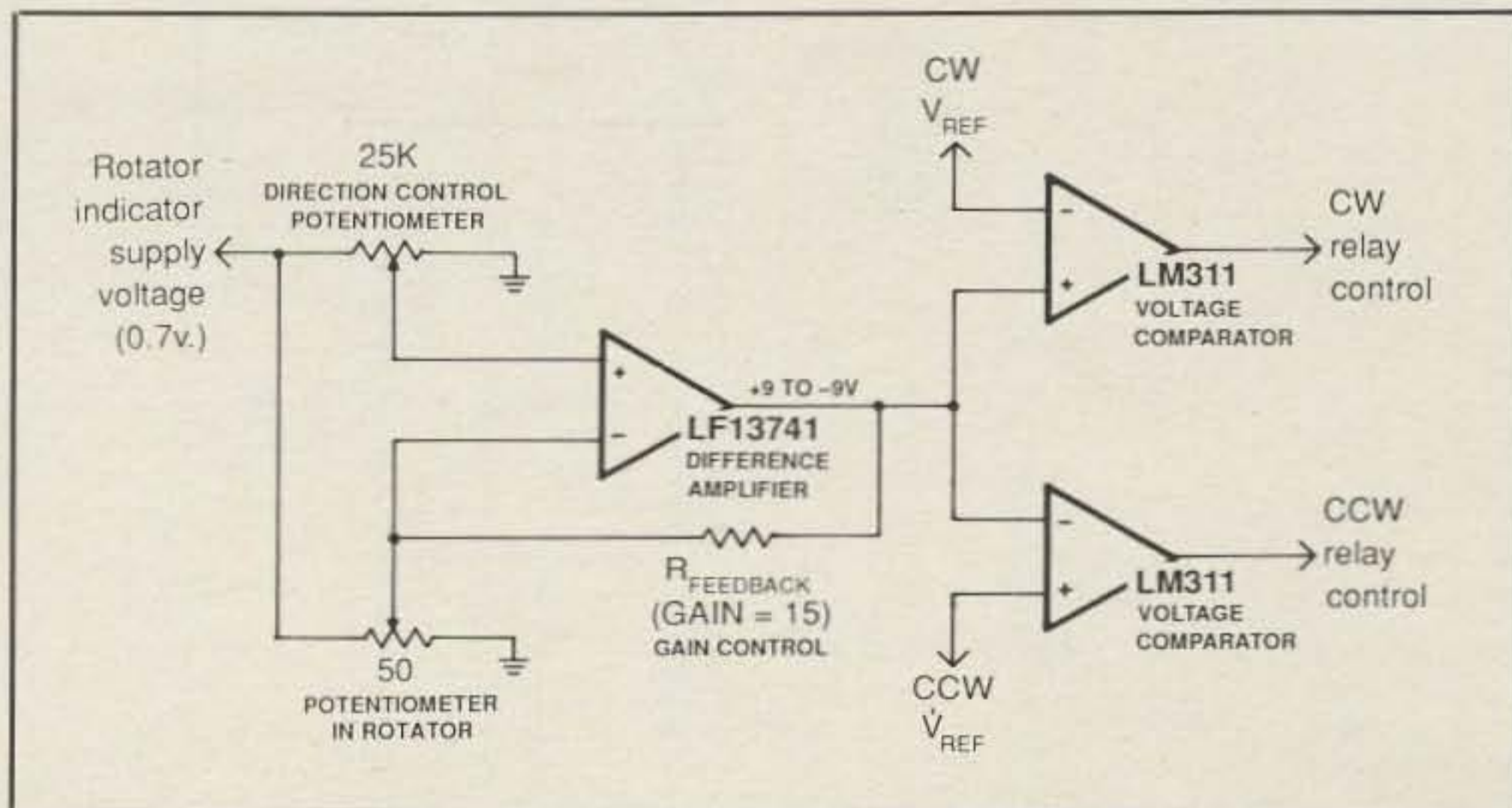
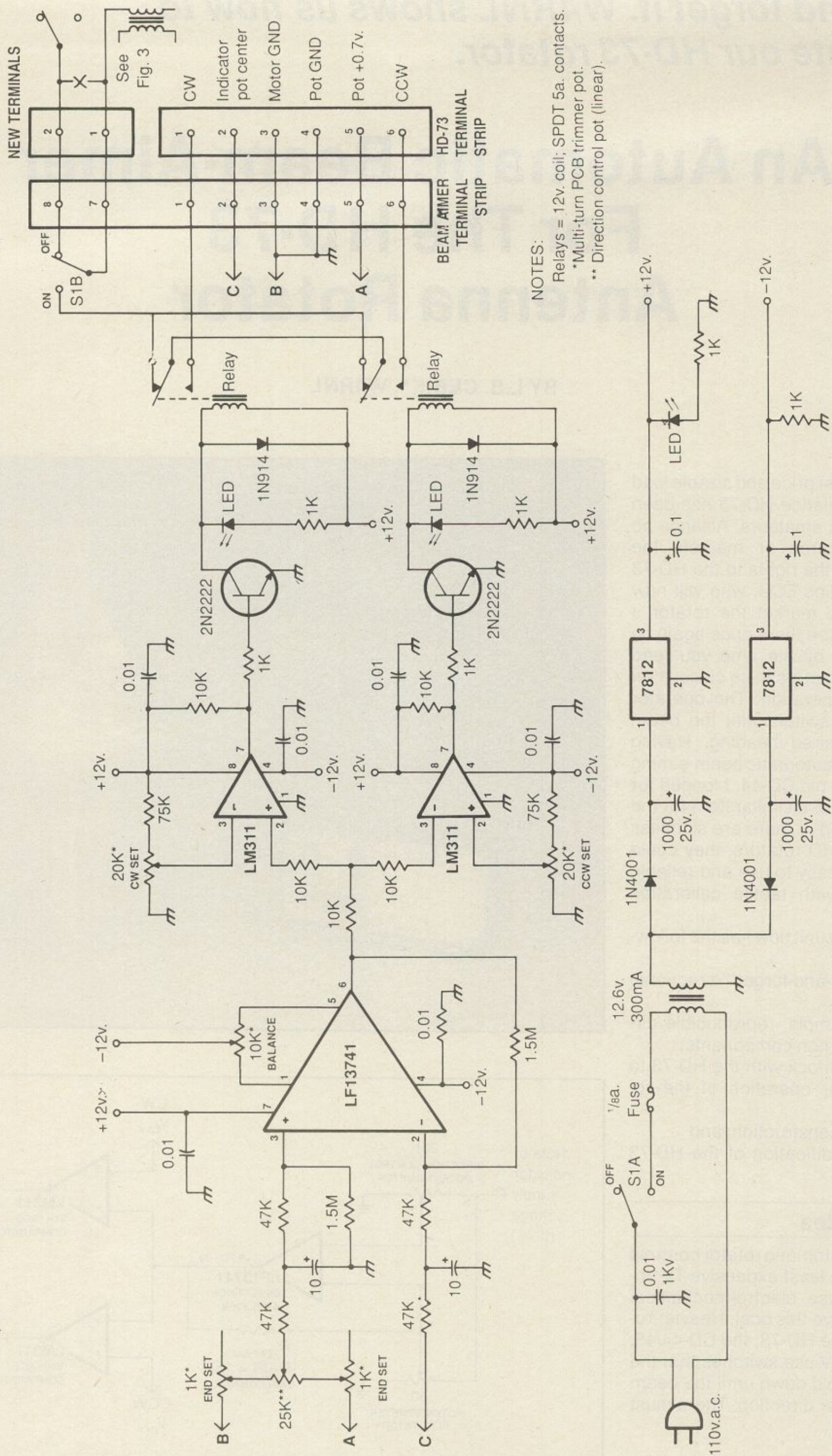


Fig. 1—A simplified schematic of the Alliance beam-aimer circuit idea.



NOTES:  
 Relays = 12v. coil; SPDT 5a. contacts.  
 \* Multi-turn PCB trimmer pot.  
 \*\* Direction control pot (linear).

Fig. 2—Schematic diagram of the beam-aimer and power supply.

A few years ago, K9AZG and I developed a reliable automatic control for the CD-44/45 and HAM-M/IV rotators.<sup>1</sup> The basic principle of these beam-aimers is to sense the difference in voltage at the taps of two potentiometers. One pot (50 to 75 ohms) is in the rotator motor unit. Its terminals are on the rotator control unit terminal strip for easy access. The second pot (about 25 K ohms) is tied across the end terminals of the rotator pot. Its tap voltage will equal that of the rotator pot tap only if the two are equal in rotation. If the operator moves the tap on the 25 K ohm pot, a differential voltage appears between the two taps.

Routing the differential voltage to a pair of voltage comparators yields the possibility of controlling two relays: one operates the rotator clockwise, the other operates it counterclockwise. The CD-type rotator is ideally set up for this type of control. When the two pots are coincident, the voltage at the direction control pot tap is zero. Positive voltages at this tap swing the beam in one direction while negative voltages send it the other way.

The HD-73 rotator differs from the CD-series in several respects. First, it uses an AC-driven motor that requires no separate braking circuit. That factor simplifies the auto-aimer somewhat, since no brake timing circuitry is required.

Second, the HD-73 indicator system uses positive voltage only for its 1 mA full-scale directional meter. Moreover, the maximum voltage across the rotator pot is about +0.67 volts, too low for sensitive, small movements of the beam.

The solution to these design variations, as shown in the simplified schematic in fig. 1, lies in a simple op amp difference amplifier input stage. Instead of driving the voltage comparators with voltages from the pot taps, we can send these voltages to an op amp which will both sense the difference and multiply it.

A DC amplifier with a voltage gain of 10 to 15 will yield positive and negative voltages of 6 to 9 volts at maximum difference between the two pots. When the pots are coincident, the op amp output is zero.

### The Beam-Aimer Circuit

Fig. 2 shows the full schematic of the beam-aimer. The differential amplifier has a gain of 15 and a noninverting input impedance of about 1.6 M ohm. The high input impedance is required so that the input circuit will not significantly affect the voltage at the direction pot tap. The direction control pot is itself of high resistance so as not to materially affect the voltage at the tap of the rotator pot. The high input impedance requires an FET-input op amp, such as the LF13741, the TL081, or similar units.

The series resistance to each input is split to permit a 10 mF tantalum filter capacitor. This capacitor tends to smooth jumps in the tap voltage during pot rotation. In addition, the series resistor and parallel capacitor add a small time delay in voltage increases and decreases. As the voltage from the rotator indicator pot meets and cuts off either of the voltage comparators, there is a very slight overshoot. The indicator pot voltage thus ends up at the center of the dead zone in which neither voltage comparator is on.

The direction control pot has trimmer pots at each end to equalize the effects of the resistance in the rotator cable on the rotator pot. A 1 ohm resistance in the line, typical for 65 to 100 foot cable runs, amounts to 1.5% of the total pot resistance. Multi-turn 1 K ohm PCB trimmers allow the end voltages to be matched precisely, after the difference amplifier has been balanced with the 10 K ohm multi-turn trimmer.

The remainder of the control circuitry is identical to earlier beam-aimers. The industry-standard LM311 provides a control voltage for the 2N2222 relay drivers. Directional LEDs indicate when the unit is working. The relays are wired so that if, by some quirk, both relays activate simultaneously, no voltage reaches the rotator motor. Each 311 has a rotation-limit trimmer to permit precise cut-off of the relay just as the motor reaches the limit of its rotation.

The power supply is a simple, dual 12-volt unit regulated with 7812 and 7912 three-terminal ICs. Note that the power switch is a DPDT toggle switch, half of which is used to provide an equipment safety feature.

### HD Modifications

The HD-73 control unit requires only one simple modification. The motor voltage line must be run to the beam-aimer unit to permit the relays to activate the rotator. All other connections are made to the existing terminal strip on the rear of the HD control unit.

We could bring a single "hot" line to the beam-aimer, but bringing a return line also allows an important safety and convenience feature. With just a hot line, we might accidentally set the beam-aimer to provide motor voltage for one direction and then hit the control-unit manual bar switch to supply voltage for opposite rotation. The second half of the power switch routes the hot line only to the relays whenever beam-aimer power is on. When power is off, the hot line is routed back to the HD-73 control unit for normal manual operation.

Modifying the HD-73 control unit requires breaking the lead between the transformer and the manual switch, as shown in the partial schematic in fig. 3.

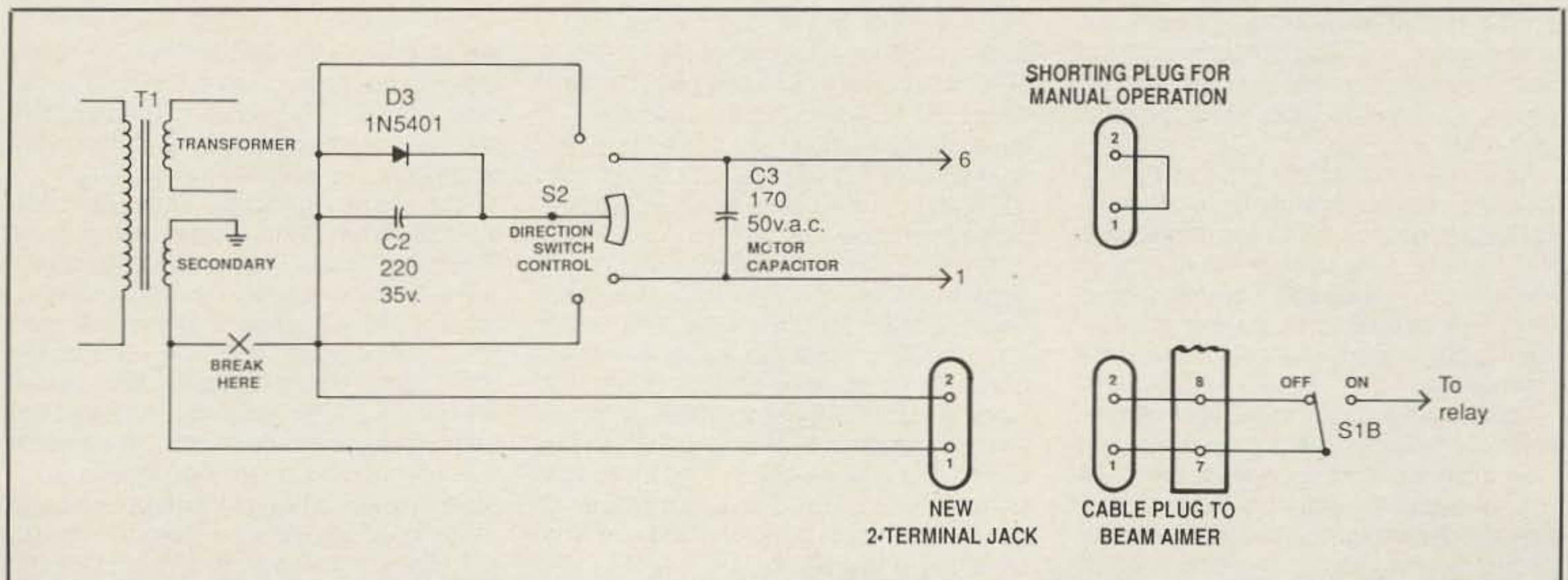


Fig. 3— Partial schematic of the HD-73 control unit to show necessary modifications.

This lead (a red wire in my unit) has a spade terminal that fits a spade lug on the switch. Simply clip off the terminal from the wire and route it to a new pair of rear terminals. Install a new spade terminal on a second piece of wire and route it from the new terminals to the switch.

There is room on the back panel of the HD control unit for a pair of terminals just to the right of the cable clamp lug. I used an old FT crystal socket because it was compact and fit the space and because a couple of old FT-241A crystals made handy plugs. Drilling for the socket installation should be done carefully with a slow-speed drill to prevent damage to the transformer about 1/2 inch behind the panel. Be sure to note carefully which socket hole is hot and which is the return line.

I made a shorting bar for one FT-241A crystal case (with the old crystal assembly removed). With the shorting plug in place, the HD control unit operates independently of the beam-aimer. The second FT-241A crystal case became a plug for two wires of the 8-wire cable connecting the HD control unit to the beam-aimer.

## Construction and Alignment

Construction is largely noncritical, since all the circuits are DC. As fig. 4 shows, the entire unit fits on a 4 1/2 inch by 6 inch piece of perfboard with room to spare. Use small heat sinks for the regulators, since the beam-aimer can draw over 100 mA during beam rotation. Keep all AC line connections isolated from the remainder of the circuitry for safety during testing and maintenance.

The difference amplifier requires only that some care be used to keep input and output leads and components well-separated—that is, on opposite sides of the op amp. Be sure to bypass the plus and minus supplies of both the 13741 and the 311s close to the body of the op amps. Also be sure that each 311 has a common ground point near the comparator; that measure helps prevent the unit from oscillating as the two input voltages pass each other.

Keep the leads to the 2N2222s short. Bypass all the hot terminals on the terminal strip to ground either inside the case or externally. Also bypass the AC line at the case entry using 1 KV ceramic capacitors. DC circuits can be sensitive at close range to the RF fields that surround a transmitter.

The parts list shows the source of most of the parts. Radio Shack carries virtually everything except the op amp, the 311s, and the negative regulator. Jameco, Digi-Key, and similar outlets are good sources for the missing items. The circuit on its perfboard fits nicely into a 2 by 8 by 6 inch case with rub-on panel markings covered

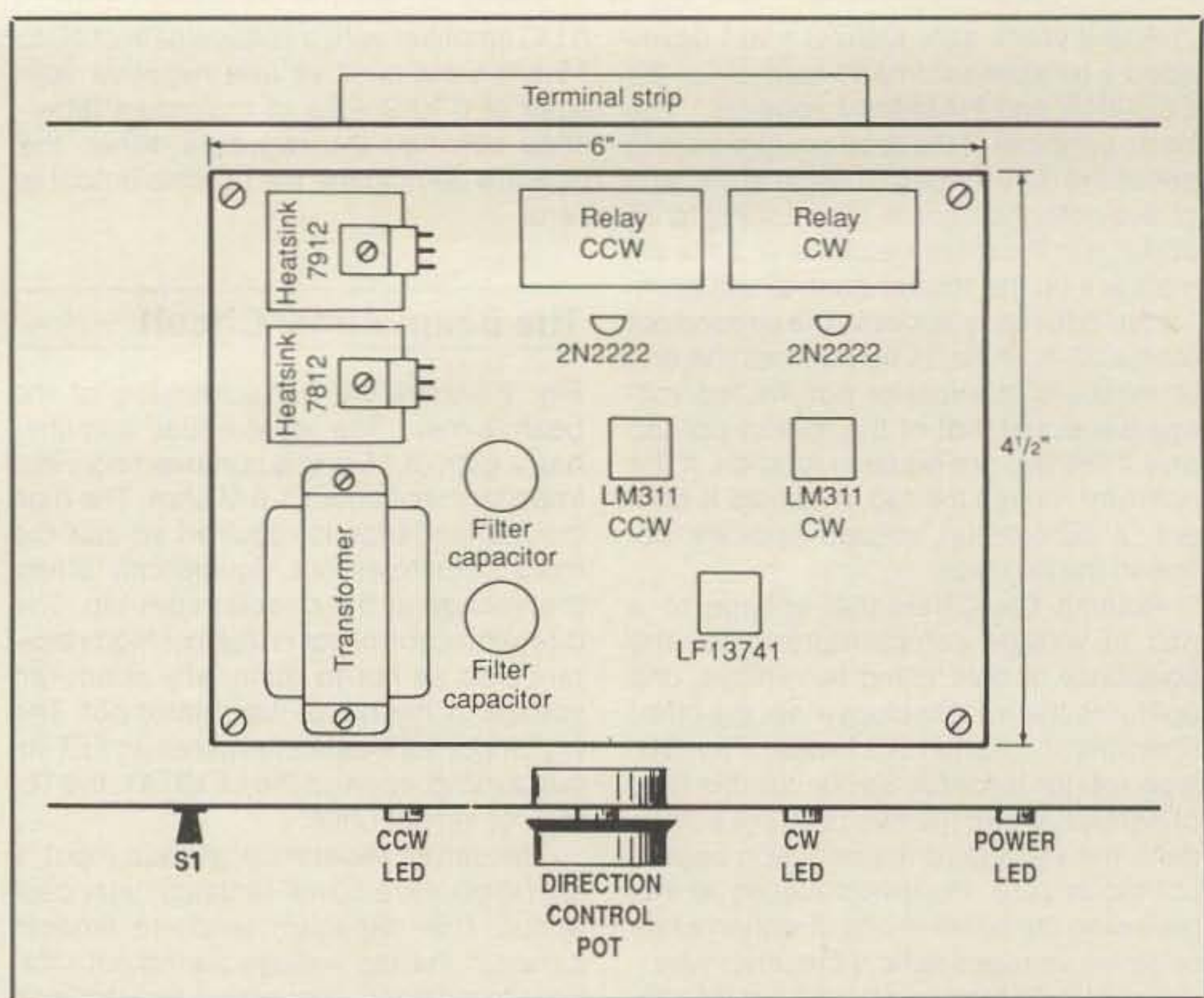


Fig. 4—A sketch of the beam-aimer circuit perfboard showing general layout of parts.

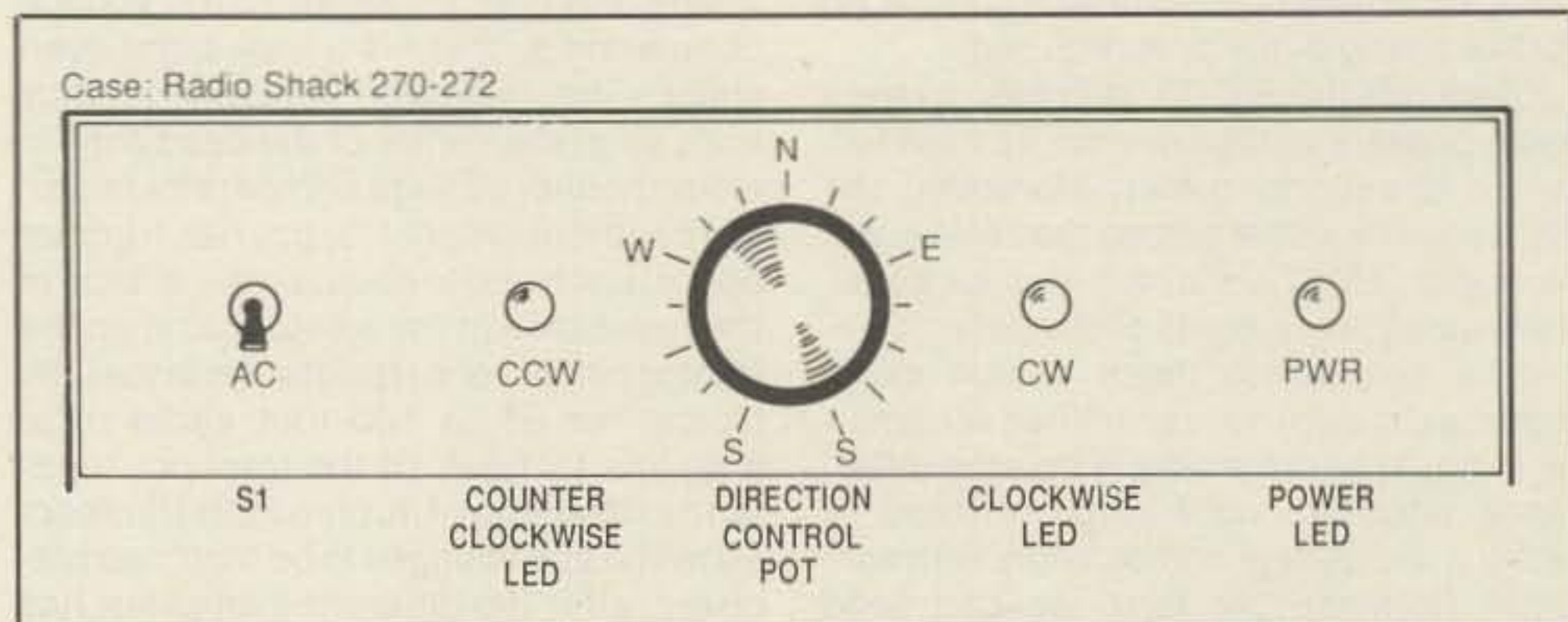


Fig. 5—A sketch of the front-panel layout of the beam-aimer.

with a coat or two of clear spray. Fig. 5 shows the general layout of the front panel, with its power switch and LED, the turn-direction LEDs, and the direction pot. The case size was selected because it fits neatly under the original HD control unit.

Tuning up the beam-aimer is a three-stage operation.

1. After building and smoke-testing the circuit and while it is outside the case, balance the LF13741. Use jumpers to temporarily ground the inputs at a point between the pot taps and the outer 47 K ohm resistors. Adjust the 10 K ohm balance trimmer until the amplifier shows 0.00 volts at the junction of the three 10 K ohm resistors. I used an analog meter to get into the ball park and did the final tweaking with a DVM.

2. With the perfboard installed in the case, connect the cable between the

aimer and the HD control unit. For now, omit terminals 1 and 6, and use the shorting plug rather than the cable plug at the new HD terminal socket. This permits setting the direction pot end trimmers while controlling the rotator manually.

Run the beam and the aimer direction control all the way clockwise. Adjust the 1 K ohm clockwise trimmer until the difference amplifier shows 0.00 volts output. Repeat the adjustment at the 1 K ohm counterclockwise extreme, using the other end trimmer. With the values shown in fig. 2, you should read about 9 to 10 volts op amp output (positive or negative, depending upon the relative positions of the pots) when the direction pot is at the opposite extreme from the rotator pot. Repeat the adjustment of the end trimmer pots to account for the slight interaction between the pots.





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



**IC-781** Xcvr/Rcvr/ps/tuner/scope .... 6149 5199



**IC-751A** 9-band xcvr/1-30 MHz rcvr 1699.00 1399  
**PS-35** Internal power supply..... 219.00 199<sup>95</sup>  
**FL-63A** 250 Hz CW filter (1st IF)..... 59.00  
**FL-52A** 500 Hz CW filter (2nd IF)..... 115.00 109<sup>95</sup>  
**FL-53A** 250 Hz CW filter (2nd IF)..... 115.00 109<sup>95</sup>  
**FL-70** 2.8 kHz wide SSB filter..... 59.00



**IC-735** HF xcvr/SW rcvr/mic..... 1149.00 969<sup>95</sup>  
**PS-55** External power supply ..... 219.00 199<sup>95</sup>  
**AT-150** Automatic antenna tuner .... 445.00 389<sup>95</sup>  
**FL-32A** 500 Hz CW filter..... 69.00  
**EX-243** Electronic keyer unit..... 64.50  
**UT-30** Tone encoder ..... 18.50

**IC-725** HF xcvr/SW rcvr..... (Special) 949.00 799<sup>95</sup>  
**AH-3** Automatic ant tuner .. (Special) 489.00 379<sup>95</sup>  
**IC-726** 10-band xcvr/6m..... (Special) 1299.00 1039

**Accessories**  
**IC-2KL** HF solid state amp w/ps..... 1999.00 1699  
**IC-4KL** HF 1KW out s/s amp w/ps..... 6995.00 5395  
**EX-627** HF auto. ant. selector (Special) 315.00 269<sup>95</sup>  
**PS-15** 20A external power supply ..... 175.00 159<sup>95</sup>  
**PS-30** Systems p/s w/cord, 6-pin plug 349.00 319<sup>95</sup>  
**SP-3** External speaker ..... 65.00  
**SP-7** Small external speaker ..... 51.99  
**CR-64** High stab. ref. xtal; 751A, etc ... 79.00  
**SM-6** Desk microphone ..... 47.95  
**SM-8** Desk mic - two cables, scan ..... 89.00  
**AT-100** 100W 8-band auto. ant. tuner ... 445.00 389<sup>95</sup>  
**AT-500** 500W 9-band auto. ant. tuner ... 589.00 519<sup>95</sup>  
**AH-2** 8-band tuner w/mount & whip .... 758.00 689<sup>95</sup>  
**AH-2A** Ant tuner system, only .. (Special) 559.00 469<sup>95</sup>  
**GC-5** World clock..... (Closeout) 91.95 69<sup>95</sup>

Accessories for IC-765, 781, 725 • CALL for Prices



★ Large Stocks  
 ★ Fast Service  
 ★ Top Trades  
 at **AES**

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



**VHF/UHF Mobile Transceivers**  
**IC-229A** 25w 2m FM/TTP mic ..... Regular **SALE**  
 449.00 389<sup>95</sup>  
**IC-229H** 50w 2m FM/TTP mic..... 479.00 419<sup>95</sup>  
**IC-448A** 25w 440 FM/TTP ... (Closeout) 599.00 499<sup>95</sup>  
**Dual-band FM Transceivers**  
**IC-3220A** 25w 2m/440 FM/TTP mic... Regular **SALE**  
 659.00 569<sup>95</sup>  
**IC-3220H** 45w 2m/35w 440 FM/TTP 699.00 599<sup>95</sup>  
**IC-2400A** 2m/440 FM/TTP ... (Special) 899.00 699<sup>95</sup>  
**IC-2500A** 35w 440/1.2GHz FM..... 999.00 869<sup>95</sup>



**Multi-band FM Transceiver**  
**IC-901** 2m/440 Fiber opt. xcvr (Special) 1199.00 929<sup>95</sup>  
**UX-R91A** Broadband receiver unit... 389.00 349<sup>95</sup>  
**UX-19A** 10w 10m unit..... 299.00 269<sup>95</sup>  
**UX-59A** 10w 6m unit..... 349.00 319<sup>95</sup>  
**UX-S92A** 2m SSB/CW module..... 599.00 529<sup>95</sup>  
**UX-39A** 25w 220MHz unit (Special) 349.00 279<sup>95</sup>  
**UX-129A** 10w 1.2GHz unit ..... 549.00 499<sup>95</sup>

**VHF/UHF Mobile Transceivers**  
**IC-970A** 25w 2m/430 MHz transceiver 2895.00 2499  
**IC-970H** 45w 2m/430 MHz transceiver 3149.00 2699  
**UX-R96** 50-905 Mhz receive unit.... 389.00 349<sup>95</sup>

**Mobile Antenna**  
**AH-32** 2m/440 Dual Band mobile ant 39.00  
**AHB-32** Trunk-lip mount..... 35.00  
**Larsen PO-K** Roof mount ..... 23.00  
**Larsen PO-TLM** Trunk-lip mount .... 24.70  
**Larsen PO-MM** Magnetic mount ..... 28.75

**Repeaters**  
**RP-1510** 2m 25w repeater ..... Regular **SALE**  
 1849.00 1649  
**RP-2210** 220MHz 25w repeater ..... 1649.00 1399  
**RP-4020** 440MHz 25w repeater ..... 2299.00 1999  
**RP-1220** 1.2GHz 10w repeater..... 2599.00 2249



Use your  
**CREDIT  
 CARD**



**Hand-helds**  
**IC-02AT/High Power** Regular **SALE**  
 409.00 349<sup>95</sup>  
**IC-04AT 440 (Closeout)** 449.00 329<sup>95</sup>  
**IC-2SA 2m .. (Special)** 419.00 289<sup>95</sup>  
**IC-2SAT 2m/TP (Spec)** 439.00 319<sup>95</sup>  
**IC-3SAT 220 HT/TTP** 449.00 369<sup>95</sup>  
**IC-4SAT 440 HT/TTP** 449.00 369<sup>95</sup>  
**IC-2GAT 2m HT/TTP** 429.00 379<sup>95</sup>  
**IC-4GAT 440MHz, TTP** 449.00 369<sup>95</sup>  
**IC-32AT 2m/440 HT** 629.00 549<sup>95</sup>  
**IC-24AT .....** (Special) 629.00 499<sup>95</sup>

**Limited Offer! .. FREE BP-82 external 7.2V @ 300ma. battery with IC-3SAT purchase.**

**IC-12GAT** 1w 1.2GHz HT/batt/cgr/TTP 529.00 469<sup>95</sup>  
**Aircraft band hand-helds**  
**A-2** 5W PEP synth. aircraft HT..... Regular **SALE**  
 525.00 479<sup>95</sup>  
**A-20** Synth. aircraft HT w/VOR..... 625.00 549<sup>95</sup>

For HT Accessories • CALL for Prices

**Receivers**  
**R-71A** 100kHz-30MHz rcvr ... (Special) Regular **SALE**  
 \$999.00 799<sup>95</sup>  
**RC-11** Infrared remote controller .... 70.99  
**FL-32A** 500 Hz CW filter..... 69.00  
**FL-63A** 250 Hz CW filter (1st IF)..... 59.00  
**FL-44A** SSB filter (2nd IF)..... 178.00 159<sup>95</sup>  
**EX-257** FM unit..... 49.00  
**EX-310** Voice synthesizer..... 59.00  
**CR-64** High stability oscillator xtal 79.00  
**SP-3** External speaker ..... 65.00  
**CK-70 (EX-299)** 12V DC option ..... 12.99  
**MB-12** Mobile mount..... 25.99



**R-7000** 25MHz-2GHz receiver..... 1199.00 1029  
**RC-12** Infrared remote controller.... 70.99  
**EX-310** Voice synthesizer ..... 59.00  
**TV-R7000** ATV unit..... 139.00 129<sup>95</sup>



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

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. Prices subject to change without notice.

**Top Trades!** • We'll take your Clean Late Model gear in trade towards New ICOM Equipment. Write or Call for our Quote Today!

**AES** ★ Over 33 Years in Amateur Radio  
**HOURS:** Mon. thru Fri. 9-5:30; Sat. 9-3

Order Toll Free: 1-800-558-0411

FAX: (414) 358-3337

**AMATEUR ELECTRONIC SUPPLY** Inc.

5710 W. Good Hope Road; Milwaukee, WI 53223 • Phone (414) 358-0333

**AES** BRANCH STORES

**WICKLIFFE, Ohio** 44092  
 28940 Euclid Avenue  
 Phone (216) 585-7388  
 1-800-321-3594

**ORLANDO, Fla.** 32803  
 621 Commonwealth Ave.  
 Phone (407) 894-3238  
 1-800-327-1917

**CLEARWATER, Fla.** 34625  
 1898 Drew Street  
 Phone (813) 461-4267  
 No Toll Free Line

**LAS VEGAS, Nev.** 89106  
 1072 N. Rancho Drive  
 Phone (702) 647-3114  
 1-800-634-6227

**Associate Store**  
**CHICAGO, Illinois** 60630  
 ERICKSON COMMUNICATIONS  
 5456 N. Milwaukee Avenue  
 Phone (312) 631-5181  
 1-800-621-5802



IC-725 HF Xcvr./Gen. Cov. Rcvr. ....	\$799.00
IC-726 HF/6-Mtr. Xcvr./Gen. Cov. Rcvr. ...	1099.00
IC-735 HF Xcvr./Gen. Cov. Rcvr. ....	939.00
AH-2A HF Automatic Antenna Tuner .....	479.00
AT-150 HF Automatic Antenna Tuner .....	369.00
PS-55 AC Power Supply .....	196.00
IC-765 HF Xcvr./Gen. Cov. Rcvr. ....	2679.00
SM-8 Desk Microphone .....	89.00
IC-R7000 Communications Receiver .....	1019.00
AH-7000 Omnidirectional Ant. For IC-R7000 ...	99.00
IC-28H 2-Meter, FM, 45 Watt Xcvr. ....	384.00
IC-228H 2-Meter, FM, 45 Watt Xcvr. ....	419.00
IC-229H 2-Meter, FM, 50 Watt Xcvr. ....	409.00
IC-2400A 2-Mtr./440-MHz, FM, 45W/35W ...	689.00
IC-26AT 2-Mtr., FM, Handheld With T-T ...	364.50
IC-46AT 440-MHz, FM, Handheld With T-T ...	384.50
IC-32AT 2-Mtr./440-MHz, FM, Handheld W/T-T ...	534.50
IC-2SAT 2-Mtr., FM, Mini Handheld W/T-T ...	349.50
IC-3SAT 220-MHz, FM, Mini Handheld W/T-T ...	359.50
IC-4SAT 440-MHz, FM, Mini Handheld W/T-T ...	384.50
IC-24AT 2-Mtr./440-MHz, FM, Mini H-H W/T-T ...	534.50
BP-5 10.8 VDC, 425 mA., Ni-Cad Batt. Pack ...	65.00
BP-7 13.2 VDC, 425 mA., Ni-Cad Batt. Pack ...	79.00
BP-8 8.4 VDC, 800 mA., Ni-Cad Batt. Pack ...	79.00
BP-83 7.2 VDC, 600 mA., Ni-Cad Batt. Pack ...	49.00
BP-84 7.2 VDC, 1000 mA., Ni-Cad Batt. Pack ...	75.00
BP-85 12.0 VDC, 340 mA., Ni-Cad Batt. Pack ...	99.00
BC-16U AC Wall Charger For IC-BP7, 8, 23, 24 ...	21.25
BC-74A AC Wall Chg.; BP-81, 82, 83, 84, 85, Int. ...	21.25
BC-35 Drop-In Rapid Charger; IC-BP2, 5, 7, 8 ...	79.00
BC-72A Drop-In Chg.; BP-81, 82, 83, 84, 85, Int. ...	99.00
CP-11 Cigarette Lighter Cable W/Noise Filter. ...	18.99
CP-12 Cigarette Lighter Cable W/Noise Filter. ...	18.49
BA-12 Bat. Chg. Adap.; IC-2SAT/Int. Bat./BC-72A ...	16.99
HM-46 Speaker/Microphone .....	31.99

**AMPHENOL**

83-1AP UHF, Right Angle Adapter .....	\$3.37
83-1J UHF, Barrel Adapter .....	2.00
83-1SP UHF, Male, Silver-Plated PL-259 .....	1.50
83-168 UHF, RG-59/U Reducer .....	.41
83-185 UHF, RG-58/U Reducer .....	.37
82-101 Type-N, Barrel Adapter .....	5.47
82-202 Type-N, Male, For RG-8/U .....	3.19
82-202-1006 Type-N, Male, For Belden 9913 ...	3.48
31-3202 BNC, Male, For RG-58/U, 142/U, 223/U ...	2.26
31-4541 BNC, Male, For RG-59/U, 62/U .....	3.07

Other Amphenol Connectors And Adapters Are Available

**CUSHCRAFT**

A3 14, 21, 28-MHz, 3-Element Beam .....	\$274.00
AP8 3.5, 7, 10, 14, 18, 21, 24, 28-MHz Vertical ...	172.00
R5 14, 18, 21, 24, 28-MHz Vertical .....	245.00
ARX-2B 2-Meter, Ringo Ranger II Vertical ...	44.00
ARX-450B 450-MHz, Ringo Ranger II Vertical ...	44.00
124WB 144 to 148-MHz, 4-Element Beam ...	44.00
215WB 144 to 148-MHz, 15-Element Beam ...	95.00
A147-11 146 to 148-MHz, 11-Element Beam ...	56.00
A449-11 440 to 450-MHz, 11-Element Beam ...	49.00

**ASTRON**

RS-7A 13.8 VDC, 7 Amp Int., 5 Amp Cont. ....	\$47.94
RS-12A 13.8 VDC, 12 Amp Int., 9 Amp Cont. ...	69.54
RS-20A 13.8 VDC, 20 Amp Int., 16 Amp Cont. ...	86.14
RS-35A 13.8 VDC, 35 Amp Int., 25 Amp Cont. ...	138.94
RS-12M Same As RS-12A, With Meter. ....	80.34
RS-20M Same As RS-20A, With Meter. ....	105.34
RS-35M Same As RS-35A, With Meter. ....	156.94
RM-35M Rack Mount Version Of RS-35M. ...	223.94
VS-35M Same As RS-35M, Adj. Volt./Curr. ...	168.74
VS-50M 13.8 VDC, 50A Int., 37A Cont., Adj. ...	232.34

UPS/Insurance Charges Are Additional  
MC And VISA Orders Are Accepted  
Prices Subject To Change Without Notice

*LaRue Electronics*

1112 GRANDVIEW STREET  
SCRANTON, PENNSYLVANIA 18509  
PHONE (717)343-2124

CIRCLE 133 ON READER SERVICE CARD

**Parts List**

Quantity	Part	Source
1	LF13741, TL-081, or similar op amp	D-J*
2	LM311 voltage comparator	D-J
2	2N2222 or equiv. NPN switching transistor	RS*
1	7812 + 12 volt regulator	RS
1	7912 - 12 volt regulator	D-J
2	12 volt, 5 amp contacts, SPDT relay	RS 275-219
2	1N4001 50 PIV, 1 A diode	RS
2	1N914 or equivalent signal diode	RS
3	LED, color to suit taste	RS
1	25 K ohm linear potentiometer	RS
1	10 K ohm multiturn PCB trimmer pot	D-J
2	1 K ohm multiturn PCB trimmer pot	D-J
2	20 K ohm multiturn PCB trimmer pot	D-J
4	47 K ohm, 1/4 watt resistor	RS
2	1.5 M ohm, 1/4 watt resistor	RS
2	75 K ohm, 1/4 watt resistor	RS
5	10 K ohm, 1/4 watt resistor	RS
6	1 K ohm, 1/4 watt resistor	RS
2	0.01 mF, 1 KV ceramic capacitor	D-J
6	0.01 mF, 50 volt ceramic capacitor	RS
2	1000 mF, 25 volt electrolytic capacitor	D-J
1	0.1 mF, 25 volt tantalum capacitor	D-J
1	1 mF, 25 volt tantalum capacitor	D-J
2	10 mF, 25 volt tantalum capacitor	D-J
1	perfboard, 4 1/2 inches by 6 inches	RS
1	case, 1 1/16 by 8 1/4 by 6 1/8 inches	RS 270-272
1	8-terminal lug strip	RS
1	2-terminal strip/jack and matching plug	
3	8-pin DIP sockets	RS
2	TO-220 heat sinks	RS
1	DPDT toggle switch	RS
1	12.6 volt, 300 mA transformer	RS
1	1/8 A fuse and holder	RS
	Miscellaneous hardware, knob, wire, line cord, etc.	

Table I- Parts list for the automatic beam-aimer. (\*Note: RS = Radio Shack; D-J = Digikey, Jameco, and other mail-order sources.)

3. During the early adjustments, you may see one or even both LED relay indicators on. The final adjustment sets the "dead zone" and the end-of-rotation position. Finish connecting all eight lines of the aimer cable before beginning this adjustment.

Use the beam-aimer to turn the beam counterclockwise. Set the 20 K ohm trimmer in the counterclockwise circuit until the relay stops just as the beam reaches south. (Note: If the relay always cuts off before the beam reaches south, adjust the counterclockwise direction pot trimmer so that the beam reaches south before the relay cuts off. Then readjust the 20 K ohm trimmer for relay cut-off.)

Turn the beam fully clockwise and repeat the adjustment in the clockwise circuit. (Note: Preadjust the clockwise direction trimmer if the beam never reaches clockwise south before relay cut-off.)

The adjustments just made create a dead zone of 5 to 10 degrees in which both relays are off. This dead zone is just about right for HF beams, with their 30 degree or greater beam angles. If the

dead zone is larger, readjust both the direction pot trimmers and the 311 trimmers until it shrinks. The object is to have a zone in which the operating relay shuts off without starting the other relay in both directions and everywhere throughout the direction pot range.

The beam-aimer is now ready for use. Its convenience will quickly show itself as you find yourself making more small beam direction adjustments than with the manual HD control unit. With tactile calibration of the direction pot scale, sightless hams can accurately track the stations they wish to work simply by setting the pot and listening for the relay to click off. One way or another, the HD beam-aimer is a satisfying project for a dead-band weekend.

**Notes**

1. L.B. Cebik, W4RNL, "Elegant Rotating," 73, June 1984, pp. 60-64; see also Guy Slaughter, K9AZG, "Automatic Beam Aimer," 73, November 1982, pp. 22-24.



# SGC

# SG-230

# SMARTUNER

**HF ANTENNA COUPLER  
SSB, AM, CW & DATA  
FAST-INTELLIGENT-ACCURATE  
OPERATES WITH ANY HF TRANSCEIVER**

The *Smartuner* high technology coupler intelligently tunes any length antenna (8 to 80 ft) in the HF band. The unit will operate with any HF transceiver within its' specifications. The *Smartuner* switches 64 input and 32 output capacitance combinations plus 256 inductance combinations in a "pi" network resulting in over a half-million different ways to ensure a perfect match for the transceiver. And, *it remembers the frequency and the tuning values* and will re-select these values in less than 10 ms next time you transmit on that frequency.

**SGC**  
**WARRANTY REGISTRATION CARD**  
Card must be mailed within 10 days of purchase to validate warranty.

NAME: J. MARTINO VESSEL NAME: AFRICA ROVER  
ADDRESS: SEE BELOW  
TELEPHONE: \_\_\_\_\_  
MODEL: SG-230 SERIAL: NBRQA90484 VOLTAGE: 12V  
PURCHASED FROM: SGC  
DATE PURCHASED: 1 MAY 89 DATE INSTALLED: 1 DEC 89  
INSTALLED BY: J. MARTINO (OPERATOR)  
CAPE TOWN DEPT OF STATE WASH DC 20521

**PERFORMANCE INFORMATION**  
LENGTH OF TIME TO INSTALL: 5 hrs (WITH COPPER STRIP GROUND PLANE)  
WAS SATISFACTORY TEST CALL MADE? YES  
DISTANCE COMMUNICATED: USSR/JAPAN/N.Z. AMATEUR BAND USING SAIL BOAT BACKSTAY

Circle One  
INSTALLATION:  Simple  Difficult  
TUNING:  Simple  Difficult  
TEST CALL:  Good  Fair  Poor  
VOICE QUALITY:  Good  Fair  Poor  
YOUR COMMENTS: WHAT CAN I SAY!  
FIRST CONTACT NEAR  
MOSCOW 5-5



**SPECIAL  
HAM PRICE:  
\$555.00**

- MICROPROCESSOR CONTROLLED
- NON-VOLATILE MEMORY
- WATERPROOF
- B.I.T.E. INDICATOR
- 1.8 TO 30 MHZ RANGE
- 10 TO 150 WATTS INPUT POWER
- 10 mS RETUNING TIME
- 8 TO 80 FT. ANTENNA (All Types)
- FOR MARINE, AVIATION, HAM AND PARA-MILITARY APPLICATIONS

The SG-230 Smartuner is available from:

Eli's Amateur Radio, FL - 305-525-0103  
Gordon West Radio, CA - 714-549-5000

Henry Radio, CA - 213-820-1234  
Surplus Sales, NE - 402-346-4750

SGC Inc. SGC Building, 13737 S.E. 26th St. Bellevue, WA 98005 USA  
P.O. Box 3526, 98009. Telex: 328834. Fax: 206-746-6384 Tel: (206) 746-6310

**Sometimes the "Walter Mitty" type fantasies that attracted a lot of us to amateur radio have a way of coming true. In some instances they come true in a very ominous fashion as VQ9TD/K3OQF relates.**

## Amateur Radio & Diego Garcia

### It Took 30 Years, But Timing Is Everything

BY WALTER SCHULZ\*, VQ9TD/K3OQF

**A**nother day is coming to a close as we sit overlooking the Indian Ocean sunset. The jukebox is blaring in the background.

*"She drives me crazy  
I don't know why,  
She drives me crazy  
I can't help myself."*

My thoughts drift farther back in time to my high school days, and the club radio station at Abraham Lincoln High School, W3EYD. I had found in a pile of books an old 1938 *QST* and was leafing through the magazine. One picture caught my eye—that of a Chinese-built junk sailing the Indian Ocean. It was interesting. The hams onboard were sailing from Hong Kong to the World's Fair in New York City. With keener interest I read on. The junk encountered the monsoons that swell the Indian Ocean, and my thoughts became interwoven with their adventure. I could not image then what was to happen 30 years later.

Slowly my mind comes back to reality. It is July 1990. I am sitting by that same ocean on Diego Garcia sipping a beer on the terrace of the EXPAT (expatriate) club with another REO (Radio Electronics Officer). The merchant mariners are here for various reasons, and all of them are silent ones. Sometimes things go wrong on the beach, or it's obvious—for the money. There are not many girls here, and those who are here have their pick, so one must be content with beer and pizza along with the big event of the night.

#### The Big Event

It is time to feed the hundreds of crabs on the beach the last slice of pizza. They

\*15225 Wayside Road, Philadelphia, PA 19116



*This is a view of the PVT Harry Fisher, one of the prepositioning vessels stationed at Diego Garcia, B.I.O.T. This ship is the same as my ship and one of five special roll-on/roll-off ships which are operated by Maersk Line, Ltd., under contract to the U.S. Navy Military Sealift Command.*



*One of my other positions, the 500 kHz console on the M/V PFC James Anderson, Jr.*



Yes, there really is a ham shack on Diego Garcia as this view shows. Next to the shack is a 100 foot tower supporting a TH7DXX.

swarm sideways, grabbing and fighting over a single slice. Wonder what would happen if you fell down drunk on the beach sound asleep? It's a question that no one has to answer. Should it happen, the next day there would be nothing but bare sand!

Every night we all go back to our ships. We all are a part of the maritime repositioning squadron. We merchant mariners sit in Diego Garcia Lagoon waiting for action, a sail order that will take us back to sea. Some hope the order never comes, for the cargo we carry means war.

Time passes ever so slowly, and the squadron waits.

I came to this place having never sailed this ocean. After 23 years of yearning, I returned to the sea I once knew so well. I know the sea is unforgiving. One mistake, one storm or mishap and my family would hear "Eternal Father Strong to Save." But I am at peace with myself here. The call is strong, and this may be my last time to sail on my radio officer license. After 1992, by international treaty, there may not be any radio operators aboard ship. Therefore, I have come to silence

the yearning before it's too late.

I am a Radio Electronics Operator (REO) onboard the *M/V PFC James Anderson, Jr.* My duties include sending telex message traffic employing the Maritime, Satellite uplink, Sitor, and CW. Other duties include maintaining the ship's radars along with all the other electronic equipment onboard the vessel. It's a never-ending job. There is always something breaking down, and always at the worst possible moment. I think Murphy's Law has taken complete control!

With being so far away from the supply line, it gets very difficult to make things work again with a minimum of spare parts. The routine never ceases to be interesting. It's a very busy time.

The radio amateur license came when I was thirteen, and then while in the Navy the Second Class Radiotelegraph ticket came. Eventually I acquired the six month sea time and obtained the First Class Radiotelegraph and First Class Radiotelephone Licenses. However, it was probably my secret yearning to work DX from VQ9 land, as I had done 26 years earlier at Guam, that really brought me to the island. This is the place to work DX, I thought! Therefore, the radio amateur license was promptly obtained from the British Consular on Diego Garcia Island—VQ9TD.

The British are in charge of the island. By treaty, only the western portion of the



## NEWS BULLETIN

CALL US NOW!

YOUR HAM DOLLAR GOES FURTHER AT...

CALL OR WRITE FOR SPECIAL QUOTE

When it comes to FAST DELIVERY, HONEST DEALING and PROMPT/DEPENDABLE S-E-R-V-I-C-E back-up We don't just advertise it—WE GIVE IT!

*we'll treat you*

SELECTION

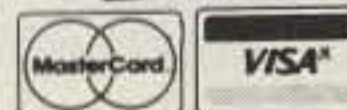
S-E-R-V-I-C-E

and

SATISFACTION!

STORE HOURS:

9-5 P.M. (CST)  
MONDAY thru FRIDAY  
OPEN SATURDAYS  
from 9-1 P.M. (CST)  
CLOSED  
SUNDAYS/HOLIDAYS



182 N. Maple  
P.O. Box 73  
Watertown, SD 57201

In 1937, Stan Burghardt (WØIT), because of his intense interest in amateur radio, began selling and servicing amateur radio equipment in conjunction with his radio parts business. We stand proud of this long-lasting tradition of *Honest Dealing, Quality Products and Dependable "S-E-R-V-I-C-E"!*

*Above all, we fully intend to carry on this proud tradition with even more new product lines plus the same "fair" treatment you've come to rely on. Our reconditioned equipment is of the finest quality with 30, 60 and even 90-day parts and labor warranties on selected pieces. And always remember:*

### — WE SERVICE WHAT WE SELL —

AEA	B & W	Daiwa	Palomar
Alinco	Belden	Hustler	Radio Callbook
Ameritron	Bencher	Kantronics	Ritron
Amphenol	Bird	Kenwood	Rohn
Ampire	Butternut	Larsen	Telex/Hygain
Antenna Specialists	Centurion	MFJ	Ten-Tec
Astron	CES	Mirage/KLM	Unadilla/Reyco
	Cushcraft	Mosley	Yaesu

Write today for our latest Bulletin Used Equipment List.

**Burghardt** INC.  
AMATEUR CENTER

"AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER"

SELL-TRADE

New & Reconditioned

HAM EQUIPMENT

Call or Write Today For a Quote!  
You'll Find Us to be Courteous, Knowledgeable and Honest

PHONE (605) 886-7314

FAX (605) 886-3444

**YAESU**

FT-470

Compact Dual-Band  
2 m/70 cm FM  
Handheld Transceiver



Up to 5 Watts Output, 2 VFOs and 21 Memories for Each Band Are Only A Few of Many Features. Specially Priced! Call, Write or FAX Today!



Here's N6SS/VQ9SS at the operating position. There had been a slight mix-up in the use of VQ9SS, but that has been straightened out and reported on in the DX bulletins.

island could be used. The eastern side is still coconut groves with one partially sunken barge. Donkeys run wild along with Diego Garcia's national bird—chickens! These animals are all left from the copra plantation days. All the native plantation workers along with their families are gone. The island has been strictly developed for military use to facilitate communications and as a forward base from which the U.S. Navy can operate in the Indian Ocean. No civilian visitors allowed!

The British incorporated Diego Garcia into its British Indian Ocean Territories, separating the island from Mauritius during 1965. The island was discovered by the Portuguese in the 16th century. During most of its history it belonged to Mauritius. The island's location is of strategic importance, being 1400 miles south of In-

dia, with Saudi Arabia lying to the northwest, Africa to the west, and one of the world's sealane bottlenecks, the straits of Malacca, to the east.

With the withdrawal of British influence from the Persian Gulf and Middle East region during the early 1970s, Diego Garcia became more important to the United States and Britain. It provides an anchorage on the world's third largest body of water, covering an area of 28 million square miles.

### It Hits The Fan

As days pass the work becomes more routine, and I can start to enjoy the island living. The REOs stand their eight hour in-port watch. Each day passing one after another makes for an idyllic winter in the tropics.



This U.S. Navy photo shows the island of Diego Garcia. The island was formed by the rim of an extinct volcano and is located 5 to 7 degrees below the equator in the Chagos Archipelago of the Indian Ocean.

Each day after supper I take the launch to the island, usually finding myself in the company of Preston, VQ9SS, and Harmon, VQ9QM (both REOs on other vessels) at the island's ham shack. Preston dutifully works his 40 meter CW early in the evening. Then around eight o'clock I work 20 meter CW. Harmon comes along later and works more CW on the amateur radio bands.

We are living a peaceful island life, going to and from the ship working DX. Sometimes we drop by the famous Brit Club to watch the Saturday night show. Nobody listens to the news or even cares!

We are out on convoy exercises when it hits the fan. The Middle East crises erupts. Cutting short our exercises, each ship breaks off, returning to Diego Garcia.

By the beginning of August, we are busy readying our vessel for sea again to sail to an unknown destination. The following morning, a bright day, we sail out to sea, never to see Diego Garcia again. Our track takes us north on the Indian Ocean. Then one day we find ourselves riding on 12 foot seas in the Arabia Sea, and we all know where we are heading. No one has to say!

The Captain calls the crew together, explaining that our destination is Saudi Arabia. The US Navy will meet us at the Straits of Hormuz and escort the ship to its destination.

The water in the Persian Gulf is usually calm and visibility is limited. A haze lies over the water from the desert's heat. This environment makes it very attractive for a speedboat to come alongside a ship in the Gulf. It is therefore a real possibility for unwelcome boarders to get on a ship. The threat of a ship seizure and the crew becoming hostages looms over our heads constantly. The Captain deems it necessary to take precautions to prevent this from happening.

The crew rigs firehoses in case of chemical warfare, and chains doors closed to the weather decks from inside the old and new living quarters. This makes it possible for only one entrance to our living quarters. Two crew members are stationed with shotguns on the stern as look-outs as we enter the Persian Gulf.

We arrive at our destination in the evening without incident, thanks to the U.S. Navy. Immediately the download of our equipment for our armed forces arriving in Saudi Arabia begins. It is hot (around 110 degrees F) and humid during this time of the year. For me the adventure is over, however. I have a medical problem that needs attention in the States.

As we drive to Dhahran to catch a British Airways jet to London, my thoughts remain with those friends on the ship. I have had an interesting adventure, and hope for my friends that the ship will soon return home to the USA and this crises will pass.



## Ameritron gives you a full

kilowatt *output* (nearly the *input* of some linears) of peak envelope power for only \$1095 -- from a whisper quiet linear that's perfect for your operating desk because it measures just 8 1/4" H x 14" D x 14 1/4" W.

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

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

### All Band Coverage

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

### Tuned Input lets solid state rigs deliver full output

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

### Pi-L Output Tank

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

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

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

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

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

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

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

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

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

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

### Gutsy Heavy Duty Power Supply

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

A husky 22 pound power transformer

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

Some competing high priced amplifiers using *two* 3-500Zs can't give you much more power output than the AL-80A. Why?

Because their lightweight power supplies can't deliver enough high voltage for the tubes.

### Step-Start Inrush Protection™

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

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

Eventually, this massive inrush current will damage your amplifier.

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

By starting your AL-80A through a 10 ohm

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

### Comes completely factory built, tested and guaranteed to work . . .

. . . *not a kit you have to build*

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

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

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

### Two Year Warranty

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

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

### Commitment to Service

Even after the 2 year warranty period, Ameritron Customer Service Technicians are available to help you keep your AL-80A performing flawlessly -- no matter how long you have it. Just call 601-323-8211.

### Input Power or Output Power? Don't be fooled

The AL-80A gives you a full kilowatt *output* -- that's nearly the *input* of some linears. Output power is what goes into your antenna. Don't be fooled by amplifiers rated by input power.

## Ameritron AL-80A SALE

. . . get a full Kilowatt output . . . for ~~\$1095~~ \$995



### Quality Made in USA

At Ameritron, we don't just ship amplifiers made in a foreign country -- we build them to last.

### Save \$100 Off Regular Price of \$1095

Call your favorite dealer for your best price while the AL-80A is on sale for \$995 retail. Order today.

Limited time offer. Sale price offer subject to cancellation without notice or obligation. Available at participating dealers.

### Lightning Fast QSK Switch

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

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

Factory installation is available.



. . . the high power specialist

921 Louisville Rd. • Starkville, MS 39759  
Sales: (601) 323-8211 • FAX: (601) 323-6551  
Free Catalog or Nearest Dealer: 800-647-1800  
Made in U.S.A. © 1991

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

Don't consider a linear amplifier without this critical protection.

### Exclusive Adapt-A-Volt™ Transformer

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

Ameritron's exclusive Adapt-A-Volt™ transformer in the AL-80A lets you compensate for too high or too low line voltage.

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

Before you buy an amplifier make sure it can adapt to *your* line voltage.

### Dual Illuminated Meters

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

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

# CQ REVIEWS:

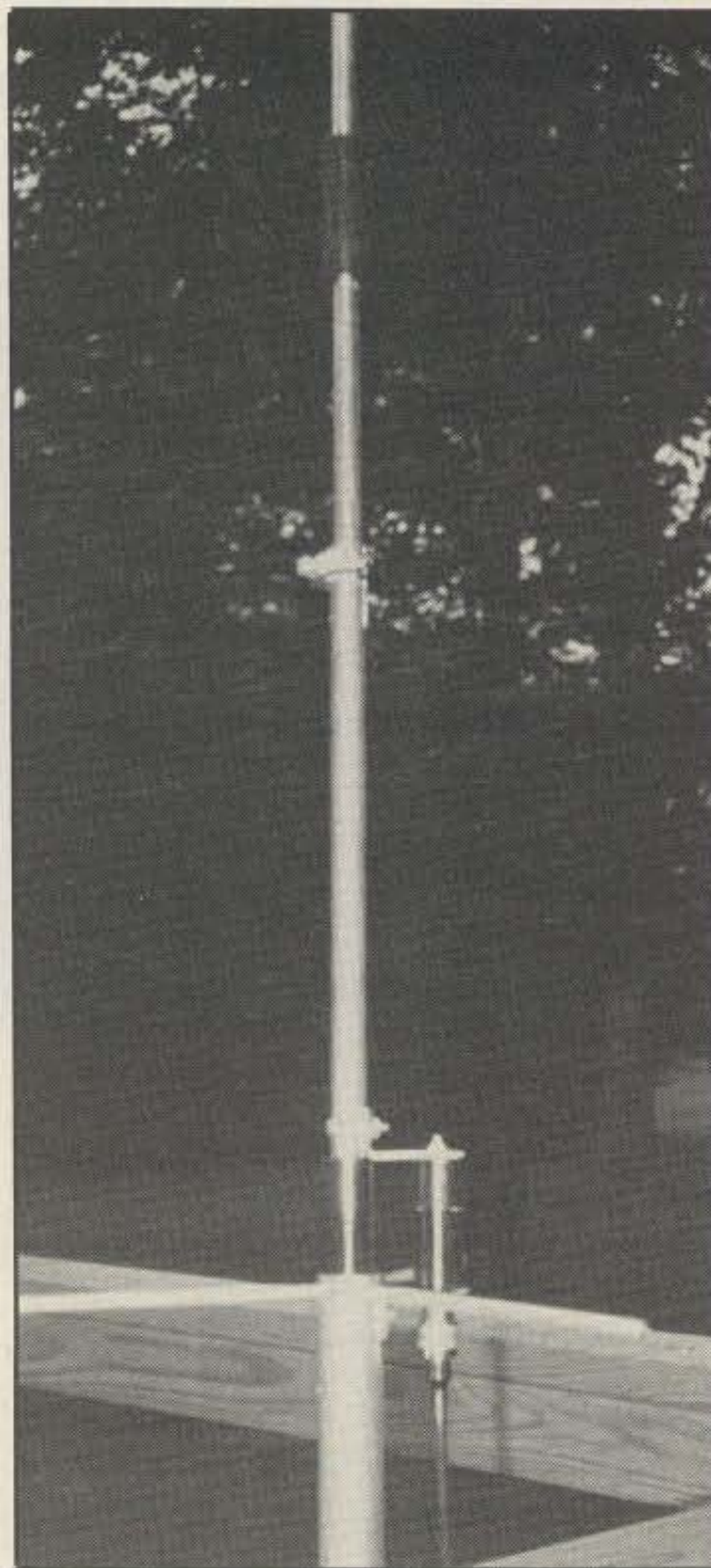
## The Cushcraft AR-270 2 Meter/440 MHz Dual-Band Ringo Vertical Antenna

BY JOHN J. SCHULTZ\*, W4FA

**D**ual-band 2 meter/440 MHz handhelds and transceivers having full duplex capabilities are becoming increasingly commonplace. Cushcraft has tried to accommodate the situation by introducing the AR-270 dual-band "Ringo" to complement their "Ringo Ranger" line of single-band VHF/UHF base-station antennas. The AR-270 does not have quite the gain of the single-band units, but it does have respectable gain and its construction is much more streamlined than some of the single-band units. As with the other "Ringo" antennas, the AR-270 has RF decoupling radials and a built-in coaxial lightning arrestor.

Table I shows the specifications for the AR-270, and fig. 1 shows the mechanical makeup of the antenna. The overall height of the antenna is about 45 inches. The 16 inch section shown in fig. 1 can be varied slightly if you want to optimize the SWR on a given frequency, although this will rarely be necessary because of the inherent broad bandwidth of the antenna on both 2 meters and 440 MHz. Only two of the three 6 $\frac{3}{4}$  inch long radial rods at the base of the antenna are shown in fig. 1. The antenna functions as a  $\frac{5}{8}$  vertical on 2 meters and as a vertical collinear on 440 MHz.

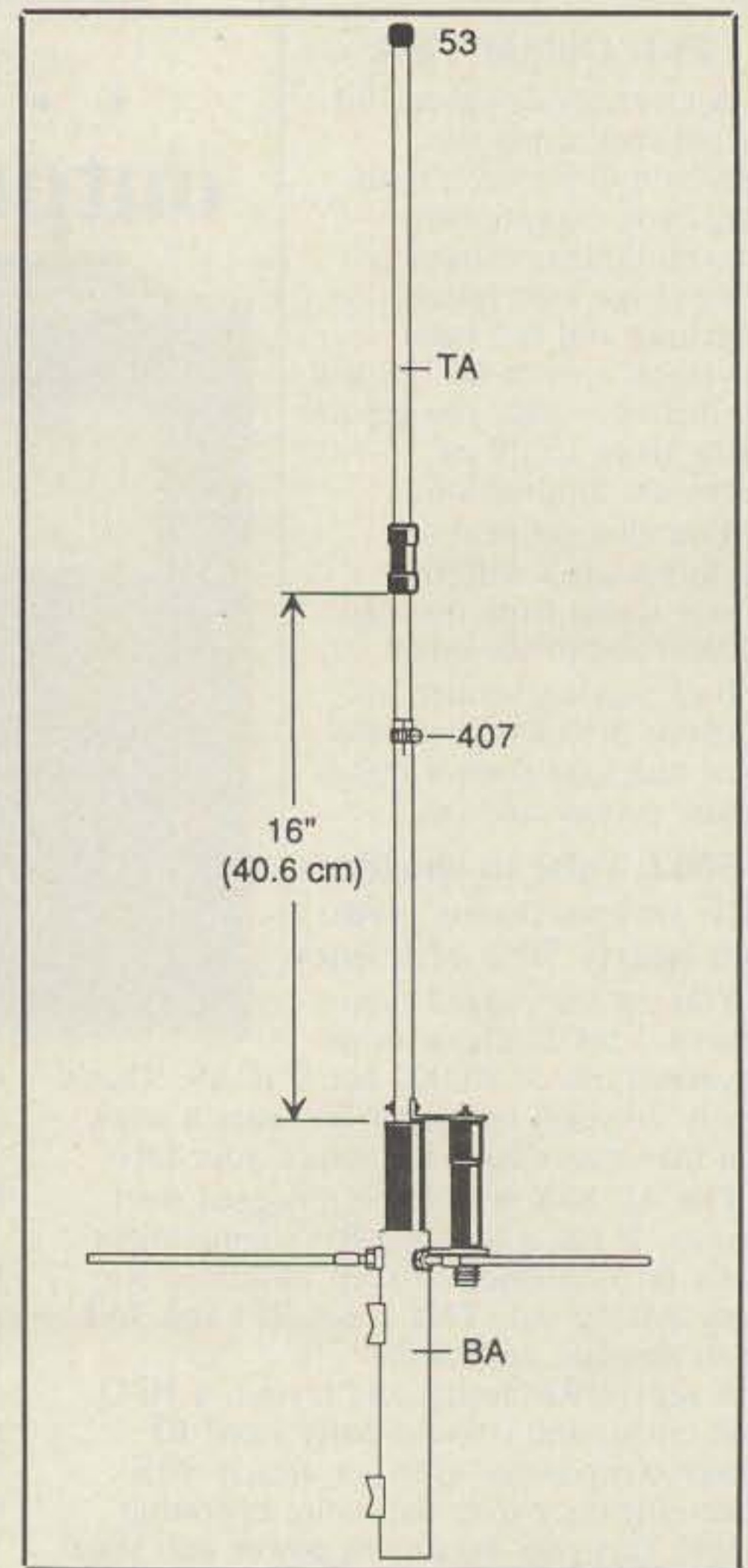
Every coupling element in the antenna is encapsulated, and there are no protruding stubs or phasing lines. The antenna comes almost completely assembled. The base section is completely assembled except for the three radial rods which screw into the assembly. The rest of the assembly work consists basically of inserting the top section into the base section, tightening them together with a worm clamp, and making a coaxial cable connection. The AR-270 can be mounted on the side of a mast (the necessary worm clamps are provided), or you could



*View of the base section of the antenna. Not all of the hardware had been installed at this point.*

devise an in-line mast mounting. A connector boot to protect the coaxial connection junction and a packet of silicone grease are provided.

The antenna certainly delivers the impression of having superior mechanical properties. The wind loading is minute,



*Fig. 1— Overall physical make-up of the AR-270. All of the coupling and phasing sections are encapsulated.*

and although I'm hardly an expert, I would suspect its survivability in 100 mph plus winds would be very high. It's the sort of antenna that if you erect it properly and pay good attention to the coaxial line connections, it should last for years of trouble-free service.

\*302 Glasgow Lane, Greenville, NC 27858



## SPECIFICATIONS

Model	AR-270	
Frequency, MHz	144-148	435-450
VSWR 1.2:1 Typical		
2:1 Bandwidth in MHz	>4	>15
Gain, dB	3.7	5.5
Power Rating, Watts FM	250	250
Horizontal Radiation		
Pattern, Degrees	360	360
Height, ft (m)	3.75 (1.13)	
Mast Size Range, in (cm)	1.25-2.0 (3.2-5.1)	
Radial Length, in (cm)	6.75 (17.1)	
Wind Load, ft <sup>2</sup> (m <sup>2</sup> )	0.27 (0.03)	
Weight, lb (kg)	2.0 (0.9)	

Table 1—Manufacturer's specifications of the AR-270.

The SWR bandwidth seemed to be well within specifications, although I didn't check it above 440 MHz. I doubt if any user would have any need to SWR tune the antenna. The AR-270 definitely works far better than a simple groundplane, although I had no way to verify gain figures. However, there is no question in my mind that Cushcraft dubbed the AR-270 a

"Ringo" antenna being quite conscious of the reputation of the "Ringo" series. Sometimes good things come in small, neat packages that instantly perform well, and that sums up the AR-270.

The AR-270 is list priced at \$80 and is manufactured by Cushcraft Corporation, P.O. Box 4680, 48 Perimeter Road, Manchester, NH 03108.



## JAN CRYSTALS

*your reliable source for  
a world of crystal clear  
communication*



- Commercial Two-Way
- MicroProcessors
- Amateur/Experimental
- Scanners/Monitors/Pagers
- Satellite-Telemetry
- Plus custom applications

**EXPEDITED ORDER SERVICE!**

FOR FREE CATALOG,  
CALL OR WRITE:

**JAN CRYSTALS**

P.O. Box 06017  
Ft. Myers, FL 33906  
(813) 936-2397



**TOLL FREE 1-800-526-9825**  
**FAX ORDERS: 1-813-936-3750**

CIRCLE 89 ON READER SERVICE CARD

**ICOM**



**IC-781**  
World's Most Advanced  
HF Transceiver  
LIST \$6,149.00

**ICOM**



**IC-970A**  
All Mode, Multi-Band  
Transceiver Covering 144,  
440 MHz and Optional 1.2 GHz  
LIST \$3149.00

**KENWOOD**



**TS-950SD**  
NEW! HF with Digital  
Signal Processing  
LIST \$4,399.95

**YAESU**



**FT-1000**  
Top-Of-The-Line 200W  
HF With DDS  
LIST \$4399.00

**AEA**



**PK-232 MBX**  
The Original TNC Now  
with Pak-Mail™ Mailbox  
LIST \$349.95

**ICOM**



**IC-229H**  
Ultra Compact 2 Meter,  
50 Watt Mobile  
LIST \$479.00

**ICOM**



**IC-2400A**  
Advanced 2 Meter/440 MHz  
FM Transceiver  
LIST \$899.00

**KENWOOD**



**TS-440S/AT**  
Compact High Performance  
HF Transceiver  
LIST \$1,449.95

**KENWOOD**



**TM-241**  
Compact 2 Meter Mobile With  
Extended Receive and AM  
Detect For Aircraft Band  
LIST \$469.95

**AEA**



**MORSE MACHINE**  
Super Memory Keyer With  
Built-in Training Functions  
LIST \$189.95

**ICOM**

**KENWOOD**



**IC-24AT**  
Compact  
144/440 MHz  
Handheld With  
40 Memories  
LIST \$629.00



**TH-27A**  
Super Compact  
2 Meter HT  
With Extended  
Receive And  
Up To  
5 Watts Output  
LIST \$419.95

Prices subject to change, some items are limited  
and subject to availability.

**HAMTRONICS, INC.**

4033 Brownsville Road, Treose, PA 19047  
For Service & Info (215) 357-1400

For Orders (800) 426-2820 FAX 215-355-8958

M, T, W (9-6) Th, F (9-8) Sat (9-3)

**Gift Ideas That Are  
Always Welcomed**

CQ's BUYER'S GUIDES  
CALLBOOKS  
LOGBOOKS  
ARRL TAPES  
ARRL MANUALS  
ARRL HANDBOOK  
REPEATER DIRECTORIES

ALPHA DELTA • CUSHCRAFT • JRC • TENTEC • DAIWA • MFJ • AMERITRON • RFCONCEPTS • B & W

**The author calls it "cheap." We prefer frugal, but either word is correct in describing this project.**

# How To Build (And Use) A Frugal, Easy To Build, HF Packet Tuning Indicator

BY FRED DAHNKE\*, WB6IQV

**W**hen I decided to give HF packet radio a try, I got so frustrated that I almost gave up packet altogether. I could hear the packets, but I couldn't copy them.

My TNC, the Kantronics KPC-2, has no tuning indicator. This is a "feature" common to many other TNCs. It is not a problem for VHF operation at 1200 baud. However, for HF operation at 300 baud, tuning can only be accomplished by sheer luck, a steady hand, and a high tolerance for frustration.

I figured there were enough amateurs in the same boat that the equipment manufacturers had solved this long ago. I learned that TAPR and MFJ both sell tuning indicators designed for TAPR clones, but the KPC-2 is not a TAPR clone. Kantronics does not have an add-on tuning indicator, but they sell the KAM All-Mode Communicator (list price around \$300) which has a built-in tuning indicator. My problem wasn't solved that easily.

The good folks at Kantronics did, however, aim me in the right direction. One of their technicians sent me the schematic (fig. 1) and instructions for using a pair of 567 IC Tone Decoder circuits. You build two identical tone decoders, each driving an LED and fed from the same audio. Each decoder is tuned to one frequency in the tone pair used by your TNC. Tuning is achieved when both LEDs flash with the same intensity.

I still had a problem. Every circuit I build rarely works and looks like a prop in a low-budget horror film. I am terrified by any project that even hints at making a printed circuit board. Even projects that I build from kits invariably go back to the factory to correct my mistakes. But with my back seemingly against the wall, I set out to acquire the handful of parts necessary to build an HF packet tuning indicator.

While searching for parts at a recent hamfest, I stopped at the Ramsey Elec-

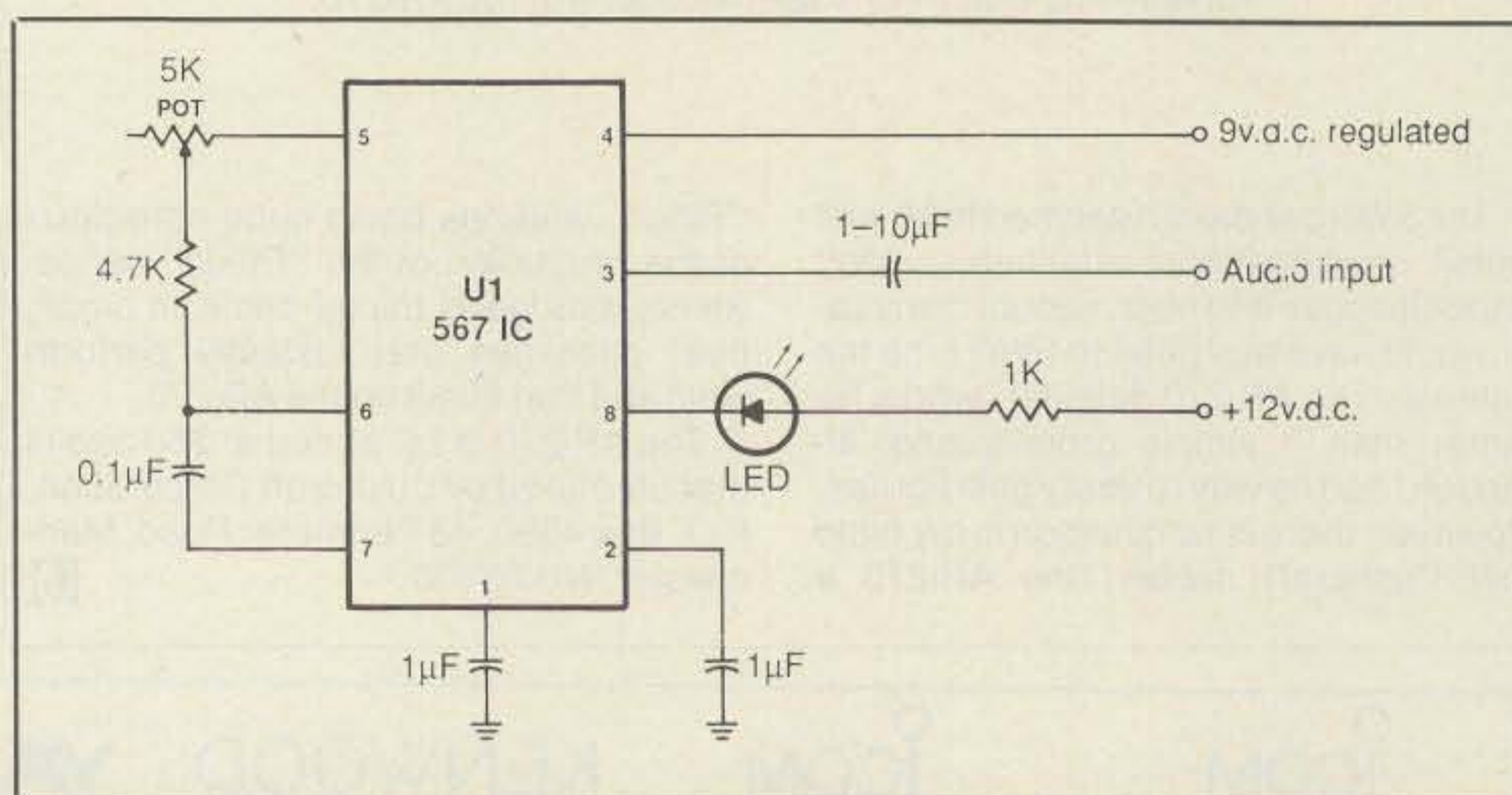
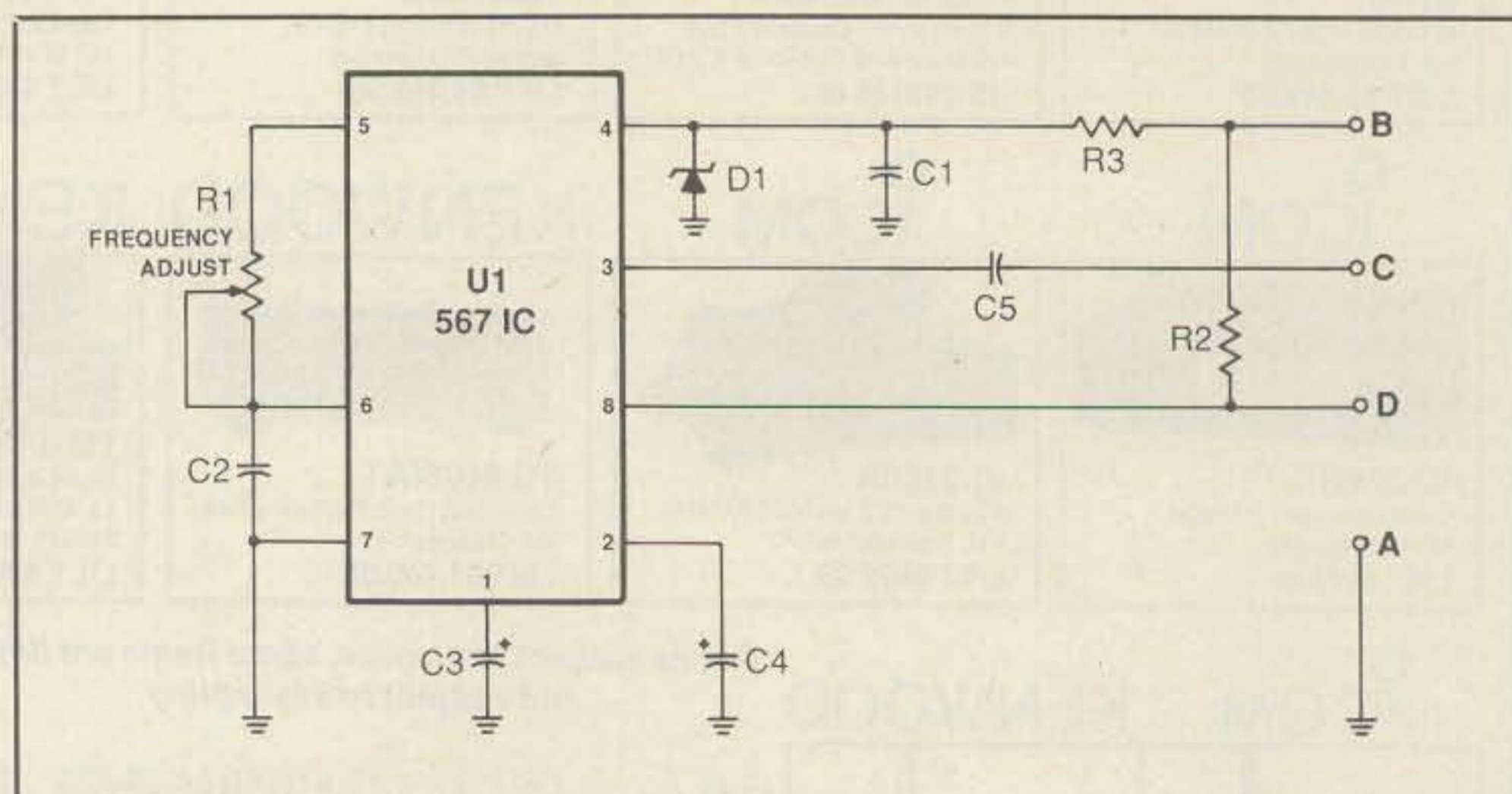


Fig. 1—The basic decoder circuit.



## Parts List

- |                        |                               |
|------------------------|-------------------------------|
| C1 = .05µF or .01 µF   | D1 = Zener diode              |
| C2 = .068 µF to .15 µF | R1 = 20 K ohm or 25 K ohm Pot |
| C3 = .5 µF to 10 µF    | R2 = 1 K ohm @ ¼ watt         |
| C4 = .5 µF to 10 µF    | R3 = 470 ohm @ ¼ watt         |
| C5 = .05 µF or .01 µF  | U1 = 567 IC                   |

\*12317 Fox Lake Court, Fairfax, VA 22033

Fig. 2—The schematic diagram for the TD-1 Tone Decoder.

# MFJ TUNERS

Here is the finest 3 KW Tuner money can buy with roller inductor, dummy load, new peak reading meter, antenna switch, balun plus more ... \$349.95

The MFJ-989C is not for everyone. However, if you do make the investment you get the finest 3 KW PEP tuner money can buy - one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

The MFJ-989C is a compact 3 KW PEP roller inductor tuner with a new peak reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With three continuously variable components - two massive 6 KV capacitors and a high inductance roller inductor - you get precise control over



MFJ-989C \$349.95

SWR and the widest matching range possible from 1.8-30 MHz.

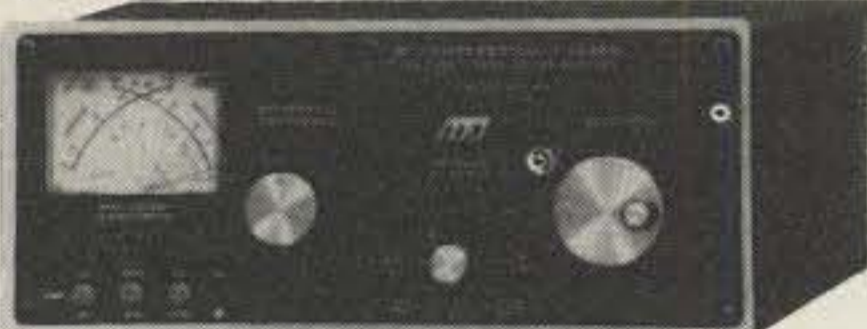
You get a new lighted peak and average reading Cross-Needle SWR/Wattmeter with a new more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced lines and a 6-position antenna switch with extra heavy switch contacts.

Its compact 10<sup>3</sup>/<sub>4</sub>x4<sup>1</sup>/<sub>2</sub>x15 inch cabinet fits right into your station.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control. Add \$10 s/h.

## 2-knob Differential-T™ Tuner



**MFJ-986** The new MFJ-986 Differential-T™ 2-knob Tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. Covers 1.8-30 MHz.

The roller inductor lets you tune your SWR down to absolute minimum. 3-digits turns counter lets you quickly return to your favorite frequency.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter with a new directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

A new current balun for balanced lines reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced for a more concentrated, stronger signal. Add \$10 s/h.

## MFJ's Fastest Selling Tuner



**MFJ-941D** The MFJ-941D is MFJ's fastest selling 300 watt PEP antenna tuner. Why? Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.

It matches dipoles, vees, verticals, mobile whips, random wires, balanced and coax lines.

SWR/Wattmeter reads forward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire, balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun. 1000 V capacitors. 10x3x7 inches.

## MFJ's Random Wire Tuner

**MFJ-16010** \$39.95



You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Install a wire anywhere! Tunes 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 in.

## MFJ's Deluxe 300 Watt Tuner



**MFJ-949D** The MFJ-949D gives you lower SWR than any tuner that uses two tapped inductors. Why? Because you get two continuously variable capacitors that give you infinitely more positions than the limited number on switched coils.

This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner? Covers 1.8-30 MHz.

You get MFJ's new lighted 2-color peak and average reading Cross-Needle SWR/Wattmeter, dummy load, antenna switch, and 4:1 balun - all in a compact 10x3x7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

With MFJ's deluxe 300 watt PEP tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything - one that is highly perfected and has years of proven reliability.

## MFJ's Mobile Tuner



**MFJ-945C** \$89.95

Don't leave home without this mobile

tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth and eliminates the need to stop, go out and adjust your mobile whip.

You can operate anywhere in a band and get low SWR. You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. SWR/Wattmeter and convenient placement of controls make tuning fast and easy while in motion. 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, \$3.00.

## 144/220 MHz VHF Tuners

**MFJ-921** \$69.95

MFJ's new VHF tuners cover both 2 Meters and the 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. SWR/Wattmeter. 8x2<sup>1</sup>/<sub>2</sub>x3 in. MFJ-920, \$49.95. No meter. 4<sup>1</sup>/<sub>2</sub>x2<sup>1</sup>/<sub>2</sub>x3 inches.



## MFJ's Artificial RF Ground

\$79.95 MFJ-931



You can create an artificial RF ground and eliminate RF "bites",

feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.

## Barefoot/1.5 KW Linear Tuner



**MFJ-962C** For a few extra dollars, the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. Covers 1.8-30 MHz.

You get two husky continuously variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter with a new directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Has 6-position antenna switch and a teflon wound balun with ceramic feedthru insulators for balanced lines. 10<sup>3</sup>/<sub>4</sub>x4<sup>1</sup>/<sub>2</sub>x14 7/8 inches. Add \$10.00 s/h.

## MFJ's smallest Versa Tuner

**MFJ-901B** \$59.95

The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200 watt PEP tuner -- when both space and your budget is limited. Good for matching solid state rigs to linears.

It matches whips, dipoles, vees, random wires, verticals, beams, balanced and coax lines from 1.8-30 MHz. Efficient airwound inductor. 4:1 balun.

FOR YOUR NEAREST DEALER OR TO ORDER

800-647-1800

• 1 year unconditional guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • Free catalog • Add \$5.00 s/h (except as noted)

CIRCLE 163 ON READER SERVICE CARD

# MFJ

MFJ ENTERPRISES, INC.

Box 494, Miss. State, MS 39762

(601) 323-5869; TELEX: 53 4590 MFJSTKV

MFJ ... making quality affordable

# 1991 CALLBOOKS



## THE QSL BOOK!

Extending a 70 year tradition, we bring you three new Callbooks for 1991 with more features than ever before.

The 1991 North American Callbook lists the calls, names, and address information for over 500,000 licensed radio amateurs in all countries of North America, from Panama to Canada including Greenland, Bermuda, and the Caribbean Islands plus Hawaii and the U.S. possessions.

The new 1991 International Callbook lists 500,000 licensed radio amateurs in the countries outside North America. It covers South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1991 Callbook Supplement will be published June 1, 1991, with thousands of new licenses, address changes, and call sign changes received over the preceding six months. This single Supplement will update both the North American and International Callbooks.

Every active amateur needs the Callbook! Fully updated and loaded with extra features, the new 1991 Callbooks will be published December 1, 1990. Order now from your dealer or directly from the publisher.

- RC0191 North American Callbook  
incl. shipping within USA \$33.00  
incl. shipping to foreign countries 39.00
- RC0291 International Callbook  
incl. shipping within USA \$33.00  
incl. shipping to foreign countries 39.00
- RC0391 Supplement, published June 1st  
incl. shipping within USA \$13.00  
incl. shipping to foreign countries 14.00

### SPECIAL OFFER

- RC01912 Both N.A. & International  
Callbooks incl. shipping in USA \$63.00  
incl. shipping to foreign countries 73.00  
\*\*\*\*\*

Illinois residents please add 6½% tax.  
All payments must be in U.S. funds.

**RADIO AMATEUR  
callbook INC.**  
Dept RACM0005  
925 Sherwood Dr., Box 247  
Lake Bluff, IL 60044, USA

Tel: (708) 234-6600

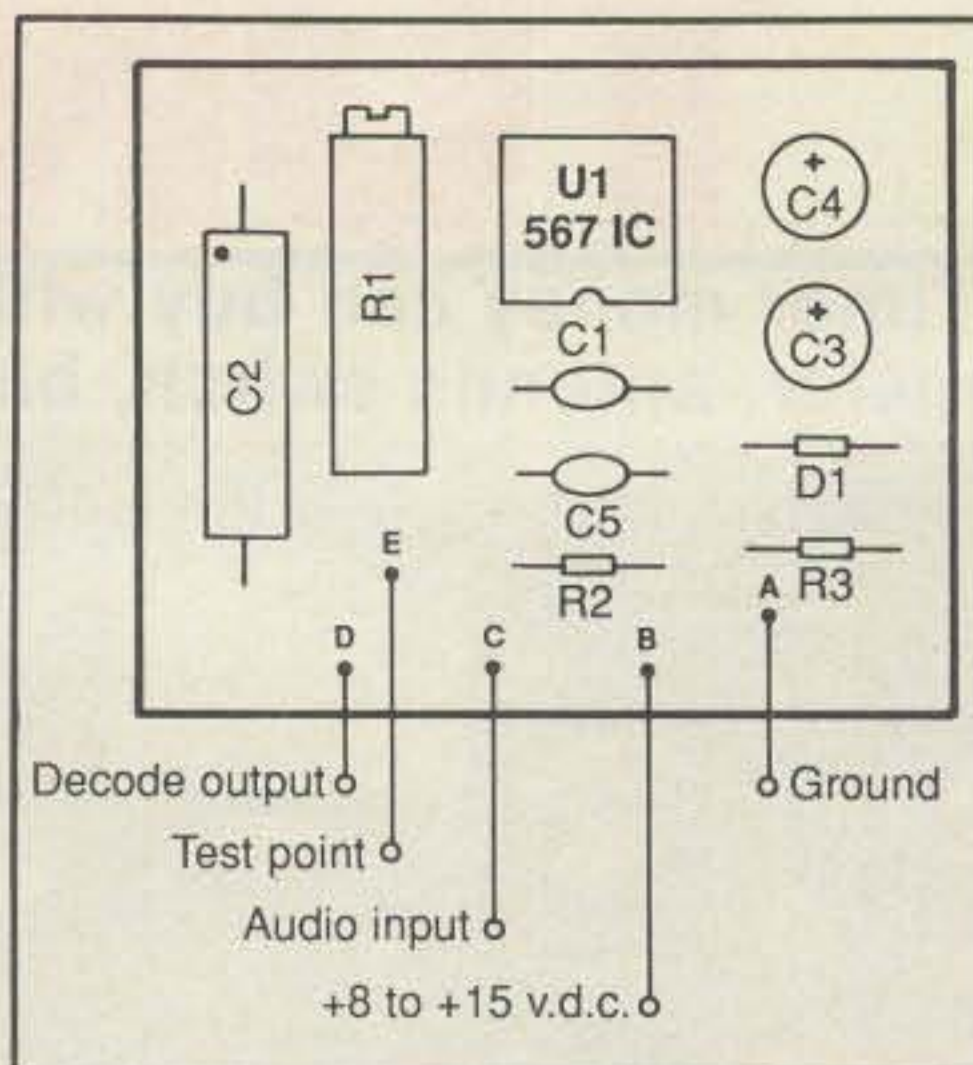


Fig. 3—Parts layout for fig. 2.

tronics booth and spotted their TD-1 Tone Decoder kit. The package label said it only tuned 400 Hz to 500 Hz, but it used the 567 IC and it seemed to contain all the parts I needed, plus a ready-made circuit board. The price was right (\$7 hamfest special), and my intuition told me that despite the narrow bandwidth claimed on the package, everything I needed was right there! I had already enjoyed moderate success with a Ramsey receiver kit, so I bought a pair of TD-1 Tone Decoder kits and a handful of spare parts "just in case."

Once I opened the TD-1 package, I found that it was labeled incorrectly. The instructions that came with the kit stated the frequency range was 400 Hz to greater than 5000 Hz (not 500 Hz).

The TD-1 (figs. 2 and 3) is similar to the circuit that I got from Kantronics. The advantage is that for dirt cheap you get almost everything you need, plus a pre-drilled circuit board measuring a compact 1½ inches by 1½ inches to mount everything. All I added was an LED and 1000 ohm resistor between the power supply and decode output terminals (see fig. 4).

Construction and alignment are almost foolproof. Follow the instructions that come with the TD-1 Tone Decoder

kits, and then add an LED and 1000 ohm resistor (fig. 4).

I ran the 1000 ohm resistor from terminal **B** on the TD-1 to the "free-standing" hole (there's one in each corner of the printed circuit board) near terminal **D**, leaving about ⅛ inch of lead protruding through each hole. I ran the LED from terminal **D** to the nearby lead of the 1000 ohm resistor protruding through the corner hole. This arrangement places all parts on the circuit board, but can limit flexibility when it comes to mounting in an enclosure.

Build two identical circuits. Use identical type LEDs and be careful to note the polarity of the zener diode, capacitors C3 and C4, and the LED. I also recommend using an IC socket for the 567. It takes the pain out of replacement.

To align each decoder properly, you will need to get your hands on a frequency counter. Again, follow the instructions that come with the TD-1. Do not apply any audio during this process! Apply power to the TD-1, probe the test point, and adjust R1 until the proper frequency is indicated. Since I use the 1070/1270 tone pair for HF packet, I tuned one decoder to 1070 Hz and the other to 1270 Hz.

Each decoder operates by making the decode output go low when the input tone matches the frequency for which you adjusted it. This, in turn, causes the LED to flash.

After setting the frequency for each decoder, give them a common ground, connect them to the same power source, and feed them both from the audio going to your TNC (fig. 5). Make sure you also attach the ground from your signal source (audio cable shield) to the common ground point on the pair of TD-1 units.

On the Kantronics KPC-2, audio can be obtained from pin 5 of the **DB-9 Radio Connector**, or the **AUD** jack. Both are found on the back panel. Since I was using pin 7 of the DB-9 to supply 13.85 VDC to the KPC-2, I used the +12 VDC jack on the back panel to supply power to my tuning indicator.

Once assembled and connected to your TNC's audio, tuning an HF packet signal is straightforward. Find a signal and tune

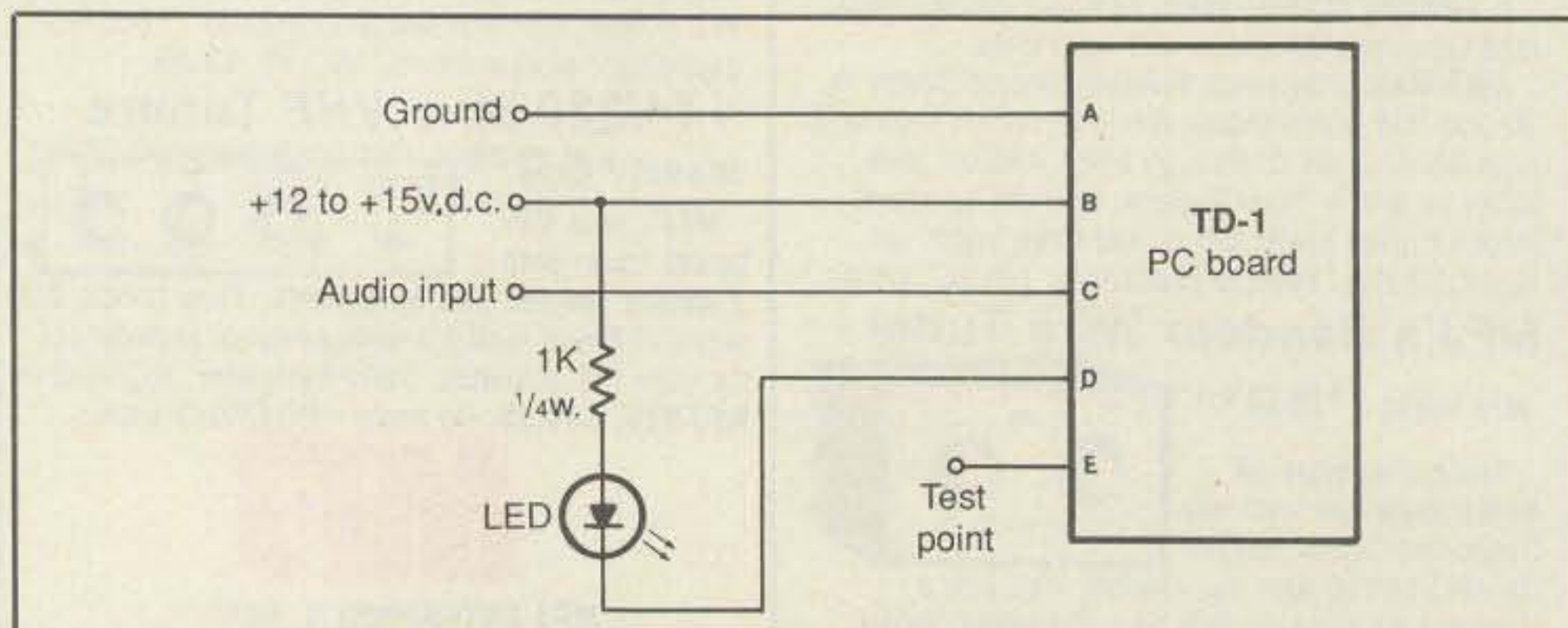


Fig. 4—The TD-1 Tone Decoder as adapted for a packet tuning indicator.

# MFJ gives you *all 9* digital modes and keeps on bringing you state-of-the-art advances . . . while others offer you *some* digital modes using 3 year old technology!

MFJ-1278

**\$279<sup>95</sup>**



No 3 year old technology at MFJ! Using the latest advances, MFJ brings you 9 exciting digital modes and *keeps on* bringing you state-of-the-art advances like new ASA™. You get tons of features other multi-modes just don't have.

### Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and Contest Memory Keyer.

You can't get all 9 modes in *any* other multi-mode at *any* price. Nobody gives you modes MFJ-1278 doesn't have.

### The best modem you can get

Tests in *Packet Radio Magazine* prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

MFJ-1278 is the *only* multi-mode with a *true* DCD circuit. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

### Exclusive Built in Printer Port

Only the MFJ-1278 has a dedicated printer port that lets you plug in your Epson or IBM compatible printer.

You don't need to buy a silly \$40 cable just to plug in your printer.

### 20 LED Precision Tuning Indicator

MFJ's unequalled tuning indicator makes it really easy to work HF packet. Unlike others, you use it the same for all modes -- not different for each mode. Just tune your radio to center a single LED and *you're* precisely tuned in to within 10 Hz -- and it shows you which way to tune!

### New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal

### MFJ Packet Radio

MFJ-1274 **\$159<sup>95</sup>**  
MFJ-1270B **\$139<sup>95</sup>**  
MFJ-1270B super clone of TAPR's TNC-2 gives you more features than *any* other packet controller -- for \$139.95

You can double your fun by operating VHF and HF because you get *high performance* switchable VHF/HF modems.

You get the Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your buddies can leave messages 24 hours a day.

In MFJ's new WeFAX mode you can print full-fledged weather maps to screen or printer and save to disk using most computers.

A new KISS interface lets you run TCP/IP and MSYS. NET ROM compatible.

You also get 32K RAM and a free 110 VAC power supply (or use 12 VDC).

For dependable HF packet tuning, the MFJ-1274 gives you a high resolution tuning indicator -- and it's only \$20 more.

New 2400 baud Turbo models available: MFJ-1270BT, \$209.95; MFJ-1274T, \$229.95.

Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

### Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp clear details. MFJ-1278 is the *only* multi-mode with a built-in multi-gray level modem. It lets you transmit and/or receive multi-gray level pictures with an appropriate terminal program.

MFJ's new Automatic Signal Analysis™ gives you *exclusive* HF packet identification!

**NEW!**

MFJ's new ASA automatically identifies HF packet, RTTY, ASCII and AMTOR signals. A

a kiss interface or dumb modem, fast throughput anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 and TTL serial ports, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW paddle jack, audio amplifier and speaker jack so you can monitor CW sidetone, transmit and receive audio and packet connect bell, *new* fully integrated instruction manual with *Fast Start*™ booklet and more. 9½ x 9½ x 1½ inches.

### No Matter What™ Guarantee

You get MFJ's one year No Matter What™ Guarantee.

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a year.

Others give you a *limited* warranty. What if *they* say, "Sorry, your *limited* warranty doesn't cover *that*?"

### Get 9 new ways of having fun

Don't settle for 3 year old technology. Choose the *only* multi-mode that gives you the latest advances and all 9 modes.

Get 9 new ways of having fun *today!*

## New MFJ-1278T Turbo with fast 2400 baud modem

MFJ-1278T

**\$359<sup>95</sup>**



The new MFJ-1278T Turbo gives you *fast* 2400 baud packet -- *twice* the baud rate of any other multi-mode. By communicating faster you'll reduce chances for error, lessen congestion and more efficiently utilize our ham frequencies. You'll also get 1200/300 baud for compatibility with older TNCs.

The 2400 baud modem is also available separately. Order MFJ-2400, \$69.95, for any MFJ and most other TNCs.

quick "OK" command selects the mode!

### One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to miss new modes and features that come out *tomorrow*. Why? Because your 1278 comes with a coupon good for one *free* eeprom upgrade exchange that'll add new features.

### Plus More . . .

Plus you get . . . 32K RAM, *free* AC power supply, Host mode that lets MFJ-1278 serve as

## New MFJ MultiCom™ . . . exciting new 1278 software

High resolution AP news photo received on 20.738 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.



MFJ-1289 New menu-driven MultiCom™ brings out the full power of your MFJ-1278 with multi-gray modem. No set-up required -- just load and use. You get incredible high resolution WeFAX maps and AP news photos right off HF. You also get color packet pictures and multi-gray SSTV.

Bursting with features . . . One-Key Macros™ combine multiple keystrokes into a single touch, Call-Alert™ sounds an alarm when any characters you tell it to watch for come in, Auto-Set™ instantly switches entire stored sets of parameters, Auto-Router™ stores digipeater node routes for instant use, Packet Multi-Plex™ lets you transmit or receive a binary file and continue your QSO, Multi-Word™ gives a powerful word processor that is tailor-made for multi-mode communications. Custom QSL created with paint program

Multi-Gray WeFAX weather map received on 16.410 MHz using MFJ MultiCom and MFJ-1278 with multi-gray modem.



can be transmitted by FAX, SSTV or Packet. On-line help. RS-232 cable. Tons more. Call for *free* MFJ catalog for full information: 800-647-1800.

Optional MFJ-1292 digitizer, \$199<sup>95</sup> . . . lets you instantly point, shoot and transmit a video picture -- all in one smooth sequence

Transmit your very own digitized pictures all over the world by packet, FAX or SSTV. MFJ MultiCom™ lets you integrate the MFJ-1292 "Picture Perfect" Video Digitizer, \$199.95 with your MFJ-1278 for shooting and transmitting your pictures in one smooth sequence.

Nearest Dealer/Orders: 800-647-1800

**MFJ** MFJ ENTERPRISES, INC.  
Box 494, Miss. State, MS 39762  
(601) 323-5869; TELEX: 53 4590  
FAX: (601) 323-6551; Include s/h.

MFJ . . . making quality affordable

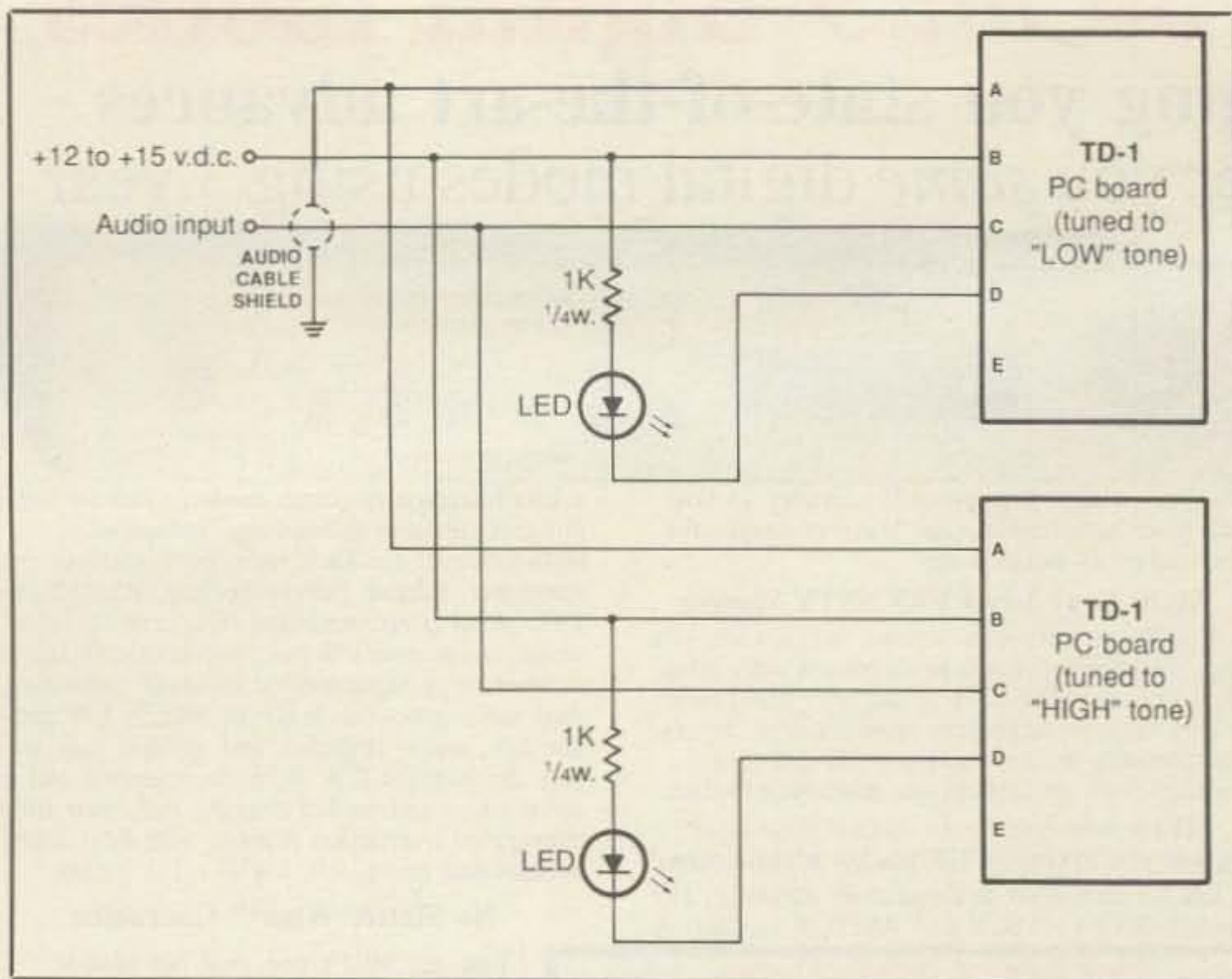


Fig. 5—The completed HF packet tuning indicator.

for equal brilliance on both flashing LEDs. You'll find that by decreasing your audio level, the bandwidth of each decoder can drop to 2%, increasing the accuracy of your tuning. Remember that for packet,

unlike RTTY, you cannot begin copying in the middle of a packet. You must wait for the next packet to see if your tuning was successful.

I simply sandwiched the two units, one

on top of the other, for a real no-nonsense construction approach. I tried to get fancy and squeeze it all into a metal case and wound up blowing out both 567s and a 3 ampere fuse in my IC-735, supplying 13.85 VDC. This fuse is sinisterly placed deep within the transceiver. It requires complete disassembly of the radio, involving a zillion screws and multiple opportunities to wreak havoc. The tuning indicator now rests unadorned on my operating desk, but it works just fine!

If you're like me, a disaster with construction projects, you'll find this a breeze to build, align, and operate. Application is not limited to the KPC-2. If you have receiver audio and know your TNC's tone pairs, you can use this tuning indicator. All but a few parts are in Ramsey's inexpensive TD-1 Tone Decoder kit, and the remaining parts are available at Radio Shack. Don't forget the IC socket! The only complexity involves getting your hands on a frequency counter to adjust each decoder.

I usually find Ramsey Electronics at every hamfest in and around Washington, DC. They also sell their kits via mail order and can be reached at (716) 924-4560. Their mailing address is 793 Canning Parkway, Victor, New York 14564.

For those of you looking for an alternative to copying the same old beacons and BBSs on VHF packet, build this tuning indicator and give HF packet a try.

## MADISON ★ ★ ★ SHOPPER

CALL FOR ORDERS: 1 (800) 231-3057

1 (713) 729-7300 or 729-8800  
FAX 1 (713) 358-0051



ALL ITEMS ARE  
GUARANTEED OR  
SALE PRICE  
REFUNDED.

Kenwood.....	Call
ICOM IC-24AT.....	Call
ICOM IC-3220H.....	Call
Yaesu FT-411E, FT-470.....	Call
Power Tubes.....	Call
Penta 6146B.....	\$12.00
Penta 3-500Z.....	99.00
831SP-PL259 Silver Plate (Amphenol).....	1.50
ALLGON 2M, 5/8 Mag. Mount, Complete.....	25.00
Receiving Tubes.....	\$1.00-5.00
UG-201 A/U Adapter N male/BNC female.....	4.00
.0015 µf 10 KV Axial.....	1.95
Ameco Books, Hi-Pass Filters.....	Call
1000's of Meters, Transformers, etc.....	Call
Copper Clad Epoxy Boards, 17" x 12".....	4.00

### POLICIES

Minimum order \$10.00. Mastercard, VISA, or C.O.D. All prices FOB Houston, except as noted. Prices subject to change without notice. Items subject to prior sale. Call anytime to check the status of your order. Texas residents add sales tax. All items full factory warranty plus Madison warranty.

Bird and Belden products in stock. Call today.



# MADISON



12310 ZAVALLA STREET • HOUSTON, TEXAS 77085

Computer Controlled Ham Shack for personal or club system  
New Simplex option, operate patch & remotes via repeaters!

## Ultra Comshack 64 Duplex/Simplex Controller

HF & VHF Remote Base\*Autopatch\*CW Practice\*Rotor Control  
\*Voice Meters\*Paging\*Logging\*Polite ID's\*Packet Voice B.B.S.



**Model CS64S**  
REV 8.....\$379.95  
Includes: C64 Interface,  
disk, cables, Manual  
Add \$5.00 S/H USA  
CA. address add 6.25%  
Ask for free catalog!

Here are a few of the Ultra's Features:

\*Operate duplex or Simplex\* Load, save, change all from T.tones, Packet, or modem\* Unlimited voice vocabulary\*Voice clock executes events Daily & Weekly\*\*Super Macros\* user programming language! \*300-4 digit user access codes \*Disk & Printer logging of all telephone numbers dialed, usage time, functions \*18 Rotating Polite ID's\* 16 External relay controls\* 2, 5, & CTCSS Tone Paging\* CW Practice with voice \*Security mode, T.tone mute\* Voice announced user call sign when logging on\* Voltage proportional courtesy beeps gives indication of signal strength\* 18 rotating Polite ID tails\* Safety timers & overrides\*\*Ultra Link\* provides T. tone control from remote audio monitored \*User defined multi-tone courtesy beeps each mode\*Modem or Packet control\* 9 T.Tone Macros store 28 digit command strings \*2 Talking Meter inputs\* Packet or Modem data\*Autopatch & Reverse Store 1000 (18 digit) tel #'s \*Quick dial & quick answer\* Directed & general page\*50 tel #'s restricted patch \*Telephone control input\* Regenerated touchtones \*Autopatch auto off, detects calling party hangup\*Pulse or touchtone dial \*Call waiting & auto redial\* H.F. & VHF Remotes \*Dual H.F. & VHF SQ. det \*Scan up/down; 100Hz step + variable scan rate \*Monitor mode defeats PTT\*Lock mode allows T. tones to TX through remote \*Auto mode & split select \*9 Scan memories store Mode, splits, VFO A & B \*Talking Meters: Voltmeter \* Voice & CW Beacon \*Voice Rotor control\* User selectable courtesy beep

### AUDIO BLASTER™ Works in all H.T.'s

AB1S ←Miniature Audio Amp! Used by police  
Module installs inside all H.T.'s; 1 watt audio amp! When it needs to be loud! Universal installation diagrams AB1S... \$24.95

### TSDQ QUAD TSDQ 4 DIGIT Touchtone Decoder

QUAD Relay Expansion plug-in option  
TSDQ use as Repeater On/Off, C64 reset, 8/20 VDC, audio in; Field Program 50,000 Codes; Mem. & Latching; Inc. DPDT Relay; LED digit valid & latch; 24 Pin connector. QUAD option adds: four 2 Amp. relays + 5 digit on & off code for each relay. 2"X3" Expandable TSDQ...\$89.95 Optional QUAD...\$99.95

Touchtone to RS232 300 Baud Interface "Decode-A-Pad" Use with all computers Decodes 16 touchtones Includes Basic program

T.tones Input Use with any terminal program or write Your own, easy to use! DAP2 \$99.95

### Ultra Com Shack 64 Options

- \*Mount All modules including C64, Predrilled & painted incl mounts & cable clamps ALBX.....\$159.95
- \*Digital Voice Recorder 32 or 64 sec. voice Mailbox & ID tail, Inc. 1 Meg Ram, control with CS8 or PK8, Incl. cable for REV8 Ultra board, 5 or 12VDC. DVM...\$179.95
- \*Operate C64 & 1541 from 12Vdc with this crystal controlled Switching supply, runs cool & efficient draws <1 amp. Plugs into C64, fused, protected Model DCPS.....\$129.95
- \*Add duplex Control of Remotes & patch with Telephone amplified hybrid, null & gain pots Plugs into CS64S board, TLCN....\$159.95
- Autoboot EPROM cart plugs into C64 or PK8, disk or System version CART... \$109.95
- 8 relay On/Off; Inc. 3-DPDT 2 A. relays +5 Sw. outputs. Use with HM1 to rotate beam.....CS 8.....\$99.95
- 2 Voice Meters + 2 Alarm Inputs + 8 Relay On/Off Sw. PK8...\$159.95
- \*PK1 adds Program & Control of Ultra via Packet or Tel line + Packet to Voice BBS, Req. 2nd C64 & PK8, Inc. 4 ft. data cable to PK8...PK1...\$99.95
- \*Rotor control Analog to digital converter; use with CS8; voice bearing +/- 5 deg. for all rotors HM1...\$69.95
- Ultra Com Shack 64 Manual all schematics, diagrams, how to operate & set up remote base. Refund with purchase of CS64S.MN.\$25.00
- \*Mastercard\*Visa\*Amex\*Disc

ENGINEERING CONSULTING  
583 CANDLEWOOD ST.  
BREA, CA. 92621  
Tel: 714-671-2009 Fax: 714-255-9884

# DATA COMMUNICATIONS INTERNATIONAL, INC.

—PRESENTS—

## COMLOOP-100

HIGH TECHNOLOGY TRANSMIT/RECEIVE COMPACT LOOP ANTENNA  
BETTER THAN 1 KW CONTINUOUS POWER RATING

### FREQUENCY RATING RANGE

MODEL A	.....7.0 MHZ-29.0 MHZ TRANS/RECEIVE
MODEL B	.....3.6 MHZ-16.4 MHZ TRANS/RECEIVE
MODEL C	.....2.1 MHZ-10.0 MHZ TRANS/RECEIVE
MODEL D	.....5.0 MHZ-29.0 MHZ TRANS/RECEIVE*

\*SPECIALLY DESIGNED FOR SHORTWAVE LISTENING

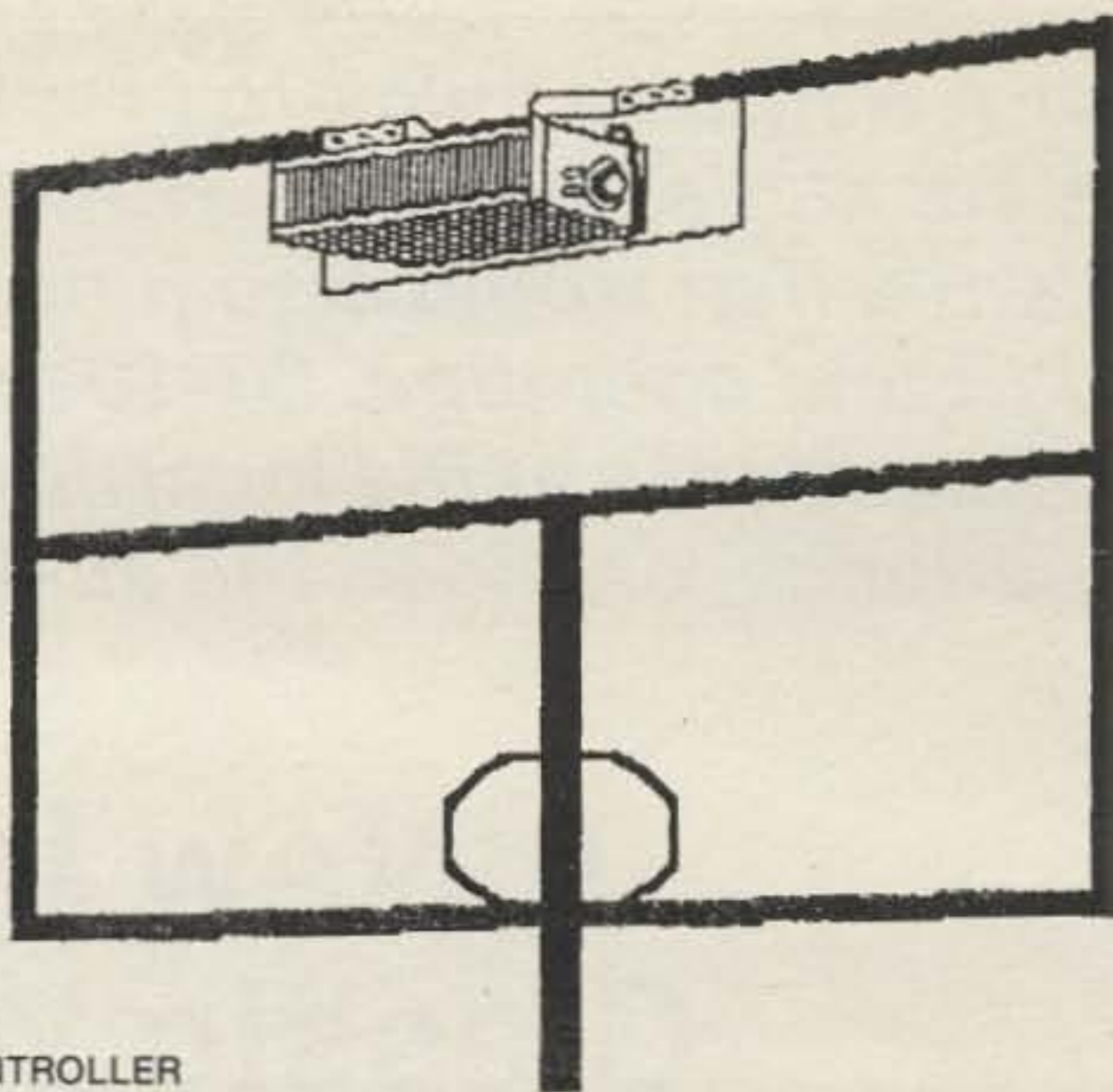
REMOTELY TUNED BY STURDY GEARED STEPPED MOTOR

ANTENNAS COME COMPLETE WITH 100 FEET OF COAXIAL CABLE  
and 100 FEET OF CONTROL CABLE FOR REMOTE TUNING

TUNES TO 1:1 SWR PROVIDING AS PERFECT MATCH ALLOWING FULL  
POWER OUTPUT ON TRANSCEIVERS AND WITHOUT ANTENNA TUNER

OPTIONS SWITCH BOX ALLOWS SWITCHING FEEDLINES AND MOTOR CONTROLLER  
COMPUTER INTERFACE PERMITS AUTO-TUNING FROM DATACOM-Y RADIO CONTROL PROGRAM

—EACH ANTENNA IS INDIVIDUALLY TESTED ON OUR ANTENNA RANGE—20 PAGE MANUAL PROVIDED WITH  
EACH ANTENNA—ANTENNA SHIPPED READY TO MOUNT—NO ASSEMBLY REQUIRED—PARTS AND  
LABOR GUARANTEED UNDER NORMAL USAGE —



IDEAL FOR RESTRICTED SPACES

EXCELLENT FOR FIELD DAY USE

NOISE REDUCTION MAKES IT IDEAL FOR LOW FREQUENCIES OR NOISY AREAS

(IF YOU CAN'T HEAR THEM, YOU CAN'T WORK THEM)

CONSIDERABLY IMPROVES FRONT END PERFORMANCE OF RADIO ACTS AS A SELECTIVE FILTER HELPING  
TO ELIMINATE INTERMODULATION, FRONT END OVERLOADING  
ALL WEATHER DESIGN.....BREAKS APART FOR EASIER SHIPPING

TEL. (305) 987-9505/989-9505 FAX (305) 987-4026

PRICING ON REQUEST

BOX 5205 HOLLYWOOD, FL. 33033

AVAILABLE 14 DAYS ARO

CIRCLE 49 ON READER SERVICE CARD

## New AOR Receiver

400 Channels.  
100KHz to 2036MHz



AR3000

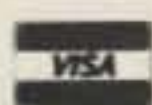
Total Price, Freight Prepaid  
(Express Shipping Optional)

**\$995**

- Continuous coverage
- AM, FM, wide band FM, LSB, USB, CW modes
- 4 Scan Banks, Programmable Attenuation.
- Tuning increments as low as 50Hz.
- Search with lock out.
- 15 front end filters.
- RS232 port built in.
- 25 Day Satisfaction Guarantee. Full refund if not Satisfied.
- Includes AC/DC power cord, Telescope Antenna.
- Size: 3 1/7"H x 5 2/5"W x 7 7/8"D Wt. 2lb. 10oz.

**ACE**  
COMMUNICATIONS

10701 E. 106th St. Indpls., IN 46256  
Toll Free 800-445-7717



Visa and Mastercard  
(COD slightly higher)  
FAX (317) 849-8794



CIRCLE 29 ON READER SERVICE CARD

Wire, Cable, Connectors

## SALE

PL-259, Nickel-Teflon USA	69¢ or \$15/25
PL-259, Silver-Teflon USA	\$1.29 or \$25/25
PL-259, Gold & Teflon, USA	\$1.49 or \$30/25
Matching UG-176s available from N connector for 9913, 9086, etc.	25¢
UG-255 convert HT BNC to SO-239	\$ 3.25
RG-8X 95%, braid, premium quality	\$ 1.79
RG-8X 95%, type II non-contaminating	14¢
RG-8X 95%, solid dielectric, "	23¢
RG-213 Enhanced, extra braid 95%++	27¢
9086 International (like 9913)	39¢
NEW! Flexible 9913-type, low-loss for crank-up towers, rotators	42¢

Rotator cable 8 cond. (2x18, 6x24)	20¢
Rotator cable 8 cond. (2x16, 6x18)	34¢
Rotator cable 8 cond. (2x14, 6x18)	48¢
#14 Hard-drawn (7x22) antenna wire	7¢
#14 Copper-clad (7x22) ant wire	8¢
Ladder Line, Poly insul, 450 ohms	10¢
Ladder Line, Poly insul, 300 ohms	11¢
KW Twin-lead 300 sim to orig. Beiden	11¢
RADIO WORKS' Center Insulator	\$ 7.95
Dog-Bone end insulator, plastic	60¢

MilSpec 3/16" Dacron Line 100'	\$ 5.00
5/16" Double Dacron(r) #1700 100'	\$15.00

Wire, rope & cable- 50' increments only

### RG-213 Mil-type 31¢

### CAROLINA WINDOM

- ONE ANTENNA = All Bands, WARC + 80-10M
- Coax feed + your transmatch = BigSignal
- Out performs dipoles, trap antennas, verticals, and other wire antennas
- It's a top performer.
- 6 product reviews say so.
- Special matching transformer and Line Isolator for max radiation efficiency.
- Performance secret is the exclusive ground independent INVERTED VERTICAL radiator. No other antenna has it.

Can't put up a beam, but need BIG SIGNAL performance? Try a CAROLINA WINDOM!

- 80 - 10 M model 132' long, 30' height
- 40 - 10 M model 66' long, 25' height
- 160- 10 M model available

• A Big Signal on all bands. **\$69.95**

'Current-type'

## BALUNS



WHAT'S SO DIFFERENT?

- 10 models fit every application.
- Stainless Steel eye-bolts.
- Large, saturation resistant, ferrite cores = high power
- L-C compensation for max bandwidth
- Teflon(r) insulation in high power models
- Completely potted

- We publish specifications for all baluns
- Internal wires brought outside of case for direct connection to your antenna.
- Excellent Output balance and load tolerance

### 1:1 "CURRENT-TYPE" BALUNS

B1-2K	2KW High Isolation 80-10M	\$15.95
B1-4K	4KW High Isolation 80-10M	\$19.95
B1-5K	5KW Precision 160-10M	\$26.95
C1-2K	2KW Precision Retro-Fit	\$16.95
C75-4K	4KW 75 ohm for loop matching	\$19.95
4K-LI	4KW RFI Line Isolator	\$19.95

### 4:1 BALUNS

B4-1.5K	80-10M 1.5 KW balun	\$17.95
B4-2K	Precision 2 KW 80-10M balun	\$26.95
B4-2KX	'Current-type' 160-10M 2KW+	\$35.95
REMOTE BALUN,	coax/open-wire interface	\$27.00

Everything For wire antennas

**RADIO WORKS**

The RADIO WORKS

(804) 484-0140

FAX (804) 483-1873  
Box 6159  
Portsmouth, VA 23703

Mention this ad for sale prices  
ADD SHIPPING - Visa & MC welcome  
Give card #, exp. date, signature  
COD add \$3.30 + shipping  
Virginia residents add 4.5% sales tax  
Dealer Inquiries Invited

Free 72 pg Discount Catalog  
Allow 4-6 Weeks Delivery of Your Catalog or Send \$2.00 for Catalog By Priority Mail

CIRCLE 99 ON READER SERVICE CARD

**W4FA wanted a quick-to-erect directive antenna for 15 meters at his new QTH. However, he wanted an antenna that would also function reasonably well for multiband operation, 80-10 meters. A look into some old handbooks at the local library, plus some of John's experience, provided the answer.**

## A New Look at Some Classic Wire Antennas

BY JOHN J. SCHULTZ\*, W4FA

**W**hen I was a young radio amateur, way back when, I often marveled at the elaborate directive, wire-type antennas shown in some amateur handbooks. The antennas had elongated dipole elements, and the antennas had such elements arranged both horizontally and vertically with the elements being fed by a maze of phasing lines. They looked good in the handbooks and provided nice daydreams for a young amateur, but I really doubted their practicability and more or less forgot about them.

However, 40 years later I arrived at my present QTH and thought about an effective antenna system that I could erect before I got into the serious business of putting up a tower and some beams. Delving into some of the old textbooks available at the local library, I found there was indeed a lot of sense in some of the old wire-type antenna ideas. Equally, however, I found that some of the old forms were sheer nonsense in terms of erectability and survivability. Therefore, I had a lot of fun in exercising 40 years of hindsight and trying to extract some old antenna ideas that would be viable today. I think I found some good ideas and would like to present them here.

### QTH Background

My present QTH is a 1/2 acre site with a trapezoidal shape. Nonetheless, some of the tall pines on the property were handy supports for erecting a wire antenna. The

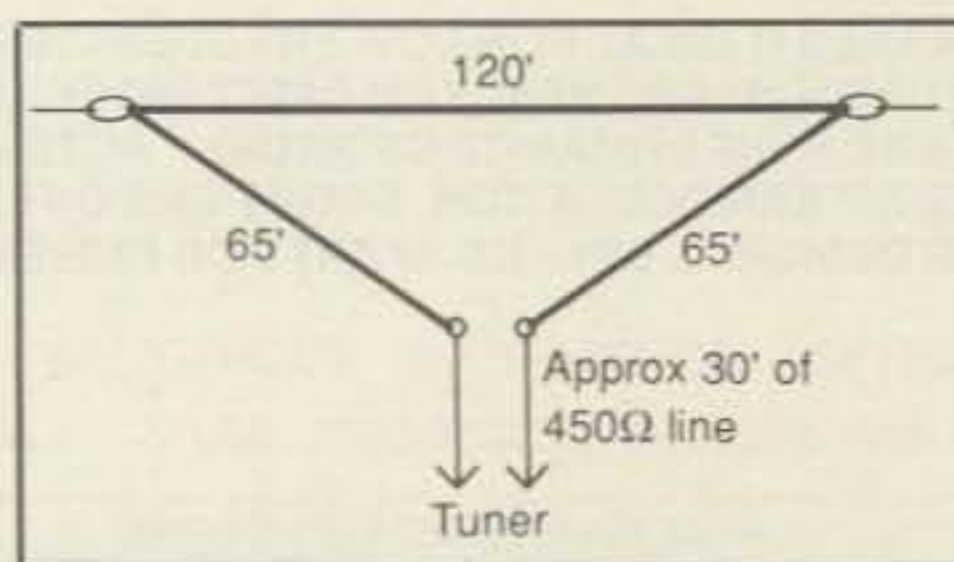


Fig. 1- The delta-loop antenna used initially with very good general results.

first antenna I erected was a simple 80 meter delta loop, as shown in fig. 1, which was strung up between two pine trees. I fed it with 450 ohm ladder line, and using a tuner, it proved to be a remarkably good multiband antenna. I would recommend it to anyone who has the space available for its erection

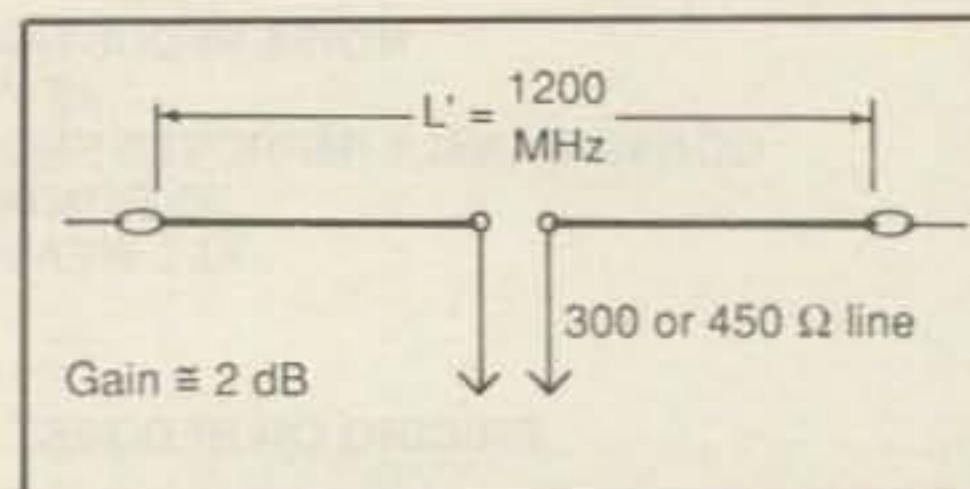


Fig. 2- Classic Double Extended Zepp fed with balanced line to permit operation on most HF bands using a tuner.

and who desires just a good, simple multiband antenna.

This antenna will put out an excellent signal over the 80-10 meter range, using a tuner, although its directivity will change from band to band. Phasing lines could be introduced to control the directivity, but I decided to avoid that compli-

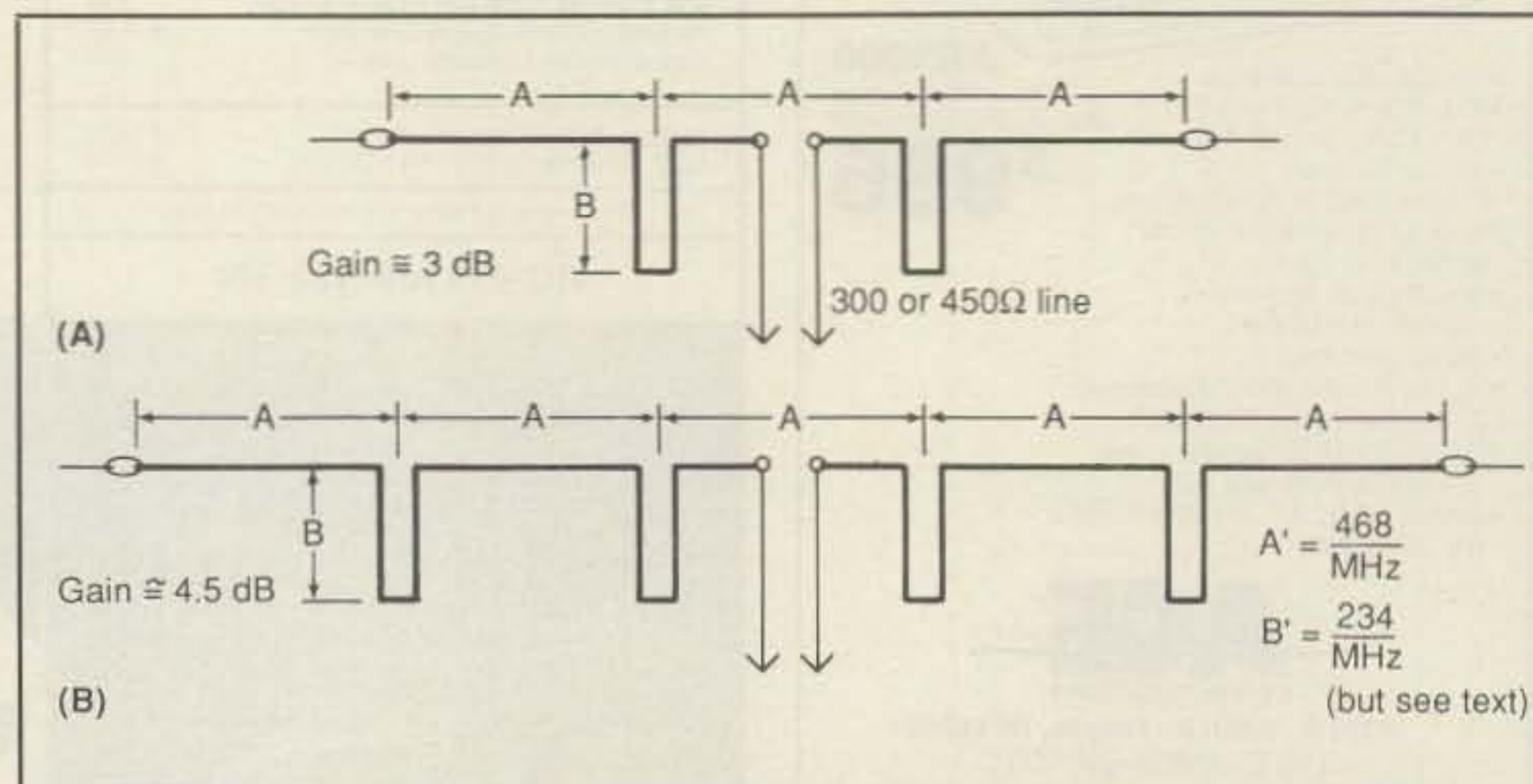
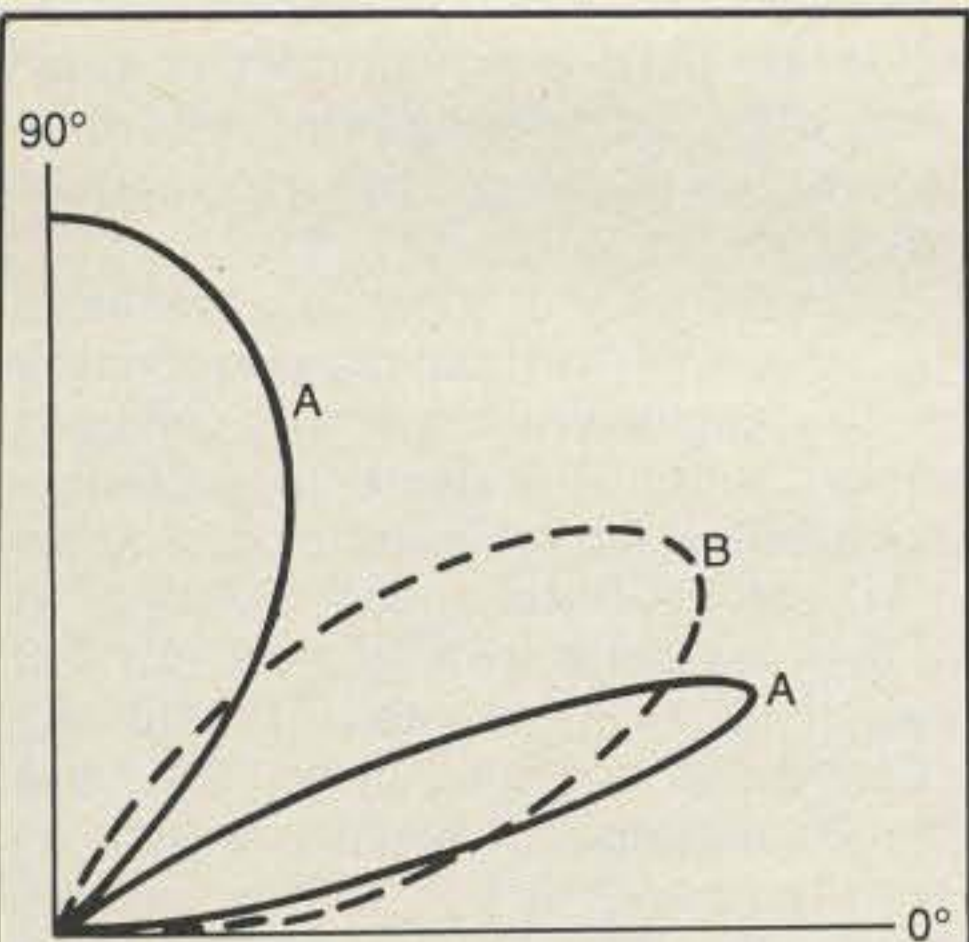


Fig. 3- Simple collinear array antennas built up by phasing dipole elements.

\*302 Glasgow Lane, Greenville, NC 27858





**NOTES:**

- A = Dual lobes of dipole  $3/4\lambda$  above ground.
- B = Single lobe of vertical stacked array, highest element  $3/4\lambda$  above ground and lower element  $1/4\lambda$  above ground.
- Lobes illustrate approximate vertical directivity, they will vary according to ground conditions.

Fig. 4— Not always well appreciated is the idea that phased-array or Yagi antennas in most cases have vertical directivity very different from that of a dipole.

What I really was after was an antenna that would have some defined directivity on 15 meters, but that could also be used as a general-purpose multiband antenna by feeding it with balanced line and using a tuner. I wanted the antenna to be directive in directions at right angles to the plane of my existing delta loop (coming in and going out the page as you look at fig. 1).

### Collinear Antennas

The simplest antenna form I could find that would do what I desired was a so-called collinear array. Collinear arrays are nothing more than extended dipoles, except that steps are taken to keep the directivity at right angles to the plane of the antenna. If you start to elongate a regular  $1/2\lambda$  dipole, the directivity remains at right angles to the plane of the antenna just about to the point where the dimensions of the Double Extended Zepp (fig. 2) are reached. The antenna has a gain of about 2 dB and is, I suppose, about the simplest "gain" type wire antenna that can be erected. Its feed-point impedance is complex, but it can be easily fed with 300 or 450 balanced line using a tuner. If cut for 15 meters, its flat-top length of about 57 feet will allow it to operate on any band from 80–10 meters. On bands above 15 meters its directivity will split into a cloverleaf pattern, while on bands below 15 meters the directivity

will be about the same as a  $1/2\lambda$  dipole.

If you keep elongating the antenna beyond the Double Zepp dimensions and wish the directivity to remain as stated, you have to introduce phasing sections. The reason for this is explained in detail in classic antenna textbooks, although rarely in the simplified amateur radio antenna books available today. It's probably not all that important anyway, as long as you accept the idea. Fig. 3 shows the idea for an antenna which has flat-top lengths of  $1\frac{1}{2}$  and  $2\frac{1}{2}\lambda$ . The quarter-wave vertical phasing sections can be constructed of classic, homebrew open-wire line (#14 or smaller spaced 4 to 6 inches), but I doubt if anyone would want to go through that fuss when KW-type 300 ohm line or 450 ohm ladder line is available. If either of the two latter lines are aer used, the length derived from the formula shown in fig. 3 has to be multiplied by the velocity factor of the line used. Typically, it's around 0.95, but you should get an exact figure from the supplier. Radio Works (Box 6159, Portsmouth, VA 23703) stocks both types of line, and they offer a free catalog with lots of antenna materials.

The gain of the antenna does not increase dramatically as the antenna is elongated, but it's very inexpensive gain. For instance, I erected the antenna form of fig. 3(B). The theoretical gain of 4.5 dB is noticeable, and the cost of all of the wire for the flat-top and phasing lines was something on the order of \$10 for a 15 meter antenna! Theoretically, you could expand the antenna endlessly to build up the gain, but I haven't found any references in antenna literature as to how far the scheme would be practical. I rather doubt that it would make any sense to expand the antenna much beyond twice the size shown in fig. 3(B). There is bound to be some measurement error when you cut the antenna wire and phasing lines, and I suspect that it will, in a practical sense, limit the gain potential of the antenna. Nonetheless, considering cost and the simplicity of construction, the old collinear antenna (also called Franklin array) is rather hard to equal.

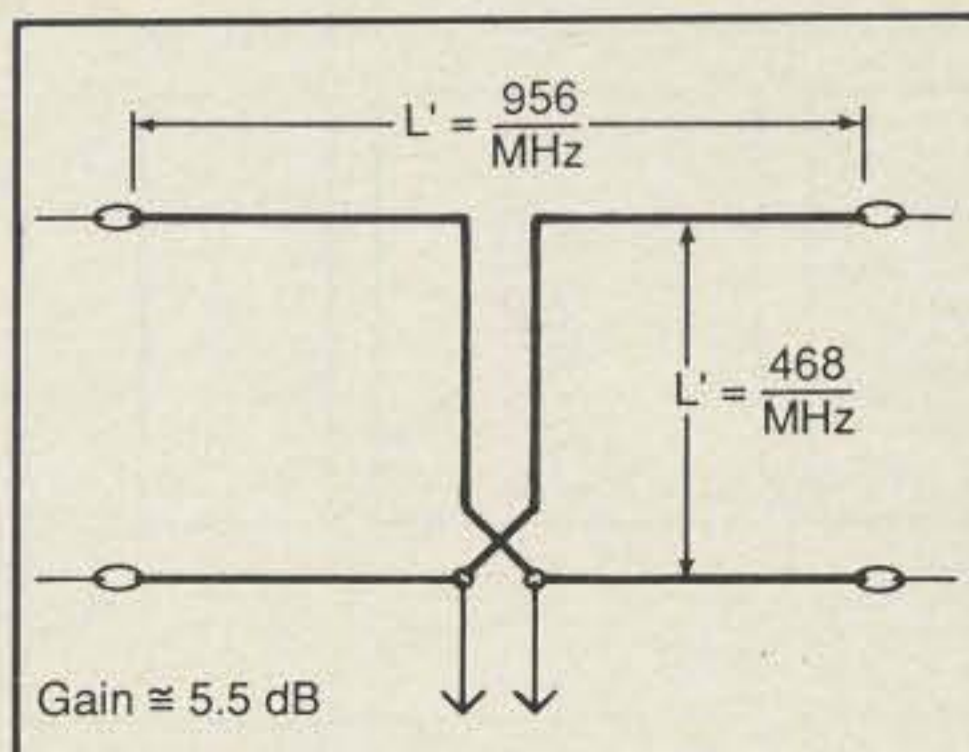


Fig. 5— The classic Lazy H antenna.

REMEMBER... A LOW COST POWER PACK WITHOUT PERIPHEX'S QUALITY IS NO BARGAIN

PERIPHEX POWER PACKS FOR LONGER QSO TIME



NEW! SUPER PACKS FOR ICOM 2/4SAT & 24AT

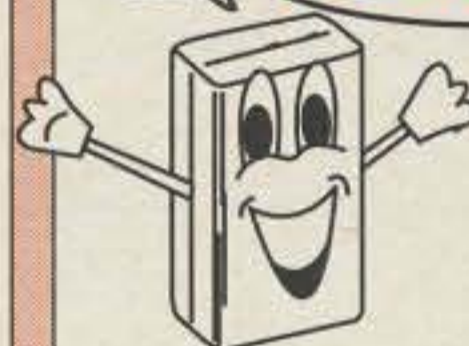


- BP-83 7.2V 600mah \$33.50
- BP-83S 7.2V 750mah \$43.50
- BP-84 7.2V 1000mah \$57.00
- BP-84S 7.2V 1400mah \$63.00
- BP-85S 12V 800mah \$76.00

SAVE ON THESE POPULAR PERIPHEX POWER PACKS

- BP-7S 13.2V 1200mah ... \$65.00
- BP-8S 9.6V 1200mah ... \$65.00

SAVE WITH THESE YAESU VALUES



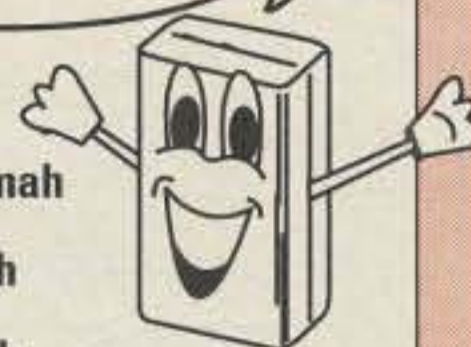
- FNB-4SH 12V 1000mah \$71.00
- FNB-14S 7.2V 1400mah \$59.75
- FNB-17 7.2V 600mah \$35.00
- FNB-12 12V 500mah \$45.95
- FNB-2 10.8V 500mah \$22.50

"SEND FOR FREE CATALOG"

KENWOOD PERFORMANCE PLUS

BIG SAVINGS!

- PB-25/26S 8.4V 900mah \$65.00
- PB-1 12V 1200mah \$67.00
- PB-8S 12V 800mah \$59.00



Manufactured in the U.S.A. with matched cells, these Super Packs feature short circuit protection and overcharge protection, and a 12 month warranty. All inserts in stock or available from authorized dealers. CALL US TO DISCUSS YOUR BATTERY REQUIREMENTS.



Add \$4.00 Shipping & Handling. Connecticut residents add 8% tax.

**PERIPHEX inc.**  
115-1B Hurley Road, Oxford, CT 06483

800-634-8132

In Connecticut 203-264-3985 - FAX 203-262-6943

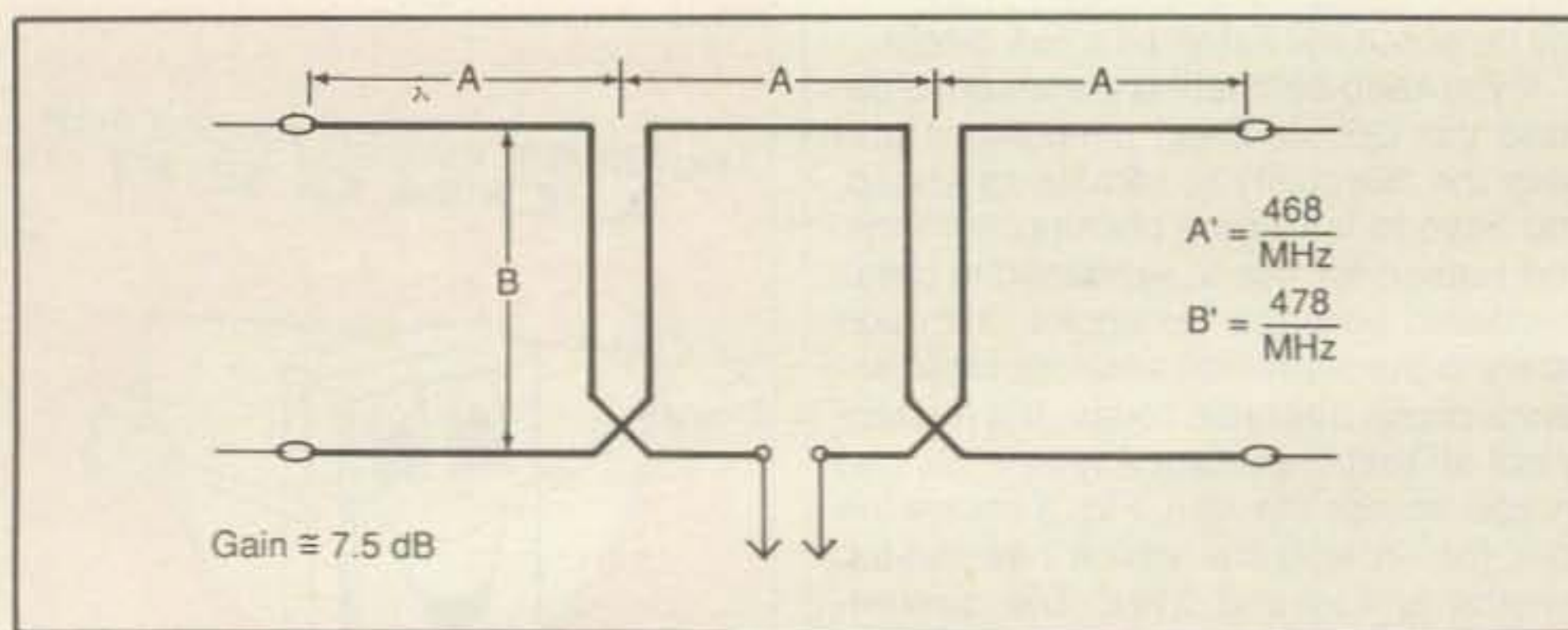


Fig. 6—Another classic—the Six-Shooter array.

### Complex Collinear Arrays

As you might imagine, and as can be fortified if you research some old antenna handbooks, many proposals were put forth to take a basic collinear antenna and stack it above another such antenna, or to phase two spaced collinear antennas in the horizontal plane, or to develop a combination array having both vertically stacked and horizontally spaced elements. I suppose various such complex arrays were actually constructed and probably worked quite well, but I suspect such antennas were also short-lived due to their mechanical complexity and weather susceptibility.

The one thing that did make sense to me when I took a look at complex collinear arrays was the idea of simple vertical stacking. A simple collinear array achieves gain, as it is made longer, by

concentrating the radiation from the antenna in the horizontal plane. For example, a simple  $\frac{1}{2}\lambda$  dipole elevated about  $\frac{1}{2}\lambda$  above ground has its vertical radiation lobe at about 30 degrees from the ground surface. No matter how long a single collinear array might be made, the vertical directivity does not change. If the single-element collinear array is elevated  $\frac{1}{2}\lambda$  above the ground, its main radiation lobe is going to be about 30 degrees from the ground surface regardless of the length of the antenna. Unfortunately, if the antenna is a certain height, even rather high ones in terms of wavelength, a good deal of radiation can take place at high angles, which is great for short-skip but hardly useful for DX. For a given antenna height, vertical stacking is not quite as effective in getting radiation concentrated at the lower angles as is the idea of horizontally spaced elements.

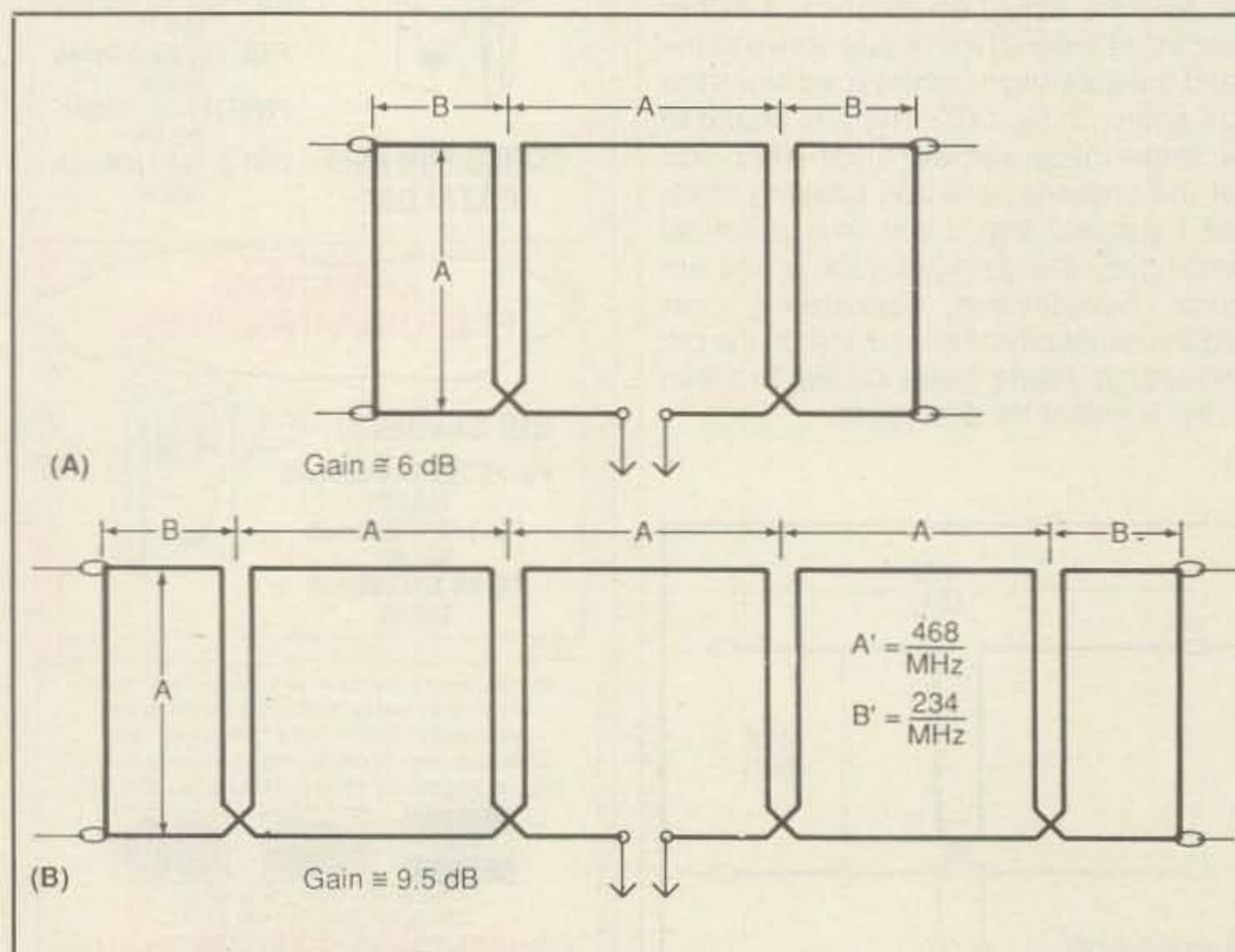


Fig. 7—Two examples of Sterba curtains. On a materials cost to effective DX gain basis they probably cannot be equalled. They differ only in size, and hence gain.


However, from a constructional viewpoint, when considering wire-type antennas, vertical stacking is by far the easiest way to go.

I don't think that too many amateurs appreciate the vertical-plane directivity change that takes place when a vertically stacked antenna is used. For instance, take a look at fig. 4. The horizontal dipole at  $\frac{3}{4}\lambda$  elevation has a good "DX lobe" at 20 degrees but a fairly useless (for DX) major lobe at 90 degrees. The stacked antenna has one lobe at slightly more than 20 degrees, but all of the vertical directivity (power, if you will) is concentrated in that lobe. Although it's out of the scope of this article, if you consider Yagi also along with fig. 4 and compare its pattern against that of the dipole, you will find that the 90 degree lobe shrinks tremendously, while the 20 degree lobe expands. That's why the Yagi "plays" so well for DX, along with its other attributes.

There are many classic stacked arrays, the granddaddy of which is probably the Lazy H, as shown in fig. 5. For a wire-type antenna it's not all that large, but it will deliver a respectable 5.5 dB gain. My next favorite is a sort of expanded Lazy H, dubbed the Six-Shooter and shown in fig. 6. By making the antenna only  $\frac{1}{2}\lambda$  longer than the Lazy H, you pick up almost 2 dB of additional gain. Both antennas are fairly easy to construct if you imagine the upper and lower elements as being each one run of antenna wire broken up as necessary by insulators. The vertical phasing lines can be 450 ohm ladder line, and it doesn't matter where the twist in each line is located as long as it is there.

Another stacked array with which I have had great success in the past is the Sterba curtain. This classic antenna (used by AT&T for overseas telephone service in the 1930s) is just a touch more difficult to construct than the preceding antennas because of the closed ends, but it develops an awful lot of gain for a relatively compact wire antenna. Two examples of Sterbas are shown in fig. 7.

### Summary

For which form did I settle after initially trying the fig. 3(B) collinear? The Sterba curtain of fig. 7(B). It provides excellent DX gain on 15 meters and certainly works out extremely well on all bands from 80-10 meters. I constructed the antenna using #18 copper-clad wire and black-colored 450 ohm ladder line having #18 copperweld conductors (both items available from Radio Works). The antenna is certainly inconspicuous, although the ladder-line phasing sections seem to be suspended in space. Until I get the beams erected, I must admit that I'm hooked again on wire-type antennas. 



# OPTOELECTRONICS

## The only name in HANDI-COUNTERS

Check These Incredible Features On The All New UTC3000

- **10Hz to 2.4GHz Range.**  
Simply amazing!
- **10 Digit LCD Display.**  
1Hz resolution to over 150 MHz direct.  
Readable in bright sunlight.
- **RF Signal Strength Bargraph.**  
16 Segment, Zero, & Full Scale adjustment.  
SEE the input signal!
- **Super Sensitivity.** <1mV 10-200MHz, <5mV to 2GHz for efficient antenna pickup.
- **6 Functions.** Frequency, Period, Ratio Time Interval, Average, & Prescale.
- **Hold Button.**  
"Locks in" your exact Measurement FAST!
- **Extruded Aluminum Enclosure.**  
Designed to fit every hand.
- **Priced Right! Only \$375.**  
Includes Nicads, AC Charger/Adapter.  
Or Select Our Most Popular **HANDI-COUNTER**, the model 2210 that set the standard in handheld frequency counter technology!  
**Value Priced at only \$239.**

Professionals and Hobbyists all over the world have chosen OEI for 16 years! **Shouldn't YOU?**

**HANDI-COUNTERS! ...Only from OEI!**  
Choose the model that fits your needs... and your budget! **CALL NOW!**

Model	UTC3000	2600H	2210	1300H/A	2400H	CCA	CCB
Function	Freq, Period Ratio, Interval, Avg, Prescale	Frequency	Frequency	Frequency	Frequency	Frequency	RF Indicator
Range	10Hz-2.4GHz	10MHz-2.4GHz	10Hz-2.2GHz	1MHz-1.3GHz	10MHz-2.4GHz	10MHz-550MHz	10MHz-1.8GHz
Display	10 Digit LCD w/Function Annunciators	10 Digit LCD	8 Digit LED	8Digit LED	8 Digit LED	8 Digit LED	.
RF Signal Strength Indicator	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	.	.	.	LED with Adjustable Threshold	10 Segment Adjustable Bargraph
Price	\$375.	\$325.	\$239.	\$179.	\$189.	\$299.	\$119.

Sensitivity: <1 to <10mV typical. Time Base: ± 1.ppm.; ± .5ppm. add \$75 - LED Models; ±.2ppm add \$80. - LCD Models. Nicads & AC charger/adaptor included. (9v Alkaline - CCB.) Carry Case, Antennas and Probes extra. One year parts & labor warranty on all products.

### UTC3000



Period Average Mode



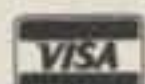
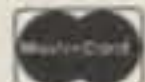
Display Showing All Annunciators

## OEI OPTOELECTRONICS

5821 NE 14th Avenue • Ft. Lauderdale, FL 33334

Toll Free Order Line:  
**1-800-327-5912**

FL(305)771-2050 • FAX(305)771-2052



Visa, MC, COD, Cash, M.O. accepted. Personal Check allow 3 weeks. 5% Shipping, Handling, (Maximum \$10) U.S. & Canada. 15% outside continental U.S.A. In FL add 6% sales tax.



*It's too good to throw out and too much of a pain to fix. What else can you do with it?*

## A Recycled Microphone Stand

BY BOB CASHDOLLAR\*, NR8U

I am sure you have all seen flex-arm lamps, the kind with the articulated arm and lamp assembly. They are fairly cheap (\$10 to \$12), and most of the ones I have seen are made rather well.

One that I owned developed a bad on-off switch in the lamp portion. Every time I needed to use it, I had to plug it in and then unplug it when I was done. In order to fix it, you had to replace the whole lamp socket, and the cost of the replacement is about half the cost of the entire lamp.

While touring around the fleamarket at Dayton this year, I spotted several of these lamps in the big vendor tent outside the back of the arena and decided this was the time to replace my defective one. The idea of using the arm part for an articulated mike stand had been kicking around in the back of my mind for a while, so I purchased some mike connectors while attending the hamfest. Once back home, I visited my local Radio Shack for some two-conductor audio cable (RS-278-1277) and gave it a whirl.

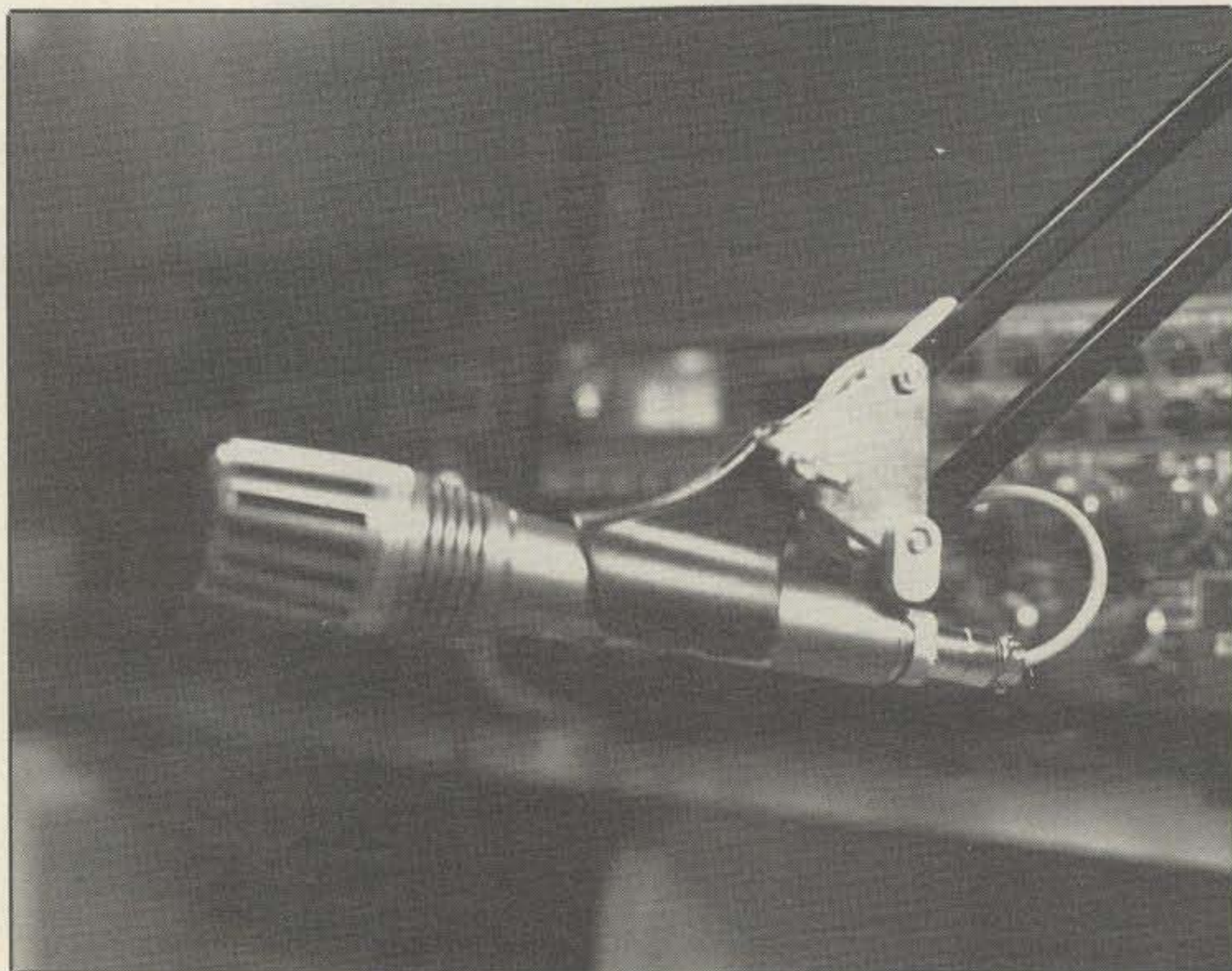
### Assembly

The comments which follow relate to my particular situation, but I am sure they can be adapted to whatever mike and radio combination you use.

The mike I use is an MC-60 desk mike by Kenwood. The mike connector is an eight-pin audio connector. My radio is an older model Kenwood, the TS-180S, and does not have any of the newer bells and whistles. It uses a four-pin connector for the audio and the push-to-talk line. It is a straightforward mike and push-to-talk arrangement.

To start with, you need the mike and the plastic holder from the desk unit. I stored the base stand in a plastic freezer bag in case I wanted to reassemble it in the future.

Next, the lamp part of the end of the arm has to be removed. A note of caution here: the arm with the springs still at-



*Side view of the microphone and holder attached to the end of the lamp arm.*

tached can swing up quickly when there is no load on the end of the arm. I would remove the upper springs first and set them aside before taking off the lamp part.

At the end of the arm, where the light fixture was, are two triangular pieces of metal which form the connection between the upper and lower parts of the arm. The mike holder from the desk unit has a tab on the bottom where it was bolted to the desk part of the mike unit. I discovered if you loosen the two triangular end pieces just enough, the tab on the mike holder will slip in between the two pieces. I put a screw through the hole where the lamp connection was and gently tightened up everything.

The mike cable can be inserted into the upper arm to take the place of the AC line cord. In my case, the arm had to be taken apart to get the mike cable through the arm. Be sure to leave enough slack in the cable so that when you reassemble the arm, it can still flex through its full range.



*Overall view of the completed assembly.*

\*1319 Granville Rd., Newark, OH 43055

## Comments

It took me a couple of hours to put the whole thing together. It would have been less if I had not wandered back and forth to watch a baseball game on the tube.

Placing the mike is a simple matter, and I have moved mine several times to try out different angles and locations. It is amazing how quickly you can become accustomed to this style of operation. Now I have room on the desk for more papers, log books, note pads, and the usual clutter.

When I showed the finished product to my wife, she said, "That really looks nice. I bet that would be great for someone who is physically impaired." Just goes to show you that a second opinion is always a good thing.

## Parts List

One flex arm light.

Mike and holder from the MC-60 desk unit.

Audio cable: one roll RS-278-277.

Two mike connectors: (in my case) one eight-pin and one four-pin.

Two-conductor line: telephone or similar.

Smaller type for the PTT.

A "normally-off" switch for the foot switch.



# COMET

ANTENNAS FOR THE PROFESSIONAL AMATEUR

## "NEW" DUAL & TRI BAND SUPER "LINEAR" ANTENNAS

MODEL	FREQUENCY	GAIN	POWER	LENGTH	USE
CA-2X4Z	146 MHz 446 MHz	8.2dB 11.5dB	200W	15' 4"	BASE/REPEATER
CA-2X4FX	146 MHz 446 MHz	4.5dB 7.2dB	200W	5' 11"	BASE/REPEATER
CA-2X4M	140-155 MHz 440-460 MHz	4.5dB 7.0dB	150W	5'	MOBILE
CA-2X4SR	146 MHz 446 MHz	3.8dB 6.2dB	150W	3' 4"	MOBILE
CX-901	146 MHz 446 MHz 1.2 GHz	3.0dB 6.0dB 8.4dB	150W	3' 6"	BASE/REPEATER
CX-801	146 MHz 446 MHz 1.2 GHz	3.0dB 6.8dB 9.6dB	100W	3' 3"	MOBILE
CA-630TN	146 MHz 446 MHz 1.2 GHz	2.15dB 2.15dB 5.5dB	150W 50W	1' 5"	MOBILE

## NEW! ULTRA COMPACT SWR/POWER METERS



CM-200	144-150 MHz
CM-300	200-250 MHz
CM-400	420-460 MHz
CM-420	140-460 MHz
CM-900	850-950 MHz
CM-1200	1250-1350 MHz

DEALERS INQUIRIES WELCOME

CIRCLE 23 ON READER SERVICE CARD

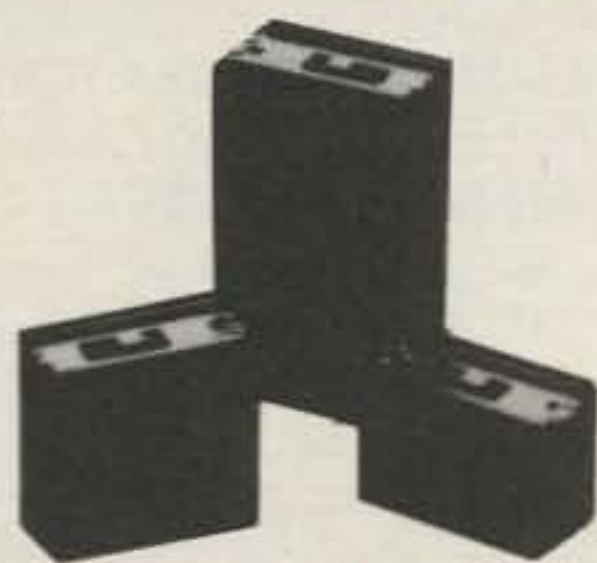
CALL YOUR DEALER



1275 N. Grove St.  
Anaheim, CA 92806  
(714) 630-4541  
FAX (714) 630-7024

# BATTERIES "R" US

You've bought our replacement batteries before...  
NOW YOU CAN BUY DIRECT FROM US, THE MANUFACTURER!



ICOM

CM2, BP2 7.2v @ 500 MAH  
CM5, BP5 10.8v @ 500 MAH

SUPER

7S 13.2v @ 1200 MAH—\$63.95  
8S 9.6v @ 1200 MAH—\$59.95

(base charge only 1" longer)

ICOM Chargers Available!

## NEW For 1991

Truly Superior **YAESU** Replacement Batteries  
At Competitive Prices

FNB-3/3A	9.6 V @ 1,200 MAH (4" Long)	\$49.95
FNB-4	12 V @ 750 MAH (4" Long)	\$33.95
FNB-4A	12 V @ 1,000 MAH (4" Long)	\$59.95
And		
FNB-17	7.2 V @ 600 MAH	\$33.95

Look For February's Special Of The Month



CUSTOM MADE BATTERY  
PACKS & INSERTS

Made to your specifications  
Introductory Offer!

KENWOOD INSERTS  
PB-25—\$20.00; PB-21—\$13.75  
PB-26—\$20.00  
ICOM INSERTS  
BP-5—\$23.00; BP3—\$17.45  
BP-7; BP-8

Prices subject to change without notice.



MasterCard and Visa  
cards accepted. NYS  
residents add 8 1/4 %  
sales tax. Add \$3.50  
for postage and  
handling.



FOR ALL YOUR COMMUNICATION  
BATTERY REPLACEMENT NEEDS.

## W & W ASSOCIATES

29-11 Parsons Boulevard, Flushing, N.Y. 11354

WORLD WIDE DISTRIBUTORSHIPS AVAILABLE. PLEASE INQUIRE.

MADE IN  
THE U.S.A.  
SEND FOR  
FREE CATALOG  
AND PRICE LIST

In U.S. & Canada Call Toll Free (800) 221-0732 • IN NYS (718) 961-2103 • Telex: 51060 16795 • FAX: (718) 461-1978

## NEMAL ELECTRONICS

- \* Complete Cable Assembly facilities MIL-STD-45208
- \* Commercial Accounts welcome - Quantity pricing \* Same day shipping most orders
- \* Factory authorized distributor for Alpha, Amphenol, Belden, Kings, Times Fiber

Call NEMAL for computer cable, CATV cable, Flat cable, semi-rigid cable, telephone cable, crimping tools, D-sub connectors, heat shrink, cable ties, high voltage connectors.

### HARDLINE 50 OHM

FXA12 1/2" Aluminum Black Jacket.....	.89/ft
FLC12 1/2" Cablewave corr. copper blk jkt.....	1.69/ft
FLC78 7/8" Cablewave corr. copper blk jkt.....	4.35/ft
NM12CC N conn 1/2" corr. copper m/f.....	25.00
NM78CC N conn 7/8" corr. copper m/f.....	54.00

### COAXIAL CABLES (per ft)

1180 BELDEN 9913 very low loss.....	.55
1102 RG8/U 95% shield low loss foam 11ga.....	.36
1110 RG8X 95% shield (mini 8).....	.19
1130 RG213/U 95% shield mil spec NCV jkt.....	.39
1140 RG214/U dbl silver shld mil spec.....	1.85
1705 RG142B/U dbl silver shld, teflon ins.....	1.50
1310 RG217/U 50 ohm 5000 watt dbl shld.....	1.05
1450 RG174/U 50 ohm .100" od mil spec.....	.14

### ROTOR CABLE-8 CONDUCTOR

8C1822 2-18ga and 6-22ga.....	.24/ft
8C1620 2-16ga and 6-20ga.....	.39/ft

### CONNECTORS-MADE IN USA

NE720 Type N plug for Belden 9913.....	\$3.95
NE723 Type N jack for Belden 9913.....	4.95
PL259AM Amphenol PL259.....	.89
PL259TS PL259 teflon ins/silver plated.....	1.59
PL258AM Amphenol female-female (barrel).....	1.65
UG175/UG176 reducer for RG58/59 (specify).....	.22
UG21DS N plug for RG8,213,214 Silver.....	3.35
UG83B N jack to PL259 adapter, teflon.....	6.50
UG146A SO239 to N plug adapter, teflon.....	6.50
UG255 SO239 to BNC plug adapter, Amphenol.....	3.75
UG255TS SO239 to BNC Teflon Silver.....	5.95
SO239AM UHF chassis mt receptacle, Amphenol.....	.89
UG175S/UG176S reducer (silver) specify.....	.45
UG88C BNC plug RG58,223,142.....	1.45

### GROUND STRAP-GROUND WIRE

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

\* Prices do not include shipping. Visa/Mastercard \$30 min., COD add \$3 (min. ship. charge \$3)  
Call or write for complete price list. NEMAL's new 40 page CABLE AND CONNECTOR SELECTION GUIDE is available at no charge with orders of \$50 or more, or at a cost of \$4 with credit against next qualifying order.

**NEMAL ELECTRONICS, INC., 12240 NE 14th Ave. N., Miami, FL 33161**  
**(305) 893-3924 Telex 6975377 24 hr. FAX (305) 895-8178**

Please send all reader inquiries directly.








9:00 am - 5:30 pm  
weekdays

Weekends and evenings  
by appointment.

280 Tiffany Avenue  
Jamestown, New York 14701

*Western New York's finest... amateur radio dealers!*

PH. (716) 664-6345  
(800) 752-8813 for orders only

## For Brands You Can Count On

AT PRICES YOU CAN LIVE WITH

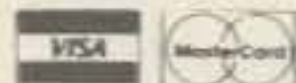
**CALL TOLL FREE: 1-800-238-6168**

### TRADE?

Yes, if you have clean, saleable gear!

**CALL FOR FREE APPRAISAL**

In Tennessee, Call  
901-683-9125



Find out why thousands of customers have switched to us.

KENWOOD, ICOM, TEN-TEC, Astron, Cushcraft, Larsen, MFJ, Butternut, B&W, Hustler, Antenna Specialists, AEA, Ameritron, Van Gorden, ARRL, RF Concepts, Diamond, Kantronics, CallBook, Alpha Delta, Heil, Grundig, Uniden, Bearcat, Mirage, Ameco, Alliance, Daiwa, Hy-Gain, Valor & others

## Memphis Amateur Electronics, Inc.

(In Business Almost a Quarter Century)  
1465 Wells Station Road, Memphis, TN 38108



### STORE HOURS:

Mon.-Fri., 9 to 5  
Sat., 9 to noon  
(Central Time)

CIRCLE 123 ON READER SERVICE CARD

## ANTENNA TUNERS



1500W

### MODEL VS1500A ANTENNA COUPLER

The Barker & Williamson VS1500A antenna coupler is designed to match virtually any receiver, transmitter or transceiver in the 160 to 10 meter range (1.8 to 30 MHz) with up to 1500 watts RF power to almost any antenna, including dipoles, inverted vees, verticals, mobile whips, beams, random wires and others, fed by coax cable, balanced lines or a single wire. A 1:4 balun is built-in for connection to balanced lines.

### FEATURES INCLUDE:

- Series parallel capacitor connection for greater harmonic attenuation.
- In-circuit wattmeter for continuous monitoring.
- Vernier tuning for easy adjustment.

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

Dimension (Approx.): 11" wide x 13" deep x 6" high

Weight: 6 1/2 lbs.

Price: **\$499.00**  
SHIPPING & HANDLING \$4.00

FOB Factory.  
Fully warranted for one year.

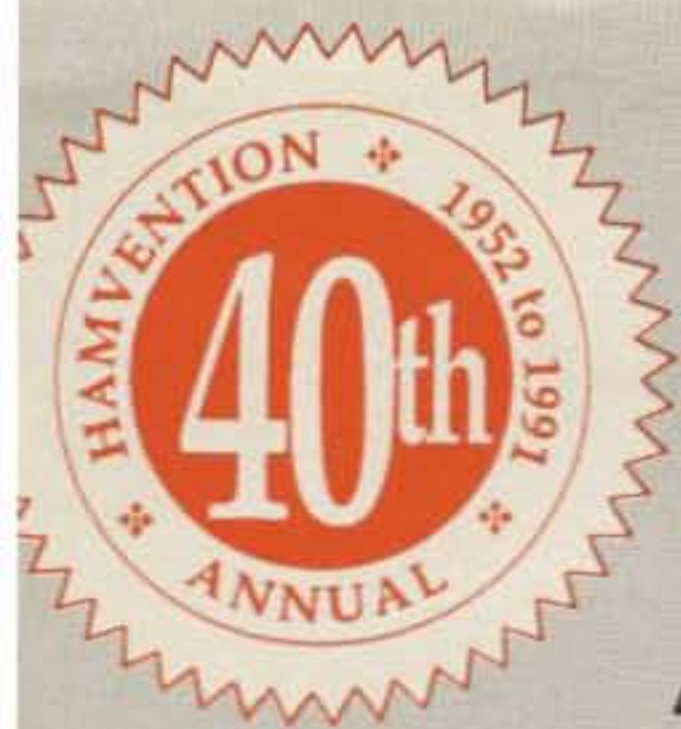


### MODEL VS-300A ANTENNA TUNER GUARANTEED THE BEST VALUE YOU'LL EVER FIND!

**\$111.00** SHIPPING AND HANDLING \$3.50

- FULL COVERAGE - 1.8 - 30 MHz
- HANDLES UP TO 300 WATTS
- MATCHES VIRTUALLY ALL ANTENNAS  
DIPOLE BEAM  
INVERTED VEE RANDOM WIRE  
VERTICAL MOBILE WHIP
- ACCEPTS COAX BALANCED LINE OR SINGLE WIRE FEEDLINE
- BUILT-IN ANTENNA SWITCH
- BUILT-IN WATTMETER WITH FORWARD AND REFLECTED POWER FOR SWR MEASUREMENTS
- WATTMETER ACTIVE EVEN WITH TUNER IN BYPASS POSITION
- ATTRACTIVE CHARCOAL GRAY FINISH AT HOME IN ANY HAM SHACK
- RUGGED 4:1 BALUN FOR BALANCED FEEDLINE

ALL OUR PRODUCTS MADE IN USA  
**BW BARKER & WILLIAMSON**  
Quality Communication Products Since 1932  
At your Distributors Write or Call  
10 Canal Street, Bristol, PA 19007  
(215) 788-5581



# DAYTON Hamvention

April 26, 27, 28, 1991

## Early Reservation Information

• General Chairman, Dave Grubb, KC8CF

• Asst. General Chairman, Ross Brown, WA8DQH

- Giant 3 day flea market • Exhibits
- License exams • Free bus service

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 shown at top of form, copy of present license and check for prevailing ARRL rates (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton, OH 45458

### 1991 Deadlines

Award Nominations: March 1

License Exams: March 26

Advance Registration and banquet:

USA - April 4 Canada - March 31

Flea Market Space:

Spaces will be allocated by the Hamvention committee from all orders received prior to February 1. Express Mail NOT necessary! Notification of space assignment will be mailed by March 15, 1991. Checks will not be deposited until after the selection process is complete.

### Information

General Information: (513) 454-1456  
or, Box 964, Dayton, OH 45401

Lodging Information: (513) 223-2612  
(No Reservations By Phone)

Flea Market Information: (513) 767-1107

### Lodging

Please write to Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402 or refer to our 1990 Hamvention program for lodging information which includes a listing of hotel/motels located in the areas surrounding Dayton.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

## Advance Registration Form

Dayton Hamvention 1991

Reservation Deadline - USA-April 4, Canada-March 31

Flea Market Reservation Deadline: February 1

Enclose check or money order for amount indicated and send a **self addressed stamped** (#10) envelope.

Please Type or Print your Name and Address clearly.

### How Many

Admission (valid all 3 days)	_____	@ \$10.50*	\$ _____
Grand Banquet	_____	@ \$22.00**	\$ _____
Alt. Act. Luncheon (Saturday)	_____	@ \$8.00	\$ _____
(Sunday)	_____	@ \$8.00	\$ _____
Flea Market (Max. 3 spaces)	_____	\$25/1 space \$50/2 adjacent	
Admission ticket must be ordered with flea market tickets		\$150/3 adjacent	\$ _____

\* \$13.00 at door

\*\* \$24.00 after April 24th, if available

**Total** \$ \_\_\_\_\_

Make checks payable to - **Dayton HAMVENTION**

Mail to - **Dayton Hamvention  
Box 1446  
Dayton, OH 45401**

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**Not all test equipment need be expensive to be of value. KB4ZGC shows us how to construct a valuable addition to our shack for about \$10.**

## How To Build (And Use) An Audio Milliwatt Meter

BY J. FRANK BRUMBAUGH\*, KB4ZGC

**D**o received signals now sound weaker than when your receiver was new? Is it more difficult to dig that rare one out of the noise because your receiver sounds noisier now?

Even the best, most expensive receivers will exhibit a gradual loss in sensitivity as time passes. This is normal and is the result of aging of components caused by heat, humidity, temperature fluctuations, and Murphy's Law. Making a quick, simple measurement of internal noise and the noise floor of your receiver monthly and keeping records of these values will alert you to any significant problems. The normal, slow loss of sensitivity signifies the possible need for tweaking the alignment. A more sudden change suggests one or more components have been damaged, in which case troubleshooting and repair are necessary.

### Find Out Why

The audio milliwatt meter described here is designed to simplify two important receiver measurements so the average amateur, including Novices, can easily

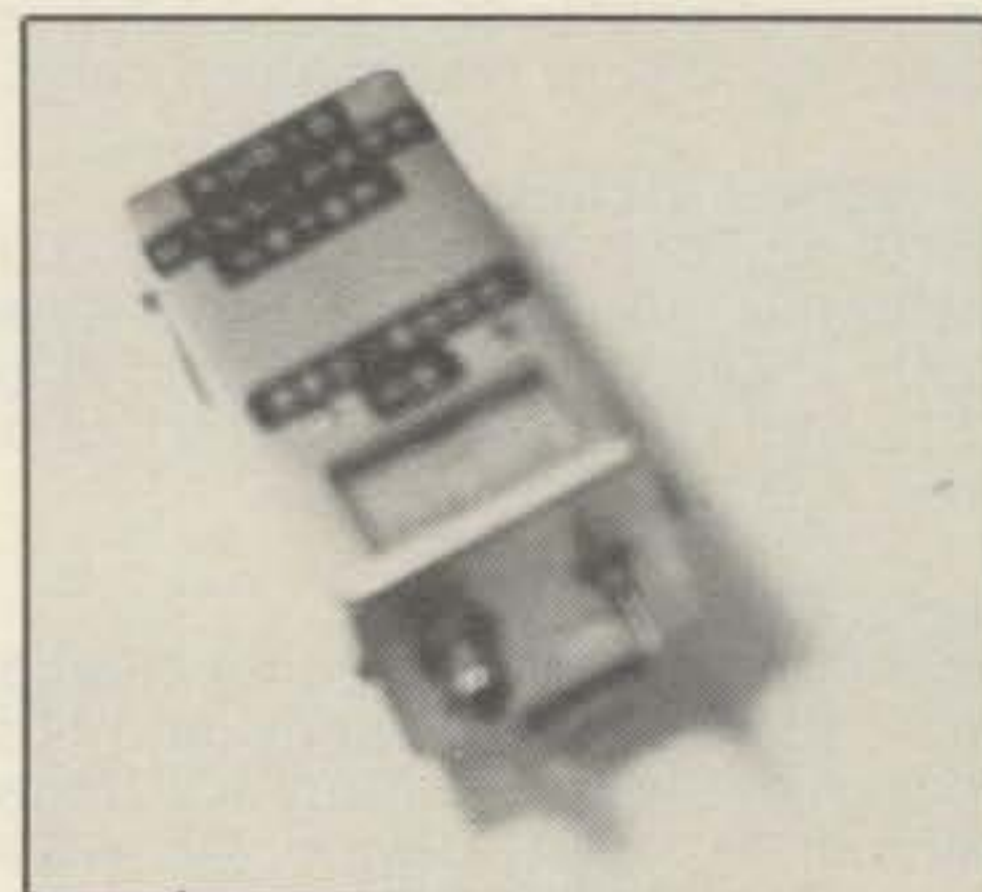
measure and keep track of internally generated noise, and the minimum discernible signal (MDS) which his or her receiver will detect.

### Theory of Operation

The schematic is illustrated in fig. 1. Audio from the receiver is fed through jack J1 to the 8 ohm winding of a small audio output transformer connected as a step-up transformer. The high-impedance winding is shunted by a resistance equal to the impedance of the winding. This is very important because it forces an 8 ohm impedance to be presented to the receiver audio output connector.

Many, if not most, amateur receivers and transceivers do not include an output transformer. Instead, audio is transferred through an electrolytic capacitor to the phones or speaker. Thus, receiver output impedance is not 8 ohms, but varies with frequency (and receiver design), generally over the range of 4 to 16 ohms. To ensure accuracy in measurements it is necessary to terminate the receiver audio output with a known 8 ohm load, which this instrument provides.

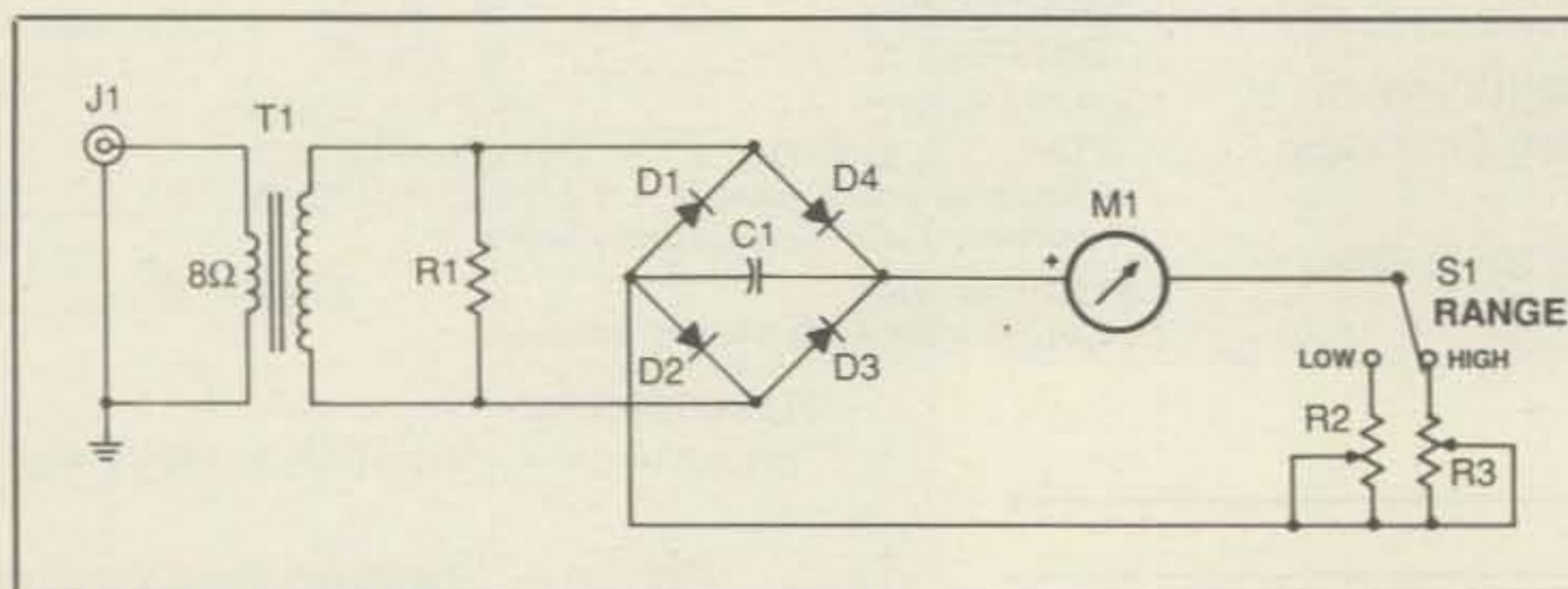
Audio (AC) voltage developed across the shunted winding is rectified by the bridge formed by diodes D1 through D4.



External view of the compact audio milliwatt meter.

This is filtered by capacitor C1, which is connected across the bridge from positive to negative. Filtered DC voltage is applied to DC microammeter M1, Range switch S1, and either R2 or R3 (the calibration trimpots) in series. These trimpots are set during the calibration procedure to provide two ranges: 5 to 100 mw and 50 mw to 1 watt. These ranges and power levels were chosen to make use of this instrument simple and easy.

\*82 Liddell St., Buffalo, NY 14212-1824

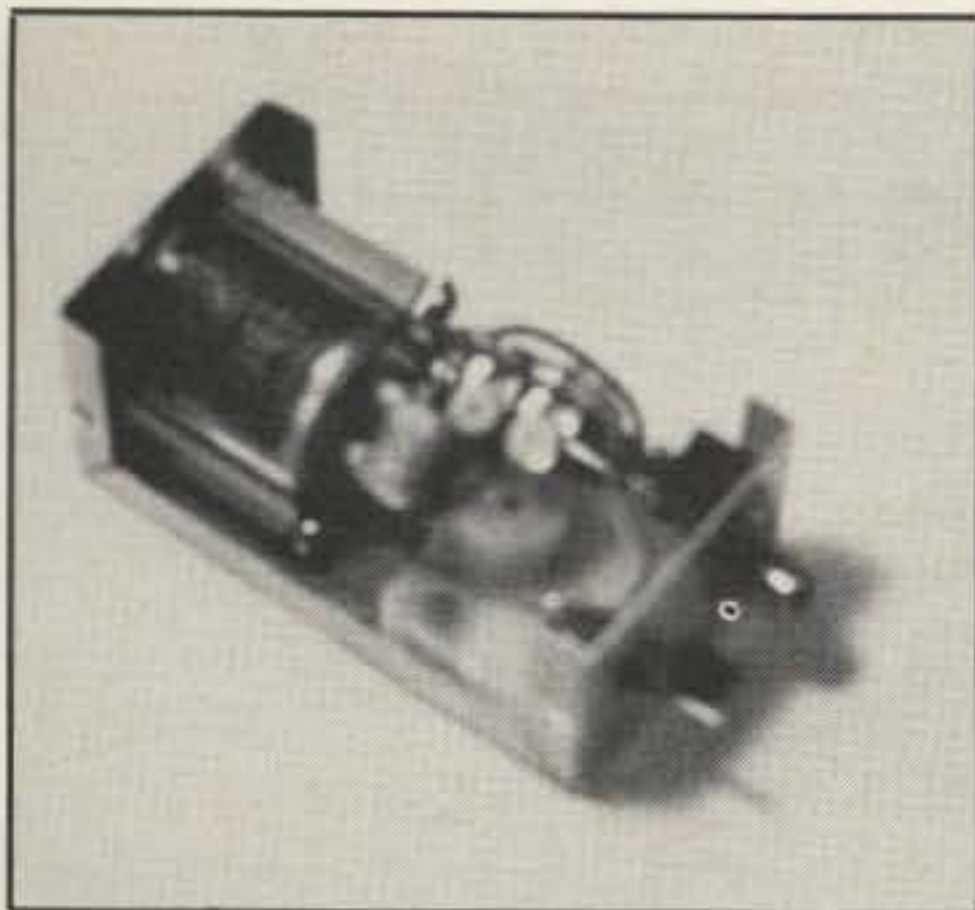


### Parts List

- C1—0.047  $\mu$ F disc
- D1-D4—1N914, 1N4148 or equivalent
- J1—Phone jack, RCA jack, etc.
- M1—DC microammeter, 100 or 200  $\mu$ A full scale
- R1—One watt resistor equal to impedance of T1 larger winding
- R2,R3—100,000 ohm trimpot
- S1—SPDT toggle or slide switch
- T1—Audio output transformer, 8 ohms to known impedance

Fig. 1—The audio milliwatt meter.





Internal view of the meter showing simplicity of construction.

## Construction

The audio milliwatt meter should be constructed in a small metal or plastic box. Jack J1 should match the plug you usually use for audio or low-voltage DC. This might be a 1/4 inch phone jack, a 3.5 mm jack, RCA jack, etc.

The output transformer T1 can be any small audio transformer with an 8 ohm winding as long as you know the impedance of the larger winding. Radio Shack sells a 1000 ohm c.t. to 8 ohm output transformer (273-1380), although this transformer probably could not handle more than half a watt without the core saturating. There are many mail-order dealers who offer suitable audio output transformers.

The transformer I used was in my junk box, having been removed from a military surplus LS-166 speaker I had purchased from Fair Radio Sales (P.O. Box 1105 Lima, OH 45802) over a year before. It is rated 600 to 8 ohms, 250 to 3000 Hz, ±1 dB, 2 watts, and is hermetically sealed in a steel case. Not having a 600 ohm, 1 watt resistor, I used two 300 ohm, 1/2 watt resistors in series. This forces the 8 ohm winding to present a solid 8 ohms impedance at the input jack J1.

The bridge is formed from four 1N914 (1N4148) small signal silicon diodes. This is preferable to using the 1N400X series

Low Range		High Range	
mw	DC Volts	Watts	DC Volts
5	1.73	0.05	5.5
10	2.5	0.10	7.75
25	3.9	0.25	12.25
50	5.5	0.50	17.33
75	6.7	0.75	21.2
100	7.75	1.00	24.5

Table 1—Results of calculations used to calibrate this instrument and an 8 to 600 ohm transformer. Voltages are rounded off to one or two decimal places.

power diodes or small AC bridges intended for power-line frequency use.

Meter M1 can be any of the small surplus tuning or VU meters which are available for about \$2.00 from Small Parts Center (6818 Meese Drive, Lansing, MI 48911), MicroMart (508 Central Avenue, Westfield, NJ 07090), and other mail-order dealers, as well as at fleamarkets at hamfests.

Switch S1 is a SPDT toggle or slide switch. Calibration potentiometers are small trimpots. Both are available from the sources mentioned above as well as from others.

The cabinet is needed only in the interest of neatness. I used a Radio Shack aluminum box (270-239) which measures 4"L × 2 1/8"W × 1 1/8"D.

## Calibration

A source of audio voltage anywhere between 300 and 3000 Hz, such as any AF signal generator or a homebrew audio oscillator, can be used. The output level must be variable. I used a 555 square-wave oscillator set at about 1000 Hz to calibrate this instrument. Waveform is unimportant, because what is to be measured is power and the induced voltages are rectified and filtered to provide a DC voltage for measurement. Also, the audio output from your receiver when using this instrument will be, or will contain, considerable white noise—random noise voltages.

Calibration points of 5, 10, 25, 50, and 100 milliwatts on the LOW range, and 0.05, 0.10, 0.25, 0.50, 0.75, and 1.0 watts on the HIGH range are suggested as the most useful. Because these power levels when translated to DC voltages are not linear in relationship, you will have to calibrate your meter face at each value.

You will save time and make calibration easier if you first calculate the equivalent DC voltages for each calibration point, using Ohm's Law, before beginning the calibration process.

$$E = \sqrt{PR}$$

where: E = DC volts, P = power in watts, and R = resistance (shunting output transformer).

Table 1 shows the results of calculations used to calibrate this instrument and an 8 to 600 ohm output transformer. Voltages are rounded off to one or two decimal places.

1. Place S1 in the LOW-range position and set both calibration trimpots R2 and R3 to maximum resistance.

2. Connect the audio generator output to J1, and connect a DC voltmeter across C1. A digital voltmeter will allow more accurate measurement, but any analog multimeter can be used. When making receiver measurements only the difference between two voltages will be mea-

sured. The actual accuracy of individual calibration points is not of great importance.

3. Advance the signal generator output level control until your DC voltmeter indicates the voltage equivalent to 100 mw. Then adjust R2 for a full-scale indication on the milliwatt meter face.

4. Reduce the input signal level until your DC voltmeter indicates the voltage equivalent to 75 mw. Mark this point on the milliwatt meter face.

5. Continue the above process for each remaining calibration point in the LOW range.

6. Switch S1 to HIGH range, and advance the signal generator output level control until your DC voltmeter indicates and voltage equivalent to 1 watt. Then adjust R3 for a full-scale indication on the milliwatt meter.

7. Reduce the input signal as described above and mark each calibration point on the face of the milliwatt meter. This will conclude calibration of the instrument.

## Measuring Receiver Internal Noise

1. Connect a shielded 51 ohm 5% resistor, or your dummy load, to the receiver antenna connector.

2. Connect the audio milliwatt meter to the EXT SPKR connector on the receiver, using a suitable cable.

3. Apply power to the receiver and tune to your favorite spot in any amateur band.

4. Rotate RF GAIN (if present) and AF GAIN controls fully clockwise.

5. Use the RANGE switch to keep the meter needle on scale, and note the power level indicated. Record this value for future reference. This is the level of the internally generated noise in your receiver.

## Measuring Noise Floor (Sensitivity)

A good-quality, well-shielded RF signal generator is required in making this measurement. A shielded step attenuator and shielded coaxial jumpers are needed for interconnections between signal generator and attenuator, and between attenuator and receiver. The audio cable used in measuring internal noise is used to connect the receiver to the audio milliwatt meter. See fig. 2, which illustrates the test setup.

1. Be certain the signal generator is OFF. Advance receiver RF GAIN (if present) fully clockwise. Turn the receiver on and adjust AF GAIN for an indication of 5, 10, or 25 mw on the LOW range of the mil-

## CB-TO-10 METERS

We specialize in CB radio modification plans and hardware. Frequency and FM conversion kits, repair books, plans, high-performance accessories. Thousands of satisfied customers since 1976! Catalog \$2.

**CBC INTERNATIONAL**

LOU FRANKLIN/K6NH - Owner

P.O. BOX 31500CQ, PHOENIX, AZ 85046

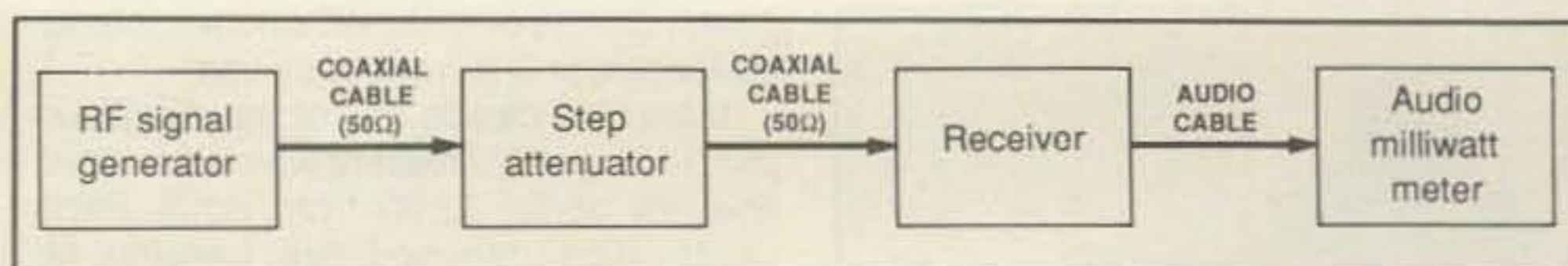


Fig. 2— Test setup; noise floor measurement.

## Feeling Left Out?

Have your favorite communications (Police, Fire, etc) moved to the 800MHz band? Are the scanners available which access this band too expensive? If you are like many scanning enthusiasts, this can be a real dilemma. For those of you who are still in a futile search for 800 MHz coverage on your hand held scanning radio, GRE America, Inc. has a product for you. Introducing the newly developed **Super Converter™ II** which has all of the features that you have come to enjoy in our **Super Converter™ 8001** (810 - 912 MHz coverage, etc.), and more. The **Super Converter™ II** has a convenient switch which allows for an instant return to normal scanning frequencies without disconnecting the unit. It is also equipped with BNC connectors for easy adaptability to your handheld scanner.



Introducing the **Super Converter 8001™** from GRE America, Inc. The **Super Converter 8001™** once attached allows any UHF scanning or monitoring receiver to receive the 810 to 912 MHz band.

It has been our experience that most scanning radios suffer from a lack of sensitivity due to antenna and power limitations. Introducing the GRE **Super Amplifier™**. The **Super Amplifier™** is a compact pre-amp designed to work with scanners and it amplifies the reception of the VHF/UHF bands (from 100MHz to 1GHz) as high as 20db.

The **Super Amplifier™** has an adjustable gain which is controlled from the back of the unit and allows amplification level of up to 20db through all frequencies, equipped with a bypass switch to return to normal scanning frequencies. As with all other GRE products, you will find the quality and design of the **Super Amplifier™** to be of the highest standard.

Wide range frequency (up to 1GHz) antenna is exclusively available from GRE America, Inc.

For more information, or a dealer near you (new dealers are welcome), contact GRE America, Inc. at the address below.

## GRE America, Inc.



GRE America, Inc.  
425 Harbor Blvd.  
Belmont, California 94002

Telephone (415) 591-1400  
Outside CA: (800) 233-5973  
Fax: (415) 591-2001



milliwatt meter. Make certain that the signal generator and receiver are tuned to the same frequency.

2. Turn the signal generator on and adjust output level to minimum. Note the indication on the milliwatt meter. If it is greater than double the previous indication from step 1, add attenuation with the step attenuator until the milliwatt meter indication is exactly twice the value obtained in step 1. It may be necessary to slightly adjust the output level of the signal generator to achieve this.

3. Note the output level of the signal generator, which will be in - dBm (decibels below one milliwatt). For instance, assume this level is - 112 dBm.

4. Note the amount of attenuation in decibels inserted by the step attenuator. For instance, assume this to be 8 dB.

5. Add together the figures obtained in steps 3 and 4. In the example used, - 112 plus - 8 equals - 120 dBm.

6. The value obtained in step 5 is the noise floor of your receiver on the frequency used to make this test. This is the minimum discernible signal (MDS) which your receiver will detect.

7. Repeat the above steps for each amateur band you normally operate, and record the MDS values for future reference.

## Conclusion

Most amateurs will be able to construct this instrument from parts in the junk box or obtained from fleamarkets or other local amateurs. Even if all new (surplus) parts must be purchased, the total cost should not exceed \$10.

Because this instrument is intended to be used on a periodic basis, it should be constructed neatly in its own small box. However, for amateurs in a hurry, it will function normally when strung together on the bench with clip leads or random lengths of wire. Both lead lengths and parts placement are unimportant because of the low frequencies involved. Build it your way, but use it several times a year or if you suspect that your receiver is not pulling out the signals the way you think it should. And keep records! They will alert you to any possible problems.

CIRCLE 71 ON READER SERVICE CARD



# AFFORDABLE 10-METER DXING

## With This Realistic® Ham Transceiver

Hams are working the world with this value-packed rig and here's what they're saying about it: "Great audio . . . Sounds like a much bigger radio . . . Best mobile I've ever owned . . . Very easy to install."

Realistic HTX-100 is a compact SSB/CW transceiver that gives you full 10-meter coverage in selectable 10kHz, 1 kHz or 100 Hz steps. You get a 10-frequency memory, mike-mounted up/down tuning, effective noise blanker and 5 or 25-watt power output.

The HTX-100 operates USB or semi break-in CW with sidetone. Packet compatible? Yes, with 40 ms rx/tx turnaround. Eight-pin mike connector. Requires 12VDC at 7 amps. Only \$259.95

More Super Values!  
Magnetic-Mount  
Antenna, \$37.95  
General Class  
Course, \$19.95  
Add-On External  
Speaker, \$13.95



## World-Class Quality, First-Class Service

HTX-100 is backed by a 1-Year Limited Warranty and Realistic's outstanding quality control. The optional Tandy® Service Plan extends warranty to five years for just pennies a month!

See this high-performance transceiver now at one of the 7000 Radio Shack locations, along with our big selection of accessories for improving your home or mobile station. Your nearby Radio Shack store offers excellent values in coax cable, antenna wire and hardware, RF connectors and adapters, fuses, power strips and more.

NOTE: You must have a current FCC Amateur Radio License to transmit with this transceiver. Prices apply at participating Radio Shack stores and dealers. Radio Shack is a division of Tandy Corporation

### CREATING NEW STANDARDS

**PROVEN LEADERSHIP.** Over 7000 USA locations, 39,000 employees, seven R&D centers, 31 USA and overseas manufacturing—**NOBODY COMPARES**

**GUARANTEED SATISFACTION.** Over 35 million customers benefit from our Satisfaction Guarantee. Putting you first made us #1 in electronics—**NOBODY COMPARES**

**Radio Shack®**  
**AMERICA'S**  
**TECHNOLOGY**  
**STORE™**

## Keyers



### The Morse Machine MM-3 Keyer

The Morse Machine has all the features you need in a memory keyer, including 2 to 99 WPM speed selection and over 8,000 characters of soft-partitioned memory. Twenty memories store your messages...as short or as long as you like. Memory can be expanded to 36,000 characters. All memory is backed up by an internal lithium battery.

Comprehensive Morse training facilities are built-in. **A Proficiency Trainer** for random code group practice. **A Random Word Generator** which generates four-letter words and **A QSO Simulator** which allows you to call stations, answer a CQ or listen to realistic on-the-air QSO's.

The MM-3 also features automatic serial number insertion and incrementing in any memory message. Use the front panel knob to adjust your sending speed or enter a precise speed with the keypad, toggling between the two at any time. Exchanges can be expedited by having parts of your message sent at a higher speed. You can even add remote switches for four of the memories to send your response or call CQ. The MM-3 can also be programmed for automatic beacon use. The RS-232 compatible serial I/O port provides computer control of the MM-3 and monitoring of the Morse training features.

## Packet



### PK-88 Packet Radio TNC

Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio--now with MailDrop, an 8KByte efficient personal Mailbox. The PK-88 also allows multiple single frequency QSO's, digipeating and networking. It's a superb value, packed with all the most needed packet radio features such as direct interface capability with NET/ROM and TCP/IP. In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other TNC:

- **WHYNOT** command - Shows reasons why some received packets are not displayed.
- **"Packet Dump Suppression"** - Prevents dumping unsent packets on the radio channel when the link fails.
- **CUSTOM** Command - Allows limited PK-88 customization for non-standard applications.
- **Enhanced MBX** command - Permits display of the data in I- and UI-frames, without packet headers and without packet headers or retried frames.
- **Enhanced MPROTO** command - Suppresses display of non-ASCII packets from Level Three switches and network nodes.

## Multi-Mode



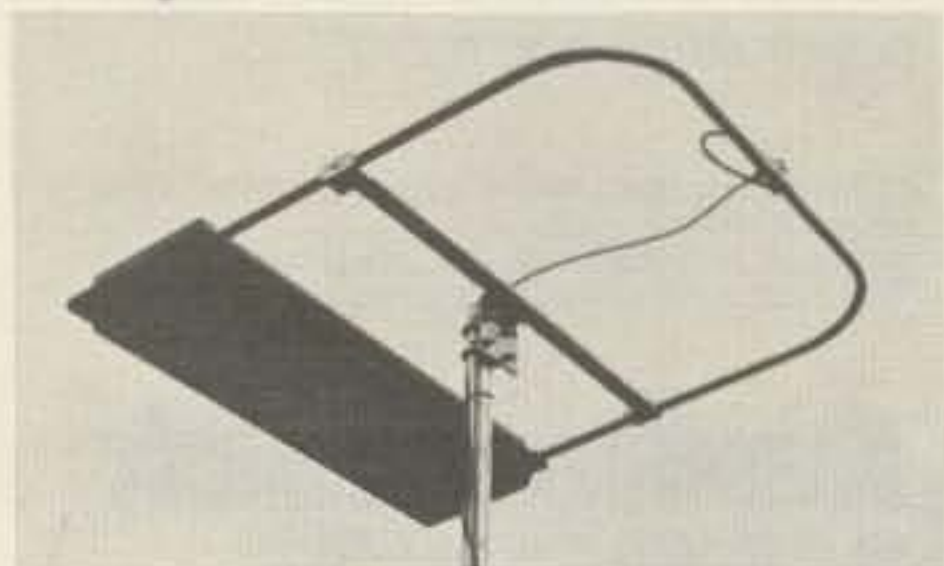
### PK-232MBX Multi-Mode Data Controller

With over 40,000 units sold worldwide, the PK-232MBX is the world's leading multi-mode data controller. Combining all amateur data communication modes in one comprehensive unit, the PK-232MBX offers Morse Code, Baudot, ASCII, AMTOR/SITOR 476 and 625, HF and VHF Packet, WEFAX receive and transmit, TDM, as well as commercial standard NAVTEX automated marine information services.

All software is on ROM.

- 20 front panel status and mode LED indicators
- RS-232 compatible
- Exclusive SIAM™ Signal Identification and Acquisition Mode
- TDM Time Division Multiplex decoding
- PakMail™ mailbox with selective control of third-party traffic
- FAX printing - supports most printers
- Two radio ports
- Host mode for efficient program control of the PK-232MBX
- KISS mode for TCP/IP networking protocol compatibility
- 32K RAM lithium battery-backed
- Many features for the digital SWL

## Antennas



### IsoLoop™ 14-30 MHz Compact HF Antenna

AEA brings you the breakthrough in compact HF antenna design with its high-performance, low-profile IsoLoop HF antenna. Designed specifically for hams with limited space or antenna restrictions, the 32"-square IsoLoop covers all frequencies from 14 to 30 MHz, at up to 150 watts continuous.

No ground radials are needed and its balanced, shielded feed-loop isolates the antenna from the feedline. This ensures that your signal is radiated by

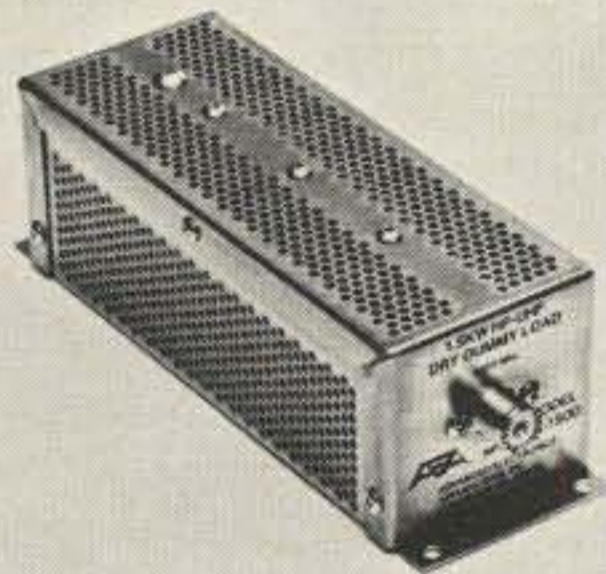
the antenna, not the feedline, which helps eliminate TVI and stray RF in the shack.

The inherent hi-Q of the IsoLoop makes it like a very sharp tunable filter that radiates. The narrow bandwidth suppresses harmonics from your transmitter, and also attenuates out-of-band signals that could overload your receiver.

The omni-directional IsoLoop makes an excellent attic or balcony antenna, and because it weighs only 12 pounds is also perfect for portable use.

# Better Experience

## Dummy Load

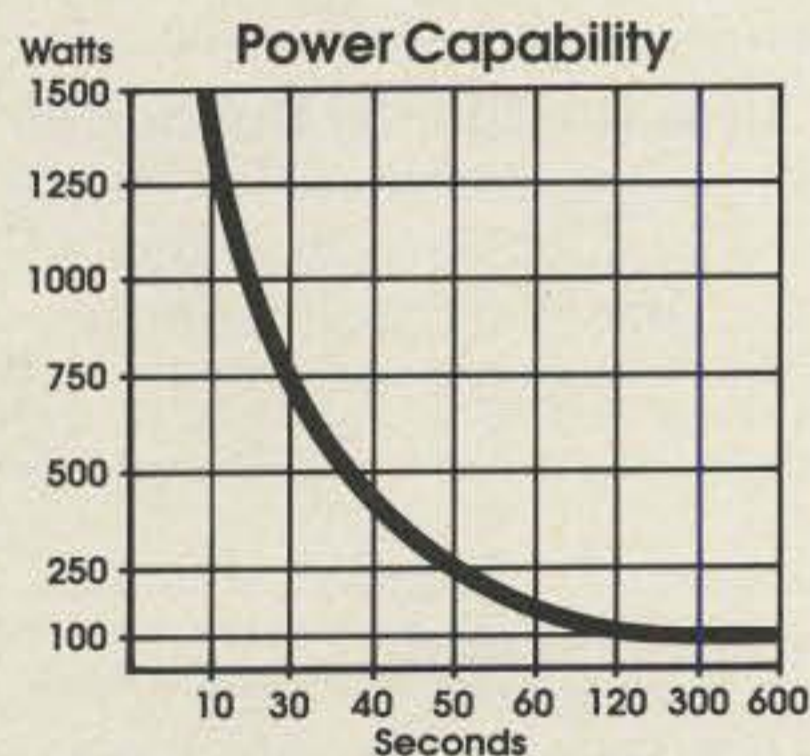


### DL-1500

#### DC-650 MHz Up to 1500 Watts

AEA's dry dummy load simulates a perfect 50 ohm antenna up to 650 MHz so you can test your transmitter without radiating a signal on the air.

- DC-650 MHz
- Simulates matched 50 ohm transmission line to test your transmitter
- Handles short-term RF power up to 1500 watts
- VSWR of less than 1.3:1 at 650 MHz
- Compact and lightweight
- Air cooled dry load



## EconoTuner



### ET-1 Antenna Tuner 300 Watts of All-Band Tuning

Meet your match with AEA's new ET-1 Econo-Tuner™. A quality, economical antenna tuner for under \$150, the ET-1 Econo-Tuner is designed to match virtually any receiver, transmitter or transceiver from 1.8 to 30 MHz with up to 300 watts of RF power.

Compatible with almost ANY antenna including verticals, dipoles, inverted vees, beams and mobile whips that are fed by coax cable, balanced lines or a single wire. For easy connection to balanced lines, a 4:1 balun is built-in.

A front panel switch control allows you to switch between two coax-fed antennas (direct or through the tuner). You can also switch to a balanced line or wire antenna. The BYPASS position allows you to switch to a dummy load (such as AEA's DL-1500 dry dummy load) or a direct connected coax antenna. In the BYPASS position, COAX 1 OUT or COAX 2 OUT can be selected so that the tuner is bypassed, but not the meter circuit.

The ET-1 features a precision dual-movement meter to simultaneously monitor power and SWR.

Unique engineering designs have made AEA one of the leading innovators in the amateur radio industry. That same quality and superior technical support make the ET-1 your best deal for an antenna tuner.

## Antennas

### IsoPole™ Omni-Directional VHF and UHF Base Station Antennas

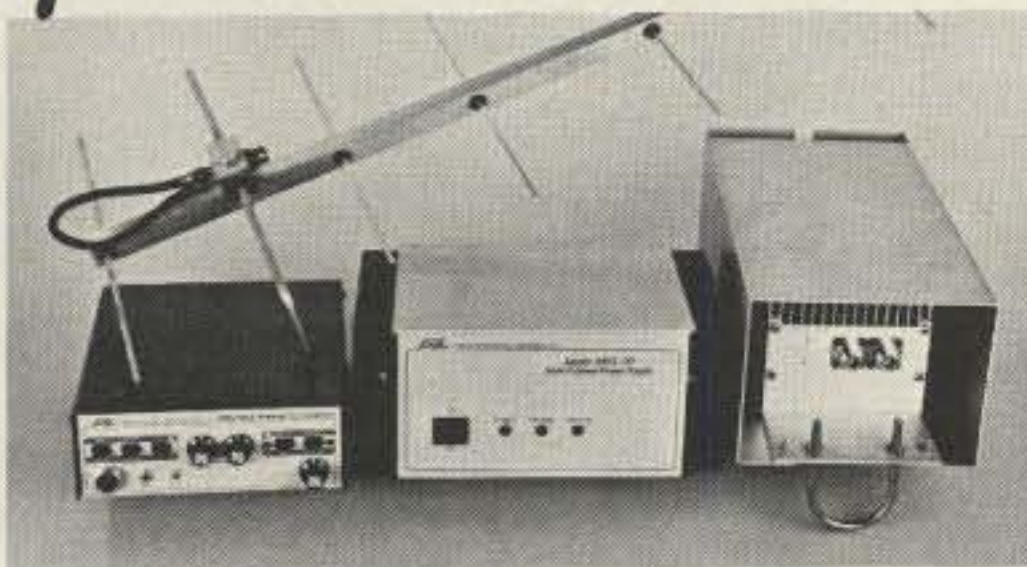


An outstanding mechanical and electrical design make the IsoPole the best choice for an economical omni-directional VHF or UHF base station antenna. All IsoPole antennas yield the maximum gain attainable for their respective lengths and a zero degree angle of radiation which puts the most signal on the horizon. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Decoupling cones offer great efficiency over obsolete radials which radiate in the horizontal plane. The IsoPoles also have a broader frequency coverage than any comparable antennas. Typical SWR is 1.4 to 1 or better across the entire band!

All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion-resistant aluminum alloys. Aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast, not supplied).

IsoPoles are ideal for packet radio. The decoupling cones stop computer hash picked up by the outer shield of the coaxial cable from being passed to the receiver.

## Amateur TV



### AEA's New ATV System

Add a new dimension to your amateur radio communications with AEA's Amateur Television (ATV) system. If you hold at least a technician-class license, you can transmit and receive live or taped audio and video Fast-Scan TV (FSTV) information that rivals broadcast quality. Now you can share more than conversation over the air with this new mode of "personal communications."

**It's Easy and Inexpensive.** If you have a video camera or camcorder and a standard TV set, you may already own the most expensive components of an ATV system. AEA's ATV system includes a transceiver and antenna. Simply connect the camera, TV and the antenna to the transceiver, and you're on the air LIVE with one watt P.E.P.! If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier and GaAsFET preamp with power supply. Your TV set will monitor your transmitted and received pictures.

Amplifier Now Available.

## NEWS OF CERTIFICATE AND AWARD COLLECTING

**T**he Story of the Month for January is:

**Michael J. Sheehan, KB1GN  
USA-CA All Counties #641, Mixed  
11-16-89**

"Finally, after more than seven years of county hunting I earned USA-CA All Counties #641. I think it is the most rewarding achievement that any amateur radio operator can earn.

"I was a radioman in the Navy in the mid-60s, and while serving on the USS Papago ATF-160 I had occasion to contact many stateside hams to relay messages from my shipmates to their families. I always wondered why these radio operators would devote their time to relaying messages for others. My interest in communications remained strong after my discharge from the Navy, but for one reason or another I just never managed to get my license. A friend, Paul Magrath, K1KZL, finally convinced me to get my General class license in 1981. I had callsign N1BTW until I upgraded to Advanced class in March of 1983 and got my present call, KB1GN.

"When I first got on the air, I used an antique Harvey Wells CW transmitter and a Hammarlund HQ 129X receiver, which I still have. I used two 100 watt light bulbs as a dummy load to tune the transmitter, which made my shack look like something from the twilight zone. Imagine my delight when I bought my old, used HW101. It was a giant step forward in my amateur radio life. My HW101 even went mobile with me as I found a mobile mount and power supply for it. It took up most of the front seat of my Bobcat, but it let me put out counties for the first time.

"I began county hunting on April 21, 1982 by contacting K5USO in Butler County, Alabama. At first my intent was only to work all states on 20 meters toward 5-Band WAS. A co-worker and long-time county hunter (unfortunately, now a silent key) Dick Torrey, AI1Q, suggested that I tune in to 14.336 for my WAS on 20 meters. Before I had worked all 50 states, I had several hundred counties, so I decided to stick with it a while longer, as it was lots of fun and there was a great bunch of people on the net. I started really to rack up the counties, and I was looking forward to #3076. I managed to get



*Michael J. Sheehan, KB1GN, USA-CA All Counties #641, at home in his shack in Massachusetts.*

hold of the mobile mount and power supply for my HW101 and take it on the road in June of 1983. I used it off and on in the car for about a year, and it was quite a chore to take it back and forth to the house.

"It was another giant step for me when I bought an Alda 103 from Dick, AI1Q. I still use it in the car, my HW101 now serving only as my home rig. I had a major setback when my AV-5 antenna blew down in January 1988. That kept me off the air (except when mobile) for a while. I moved in June 1988 and I didn't get my antenna back up until April 1989. Finally, on Sep-

tember 13, 1989 I worked WA0YFQ in Dickinson County, Iowa for #3076. Oh, what a feeling! It was a long, hard struggle, but it was worth it, and I started promptly to earn the second-time-around award.

"A bit of county hunting irony: As soon as I got my new number, I hit the road to give it out. One of my first operating points was the county line of Plymouth and Norfolk, which happens to be the oldest county line in the country. There is an engraved stone at the sight which reads, 'The oldest jurisdictional line in the country. On this site in 1664 surveyors placed an heape (sic) of stones to mark the boundary between Plymouth Colony and Bay Colony. . . .' So here was the newest USA-CA All Counties holder putting out the oldest county line.

"I look forward to putting out as many counties as I can during my further county hunting activities. Thanks to all those who helped me earn USA-CA All Counties #641. By the way, I did manage to buy an antenna tuner and put the light bulbs back in the lamp.—73, Mike Sheehan, KB1GN."

### USA-CA Special Honor Roll

Louis R. Mele, W2EMW  
USA-CA All Counties #678  
All CW, 9-10-90

### USA-CA Honor Roll

3000		1000	
W2EMW	704	KB9AFA	1129
		W2EMW	1130
2500		N2JNE	1131
W2EMW	780		
W3DYA	781	500	
2000		OK2ON	2445
W2EMW	849	OK2PO	2446
W3DYA	850	N2JNE	2447
		DJ8WD	2448
		ON4ACB	2449
1500		YN3CC	2450
W2EMW	933	KB6LQV	2451
KA1EAP	934	N4JED	2452
KW0U	935	SM4ASI	2453
WA2CNJ	936	KA3THS	2454
K6PQA	937		

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

### Awards Issued

Louis R. Mele, W2EMW, finished all of his paperwork, filed his claim, and received USA-CA All Counties #678, USA-CA 3000 #704, USA-CA 2500 #780, USA-CA 2000 #849, USA-CA 1500 #933, and USA-CA 1000 #1130, All CW, dated 9-10-90.

Norm Beavers, W3DYA, took another nice step in his quest by claiming USA-CA 2500 #781 and USA-CA 2000 #850, All CW, dated 9-29-90.

David W. Rathhoff, KA1EAP, filed another group of confirmed contacts and qualified for USA-CA 1500 #934, Mixed, dated 9-13-90.

Richard H. Weil, KW0U, filed his good application for USA-CA 1500 #935, All 20M SSB, dated 9-13-90.

Ray E. Skrabut, WA2CNJ, received USA-CA 1500 #936, All 20M SSB, dated 9-19-90.

Robert P. Banner, K6PQA, claimed

333 South Lincoln Ave., Mundelein, IL 60060



*Worked All Europe, Class I, Telegraphie (Telefonie), a DARC award.*



*Europa-DX Diplom available annually from the Deutscher Amateur Radio Club.*

and received USA-CA 1500 #937, Mixed, dated 9-27-90.

Sally E. Butzow, KB9AFA, added to her record by claiming USA-CA 1000 #1129, Mixed, dated 9-6-90.

Charles Steele, N2JNE, filed his qualifying application for USA-CA 1000 #1131 and USA-CA 500 #2447, All 20M SSB Mobile-to-Mobile, dated 9-10-90.

USA-CA 500 certificates went to:

Radmie Zoukar, OK2ON, USA-CA 500 #2445, All CW, 9-4-90.

Josef Bartos, OK2PO, USA-CA 500 #2446, All CW, 9-4-90.

Charles Steele, N2JNE, USA-CA 500 #2447, All 20M SSB Mobile-to-Mobile, 9-10-90.

Hartmut Probsthain, DJ8WD, USA-CA 500 #2448, All CW, 9-13-90.

D. A. (Danny) Commeyne, ON4ACB, USA-CA 500 #2449, Mixed, 9-20-90.

Jose J. Cespedes Cruz, YN3CC, USA-CA 500 #2450, All CW, 9-21-90.

Ray Harkins, KB6LQV, USA-CA 500 #2451, All 20M SSB, 9-21-90.

David R. Jones, Jr., N4JED, USA-CA 500 #2452, Mixed, 9-25-90.

Carl E. Alafsson, SM4ASI, USA-CA 500 #2453, All CW, 9-28-90.

Patrick A. Kelley, KA3THS, USA-CA 500 #2454, Mixed, 9-29-90.

## Awards Available

**DARC (Deutscher Amateur Radio Club) Awards.** The following information about awards offered by the DARC is courtesy of Ralph M. Hirsch, K1RH. Ralph is the North American check point for all of these awards. Anyone desiring further information and the mandatory forms should enclose a business-size SASE and \$1.00 to help cover costs. Ralph's address is 172 Newton Road, Woodbridge, CT 06525.

The following general requirements are applicable:

**Processing:** Original application fee

\$6.00; endorsement \$4.00. These processing charges include airmail return of awards from DL3RK, except for the EU-DX-D 1000 Point Plaque, which costs an additional \$10.00.

**Postage:** Actual cost. If first-class mail, 25 cents for the first ounce and 20 cents for each additional ounce. Figure return postage at what it costs to send the cards to the check point.

**Fees:** For registered mail, add \$4.85 per package. For certified mail, the cost is only 85 cents per package and is recommended.

**General:** You may use any of the following bands authorized in your country: 1.8, 3.5, 7, 10, 14, 18, 21, 24, and 28 MHz. The same cards may be used for any of the awards.

**Country List:** The following countries may be used for the DARC awards: C31, CT1, CT2, DL, EA, EA6, EI, F, G, GO, GI, GJ, GM, GM (Shetland), GU, GW, HA, HB, HB0, HV, I, IS, IT, JW (Bear), JW (Spitzbergen), JX, LA, LX, LZ, OE, OH, OH0, OJ0, OK, ON, OY, OZ, PA, SM, SP, SV, SV5 (Rhodes), SV9 (Crete), SV (Athos), T77, TA (European), TF, TK, UA1346, UA2, UA (FJL), UB, UV, UN/UK1N, UO, UP, UQ, UR, Y22-99, YO, YU, ZA, ZB2, 1A0, 3A, 4U1 (Geneva), 4U1 (Vienna), 9H1.

The awards may be obtained by licensed radio amateurs and SWLs in the USA, Canada, and Mexico. All contacts must be made from the same country.

**WAE (Worked All Europe) Award.** The WAE is a certificate awarded to amateur radio stations for contacts with European countries on different bands. It is issued in two divisions—Telegraphy (2x CW) and Telephony. Each European country counts one point on each band. For USA, Canadian, and Mexican stations, contacts on 80 and 160 meters count two points. A maximum of five bands per country may be used.

**Classes:** WAE III—at least 40 countries and 100 points. WAE II—at least 50 countries and 150 points. WAE I—at

least 55 countries and 175 points.

Holders of WAE I get a special WAE Badge.

**EU-DX-D (Europa-DX Diplom).** The EU-DX-D is an award that may be claimed annually. The EU-DX-D is issued in the following classes: Telegraphy, SSB, or Mixed modes. For the Mixed class, at least 30% of the contacts must be made in a different mode.

A minimum of 50 points is required for the EU-DX-D per year. Twenty points must be obtained by contacts with European countries, and 30 points by contacts with countries outside Europe. All bands can be used, but each country can be used only once per year on just one band, which counts for one point, unless claimed on 80 or 160 meters, when two points are given. Stickers are available for each additional block of four European and six non-European points within the same calendar year.

The EU-DX-D may be claimed every year anew. Each year's score may be added to obtain the ED-DX-D 500 Badge and the EU-DX-D 1000 Trophy. There is no limit to the number of years.



*Europa Diplom offered by the DARC for specified cumulative annual Europa-DX scores.*

**Europa Diplom.** The Europa Diplom is awarded for working (or hearing) amateurs in European countries. Applicants must prove a total score of at least 100 points.

**Annual score:** Each confirmed European country counts one point per year on each amateur band.

**Total score:** The sum of the annual scores for the year of application and the five preceding years.

**Europa 300 Trophy.** Owners of the Europa Diplom may obtain the Europa 300 Trophy. Applicants have to prove 300 country points when counting each country on each band only once in all the years. The service charge is \$10.00 for the trophy when applied for together with the Europa Diplom.

Good Hunting!

73, Dorothy, WB9RCY

# ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

## Open Forum

Last time we got together we focused on a number of books for the well-read amateur's hamshack. We also honed in on several software topics, including a review of Micro Logic's INFO SELECT personal information manager program for the IBM PC. This time it's an open forum with a deep scoop into the mailbag, so let's get started.

### Open Forum

**Antenna Restrictions de KE7QE.** In several past columns we printed letters from readers describing their problems with restrictive local antenna ordinances, deed covenants, condominium rules, and the like—things that put a crimp in the most optimistic antenna farmer's plans. Bill Hemmer KE7QE, wrote to tell of his antenna-raising experience when he retired and moved to Rio Verde, Arizona, sharing the Sonoran desert with saguaro cactus and coyotes. He found that there are several effective ways to deal with restrictive antenna rules.

You might have guessed his villa's restrictions included a "no antennas, no broadcasting" rule. So, Bill found himself before the Community Association Board trying to explain that he really wasn't a threat to the cable TV system, that he was sane and sensitive to the concerns about appearances, and that he and his station equipment might even be a valuable community resource in the event of disaster.

Finally, Bill got a variance after promising that no one would see his antennas! He brought out his 55 foot, three-section tubular crank-up tower from Ohio and remanufactured the tower to an extended height of only 35 feet. He's able to use the tower inconspicuously with his custom-built home that has a flat roof with parapets—along with a hole in the garage roof for the tower. At rest, the Yagi is below the parapet, where it stays during the daytime. He also has a near-invisible dipole at 35 feet and a modest 2 meter vertical.

Bill was elected to the board, served for three years, and was appointed a member of a committee to review the whole "restrictions and ordinances" document. Thanks, I am sure, to Bill, the revised version of the document includes the item "No radio transmission except for federally licensed amateur radio operators and no outside antennas unless approved by the Architectural Committee."

Since Bill fought the battle, three other amateurs have moved in and are enjoying some beautiful country and amateur radio as well. As Bill notes, it took a great deal of patience and persistence to prevail and, of course, the opportunity to design his home around the antenna problem. He chuckles when he says that the hole in the garage roof did give his archi-

tect fits, but since it only rains about a half-dozen times a year in his area, the hole is worth the inconvenience of an occasional garage-floor mop-up.

Bill also notes that there has been a good deal of progress in the Phoenix area in making sensible rules about antennas, with the help of the ARRL, the FCC, and volunteer amateur attorneys. He thinks city councils are more willing to listen and consider responsible, well-reasoned requests than the emotional ones.

**More on "Last-Ditch" Antennas de KA7ZSI.** There are many ingenious ways to get on the air, as we repeatedly learn from readers who share their "they said I couldn't work out" solutions with us. Gordon "Chad" Chadwick, KA7ZSI, recalled Richard Bell, WA4BNO's approach to using his apartment building's rain gutter in a "last ditch" chance to operate, as detailed in last May's column.

Chad says that for three years he had been successfully using a Butternut HF6V vertical on 40, 15, and 10 meters. The antenna was located atop his second-story townhouse roof and was visible for blocks. During the past few months he's been fighting with the homeowners' association about whether he could continue to keep the antenna, since it was in violation of the association's rules. PRB-1 was no help, he says, and he finally lost the battle and had to take down the vertical. The bottom line was that he wasn't going to be able to erect any kind of outdoor antenna, and had just about given up operating. Then he read WA4BNO's letter about using the rain gutter as an antenna. Chad continues:

"I finally arrived at the decision to load up the building's rain gutter and went out and purchased an MFJ-949D antenna tuner to take care of the match. When I got home I was anxious to see how the tuner worked, but getting from my second-story bedroom 'shack' window to the downspout was going to be a real chore. Instead, I located an old roll of about 60 feet of high-voltage wire, hooked it to the tuner, and laid it out in the top of the oleander bushes along the side of the building. It tuned up on all three bands; now I could get out again."

"Since the insulation on the high-voltage wire was a bright red, there was no way I could continue to use it for any length of time without the management company spotting it. What I then did was to buy a spool of no. 28 enameled copper magnet wire, got the XYL out on a Saturday morning, took a can of off-white spray paint, stretched out a hundred feet of the wire, and painted it! When it was dry I ran it out the window under the vines to the corner of the building and then around the corner and down the length of the next side. Since the building is stucco and the wire very light, I simply used a stapler to tack up the wire."

Chad notes that you can't see the skywire unless you're right on top of it, and it works out very well on his three bands of interest—40, 15, and 10 meters. The only problem he's had

to contend with is the wire's weight. He originally had it tacked up only at the corner of the building and at the far end, but it has sagged considerably and needs to be tacked up at intervals along its length.

Well, Chad, your antenna design doesn't necessarily jibe with theory, but what's important is that it works and you're on the air. Obviously, the oleander bushes must somehow be responsible for its success!

**More on Fessenden.** In the December 1989 column, and again in May 1990, we presented some information contributed by our readers on one of radio's unsung pioneers, Reginald Fessenden.

William Squire of West Virginia University, who also is interested in Fessenden's accomplishments, sent us copies of two 1927 Fessenden patents. One was on the use of the shortwave spectrum for "directive wireless signaling"; the other described a familiar antenna, the ground plane. According to Mr. Squire, some of Fessenden's original 1914 patent application files have been mislaid by the National Archives. Also, apparently, some of Fessenden's antenna patents were rediscovered (and re-patented) in the 1940s and 1960s. If you're a Fessenden fan and would like to correspond with Mr. Squire, contact him at the Department of Mechanical and Aerospace Engineering, West Virginia University, P.O. Box 6101, Morgantown, WV 26506-6101.

**W7WHY Sloper.** Tom Osborne, W7WHY, dropped us a short note to tell us he's excited about a new sloper he erected for DX work on 80-10 meters, the coverage of which includes the WARC bands. He's encountered excellent results, especially on 18 MHz.

Bill describes the antenna as "a sloper of sorts" that bears some resemblance to the famed "Carolina Windom." His antenna is 100 feet long, fed with 40 feet of 300 ohm TV ribbon line through a homemade 4:1 balun, to a final run of 60 feet of 52 ohm coax to the rig. The high end of the antenna is supported by a 30 foot Radio Shack push-up mast having a Cushcraft A-3 tribander on top.

**Stacked Monobanders de KF4HK.** In last May's column we printed an intriguing letter from Fred Bonavita, W5QJM, who questioned the conventional "Christmas tree" arrangement of stacking monobanders (20 meters on the bottom, 15 in the middle, and 10 on top). Fred also wondered what beam antenna manufacturers recommended for minimum spacing between beams mounted on the same tower to minimize interaction.

Jim Miller, KF4HK, wrote that as long ago as 1976 he used upside-down stacking of his Hy-Gain 3-element monoband Yagis for 10, 15, and 20 meters. He simply wanted to get the 20 meter antenna at the highest point on his tower. Using a Rohn 25G tower, he placed the 203BA (20 meter) antenna at 75 feet, the 153BA (15 meter) antenna at 70 feet, and the 103BA (10 meter) antenna at 65 feet; thus, the



# MorseMan Plus

## The IBM-PC based Morse Code trainer the experts recommend

"A slick commercial program that clearly ranks among the top Morse trainer programs I've laid my hands on.", Karl Thurber, W8FX, March 1990 - **CQ Magazine**

"Morseman Plus is the slickest program to come along in a long time and I highly recommend it to those who want to learn Morse properly", Ike Kerschner, N3IK, May 1990 - **Monitoring Times** magazine

"One of the top Morse Code trainers available", Gordon West, WB6NOA, **West Radio School**

The reviews are in and **Morseman Plus** has scored the highest marks yet! The premier Morse Code trainer for the IBM-PC and compatibles will take the the newcomer from ground level to expert in record time! It is also ideal for the experienced ham trying to get to the 13 or 20 wpm level.

**Morseman Plus** is loaded with advanced features, such as FCC/VEC tests, random QSO's (over 20 trillion possible!). Other features include full Farnsworth implementation, ASCII text file creation and transmission, true random call sign generation, random characters and much more! **Morseman Plus** was designed by a CW expert (NE4L) who knows what it takes to get to that high level of proficiency. Hundreds of users can't be wrong!

You can get your copy for \$24.95 (plus \$2.00 s/h) by calling 1-800-525-7235 (M-F, 9-5 CST) and using your Visa or Mastercard or send a check/MO (no cash please) to the address below. (specify 5.25" or 3.5" disks - requires 300k RAM and one floppy drive)

## Top -rated IBM-PC shareware and public domain software

\$3.50 per disk (1-9 disks) - \$3.00 (10 or more) - 3.5" disks add \$1.00 per disk

**20 SimCGA** - allows you to run CGA programs on a Hercules monitor.

**48-49 ImagePrint (2 disks)** - top high resolution printing enhancement for 9 & 24 pin printers. Has 25 various fonts in many sizes. Print is very high quality.

**51 AutoMenu** - THE DOS standard in menuing programs. Set up your system so novices may use it.

**60 XTree** - the best DOS hard drive manager around!

**116 Anti-Virus Utilities** - McAfee's famous virus detection and removal utilities.

**121-123 PC-Write (3 disk set)** - Version 3.03 of the top shareware wordprocessor (hard drive req'd).

**165-166 Q-Modem (two disk set)** - THE modem communications standard for BBSing. Very full featured. Even good for packet radio.

**170-171 Procomm (two disk set)** - One of the best telecommunications programs available (easy to use).

**190-192 PC:File 5.0** - THE shareware star in database systems. Easy to use with an extensive users manual. Customize your own powerful database system.

**211 As Easy As** - A true Lotus 1-2-3 clone. Does about 97% of what 1-2-3 does - and then some! Well supported.

**275-276 DanCAD-3D (2 disk set)** - A very sophisticated 3D frame and drawing program. Good general purpose CAD system.

**278 PC-Key Draw** - Top draw/paint/CAD system with many features, incl. animation. Prints to Epson printers.

**290 Flowdraw** - Full-featured program for drawing schematics, flowcharts, HIPO's and more. (CGA req'd)

**340 Printshop Clipart** - 500 pictures in Printshop/Printmaster format. (requires Printshop/Printmaster)

**683-684 C Tutor (2 disks)** - An excellent way to learn the C programming language. Comes with several source code examples.

**734 PC Tutor** - interactive DOS tutor system for beginners. Covers just about everything you need to know.

**761 Fortran Library** - 142 routines for the Microsoft and Lahey FORTRAN compilers.

**1082 Ham Radio 2** - Packet Terminal Programs - YAPP and Packtalk - both work well with most TNC's.

**1084 Ham Radio 4** - Smith Charting, antenna design, counties listings and more (needs BASIC).

**1085 Ham Radio 5** - AntennaX antenna analysis, RF engineering, antenna design program, Smith Chart matching and more.

**1086 Ham Radio 6** - Sunrise/sunset predictions, circuit analysis and tropospheric path loss prediction

**1087 Ham Radio 7** - QSL Maker, engineering programs, grid square calcs and more (req's BASIC)

**1089 Mapper** - EGA Great world map system. Shows grayline and shortpath, longpath, muf, luf plus much more by entering a prefix (EGA/VGA req'd).

**1090 Miniprop 2** - Great propagation prediction program - the predecessor to Miniprop 3.

**1091 TrakSat** - nice satellite tracking system w/ good graphics & several example tracks

**1092 PC-Track** - The tops in EGA/VGA satellite tracking. Great graphics & easy to use. Easy to add new "birds".

**1093 Telemetry Decoders** - collection of telemetry decoders for the new PACSATS

**1094 Icom Rig Control** - Three programs to control IC735's with your PC.

**1095 Paragon Rig Control** - Control Ten Tec's Paragon HF rig with the PC.

**1096 Radio Mods** - A through listing of several modifications to many popular HT's, scanners and HF rigs.

**1097 SSTV** - View on the air SSTV activity. Hooks between game port and receiver. (CGA req'd).

**1098 Yaesu FT767 Rig Control** - Control FT757 and FT767 HF rigs with your PC.

**1099 Kenwood Rig Control** - Three programs to let you control your TS 140/440/940 with your computer.

**1100 - Icom R7000 rig control** - PC control for the R7000 - even has a logbook function, freq. database, ect.

**1101 CW Decoders** - a collection of on the air CW decoders. Turn your PC into a CW tx/rx unit

**1102 FCC Exams** - Prepares for novice thru general written exams. Cover all aspects of the test.

**1109 DXCC Worldfix** - countries listing, beam headings, sunrise/sunset times for any DXCC country.

**1110 K1EA DX Contest Logger 4.25** - The tops in contest logging for CQ WW DX & WPX, WAE & ARRL DX contests.

**1112 Contest Logging** - An assortment of contest logging programs for Field Day and other contests.

**1118 - QQL v 3.1** - AA4M's QSL label program. A good program for automating QSL chores.

**1119-1120 Total Ham (2 disks)** - Excellent multipurpose station utility. Logging, awards keeping, counties, countries and much more.

**1121 ARL Logbook** - Fast logbook system. Add, delete, lookup QSO's and more.

**1122 LOG-EQF** - top rated logging program that also allows control of Kenwood HF rigs. Nice!

**1131 Hamfest** - Hamfest mailing list system - keeps track of vendors and attendees with year(s) attended

**1132 - Packet Radio Tutorial** - Very nice intro to the world of packet. 18 Chapters of text. Easy reading!

**1140 WORLI Packet BBS** - The dominant packet BBS system - complete with all information.

**1143 KAM Car** - A dedicated RTTY/ASCII/CW terminal program for the KAM TNC (does packet also!).

**1144 LanLink!** - great multifunction terminal program. Has configurations for all popular TNC's.

**1145 PK232 Terminal** - Dedicated termprog that takes advantage of the features of the AEA TNC.

**1146 Multiconnect PBBS** - AA4RE's top notch multiconnect BBS. RLI/MBL compatible..

**1148 K4ABT's PicPro** - Send and receive packet pictures w/ a KAM. Also incl. WEFax pgm (EGA req'd)

**1149 GeoClock** - similar to DX edge - shows full view of Earth and moves light/dark areas real time (Herc/CGA/MCGA/ATT - for EGA/VGA see #1150)

**1150 Geoclock EGA** - the same as # 1149 except for EGA and VGA monitors.

**1151-1152 ACE (2 disks) Astrosoft Computerized Ephemeris** - top notch database of astronomical information. Deep sky & Messier objects, double stars, more.

**1153-1154 Deep Space (2 disks)** - Excellent star map system. Includes stars down to magnitude 2. Displays any skyview from any vantage point (CGA req'd)

**1155 USN Floppy Almanac** - By the US Naval Observatory - good retrieval system with data for Messier & radio objects plus 1536 stars

**1156 Skyglobe** - The best star viewing system we've seen! Many, many features (CGA or EGA req'd)

**1201 Storm** - Hurricane tracking at its finest - includes several sample tracks of past storms.

**1249 World 29** - Nice CGA map system. View the Earth from any vantage point and "zoom" in. Includes "quizzing" function.

**1250 World Atlas** - Online information base - includes data on countries, rivers, cities and much more.

**1311-1317 On Line Bible (7 disks)** - The King James version of both Old and New Testaments. Has an online and browse facility. (hard drive req'd)

**1320 PC Board Layout** - good printed circuit board design and layout program.

**1321 Motorola Database** - good cross-referencing system for Motorola semiconductors (hard drive req'd)

**1322 Core DBMS** - full database for ferrite & toroid cores. Look up via part #, size, ect. Even loss v. freq.!

**1330 ACIRAN** - AC circuit analysis on a PC! Design circuits before you build them.



renaissance software & development  
box 640 - killen - alabama - 35645

1-800-525-7235 (M-F, 9-5 CST)

(205)757-5928

TO ORDER WITH VISA AND MC, CALL 1-800-525-7235 (9-5 CST, M-F) - for catalogs, call (205)757-5928. US & Canada enclose \$4.00 for shipping DX enclose \$7.00 for airmail freight.

20 meter Yagi was at the top of the tower. Jim says he mounted his rotator at the bottom joint of the top section, with the thrust bearings on the top section.

Jim also notes that Hy-Gain recommends for their Christmas-tree stacked 5-element models that the 205BA (20 meters) be 6 inches above the tower, the 155BA (15 meters) be 9 feet above the 205BA, and the 105BA (10 meters) be 7 feet above the 155BA. Jim notes that this spacing requires a 20 foot mast with half-inch wall, meaning it's quite heavy. Jim also says that KLM recommends a distance of 35 to 45 feet when stacking (phasing) two KT-34XA (32 foot boom) tribanders.

**T2FD Notes.** We've mentioned the sloping T2FD ("Terminated Tilted Folded Dipole") antenna in several previous columns, so I won't bore you with construction details again (see *CQ*, June 1988, January and September 1989, and May 1990). The broadband, folded dipole-like antenna is rather rarely used in amateur and SWL circles, but it seems to be common in maritime HF work.

One of the problems in building this antenna has been locating the high-power noninductive ceramic power resistors. I haven't found a reliable commercial source for them, though Dick Genaille, W4UW, who fondly remembers his 1950s-style T2FD, sent some 1981 Carborundum Company product literature describing such resistors with average power dissipation up to 1000 watts (though an inquiry to them brought no response). Perhaps the resistors are available in surplus—not a reliable source, but the only one I can think of, other than the fleamarket circuit.

R. T. Carruthers, K7HDB, wrote to tell us that the T2FD has been written up as an SWL receiving antenna in recent editions of the *World Radio and TV Handbook (WRTH)*. The *WRTH* specs have its desired length in meters pegged as 100 divided by the desired lowest frequency in MHz, with spacing between the parallel wires of about 60 centimeters. *WRTH* recommends a standard 470 ohm, 1 watt carbon resistor be used as a terminating resistor. For receiving purposes, the low-power resistor is fine, but it would be inadequate for transmitting except possibly for QRP.

There is at least one commercial SWL T2FD on the market, according to the *WRTH*. It is available from Kurt Fritzel, Siemensstrasse 2, D-6708 Neuhofen/Pfalz, Federal Republic of Germany.

**TA33 Jr. Question.** Jeff Kadet, W3CRH, wrote with a question to which I'm not sure there's an answer. He has a very well-guyed 80 foot Rohn 25G tower with six sets of guys at the 25, 50, and 75 foot levels, each 60 degrees apart.

Jeff wants to mount and rotate a Mosley TA-33 Jr. somewhere on the tower, but not on the top—preferably at the 50 foot level. Short of a rotating tower or ring-rotor system, which Jeff doesn't want to use, I'm not enough of a "Rube Goldberg" inventor to know how to do this. Any suggestions for Jeff?

**A Tip of the Hat.** Unfortunately, we've run out of space for letters this month. But we would like to take time to thank several additional correspondents for their time in writing. These folks include L. B. Cebik, W4RNL; Mike Zane, K6URI; Don Shulkey, W1BLR (two letters); Ken Pendarvis, KB6LF; and Clarence A. Grimm. Keep those letters flowing to let us know someone is reading our words each month, and do enclose an SASE (or IRCs if you're overseas).

## Antenna Notes

**AA1A Sidekick Antenna.** Recently we received some information on Dave Riley's AA1A Sidekick Antenna. The antenna is available in 144, 220, and 440 MHz models and is designed for mounting on the side or top of a tower or mast. The antenna is said to be of heavy-duty construction with liberal use of stainless steel for long-lasting service.

The antenna's electrical equivalent is that of two extended halfwave elements fed by a specially designed balun transformer and "sliding short stub." The feed system is adjustable to outside the amateur bands for use on MARS and other services.

The antenna's SWR is said to be essentially flat over the band, typically under 1.2:1 at band edges. The antennas have been tested to handle 160 watts, and they show a minimum gain of 3 dBd. The antennas are priced at \$79.95 each, or \$89.95 with type N connectors and silver-plated feed probe.

For more details, contact Dave Riley, AA1A, at Broadcast Technical Services, 11 Walnut St., Marshfield, MA 02050.

**Ground Rod Parts.** The RF Connection is now stocking the CADWELD "ONE-SHOT" ground rod connections, designed for use by electrical contractors but certainly of interest to amateurs who are installing serious grounding systems. The CADWELD devices are ceramic units that replace semi-permanent graphite mold and associated handle clamps. Each unit consists of the ceramic mold which contains the CADWELD weld metal, a metal disk, a flared sleeve or sleeves, and a cover.

The units fit both plain or threaded copper-clad and full-size (galvanized steel and stainless steel) rods. Available separately are flint igniters, wire brushes to clean ground wire ends, and drive sleeves to protect the tops of the ground rods. The same firm also carries a variety of pipe and rod ground clamps, as well as 4 foot radial rods and 8 foot ground rods and a selection of RF connectors and coax.

For more information, contact The R.F. Connection, 213 N. Frederick Ave., Suite 11-F, Gaithersburg, MD 20877.

**Unadilla Parts Update.** Despite its split-off from the Microwave Filter Company several years back, Unadilla has continued to provide a wide selection of mail-order antenna parts and accessories for the do-it-yourself builder.

Some of the products carried include the W2AU "ANSulator" center antenna insulator; W2AU 1:1 and 4:1 baluns; W2DU HF and VHF baluns; the KW-series of multiband traps; a variety of coaxial relays, couplers, and switches; several HF trap antenna kits, including CAP and MARS frequency models; insulators; copper wire; an "invisible" 10 meter mobile slot antenna; TVI filters; and several Caywood/James Millen RF products, including solid-state and tube-type grid dip meters and an antenna bridge.

For a flyer, contact the Unadilla Division of Antenna's Etc., P.O. Box 215 BV, Andover, MA 01810-0814.

**Ameritron Coax Switch.** In last July's issue of *73 Amateur Radio*, Bill Clarke, WA4BLC, did a thorough and quite favorable review of the Ameritron RCS-4 Coax Switch; you might want to peruse it. We'd seen the unit advertised widely, but never checked out one ourselves.

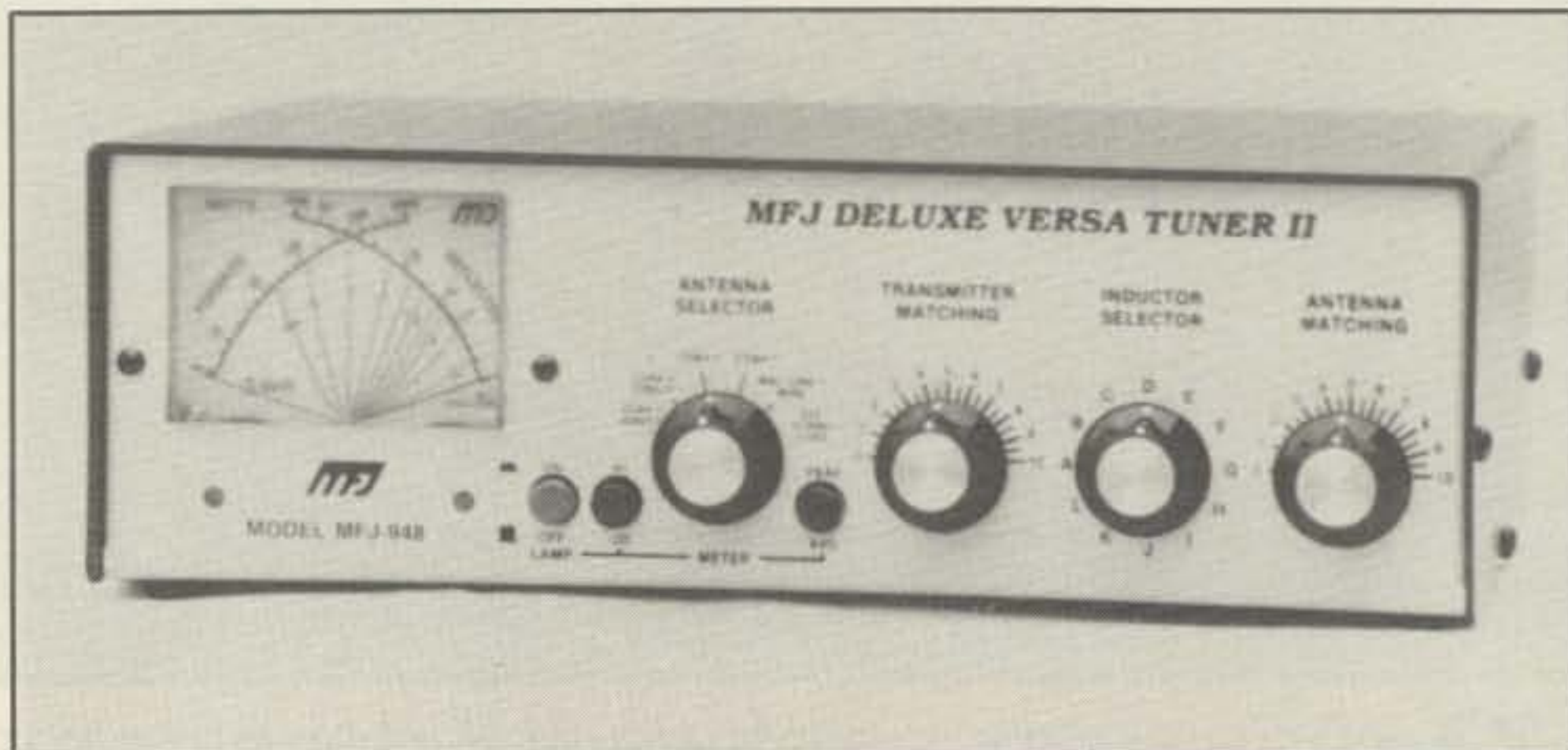
The RCS-4 is a four-position remotely controlled HF coax switch in which the "business end" is mounted on the tower; it allows you to use a single HF feedline from the shack. By means of operating voltages that are superimposed on the coax feedline, the RCS-4 has the advantage of not requiring separate control cables. A switch console contains the AC power supply and a four-position rotary control that you use to select the proper antenna; LEDs indicate your choice.

The box is designed for 50 ohm cables and has a power-handling ability of 2.5 KW PEP (1.5 KW average power). Switching time is 50 ms and loss below 30 MHz is said to be less than 0.05 dB. The unit comes equipped with SO-239 connectors.

For specs, contact Ameritron, 2375 Dorr St., Suite F, Toledo, OH 43607.

**New Antenna Tuner.** MFJ has announced a new 300 watt antenna tuner for 1.8–20 MHz use which handles coaxial cable, balanced lines, and single-wire feed. The new model features an illuminated peak-reading "cross needle" SWR bridge and wattmeter that also reads average power, which is read on two scales of 20 or 200 watts. The tuner has a six-position antenna selector switch that lets you select two coax lines (direct or through the tuner), random wire feed, balanced line, and external dummy load. There's a built-in 4:1 balun for connecting balanced-line antennas.

For more information, write to MFJ Enter-



Shown here is the MFJ-948, a new 300 watt tuner with built-in cross-needle SWR bridge and wattmeter that covers 1.8 to 30 MHz and handles coax, balanced lines, and single wire feed. (See the text of this month's column for more details.)

prises, Inc., P.O. Box 494, Mississippi State, MS 39762.

## Software Notes

**CoCoPACT/CoPACT3.** Who says we never mention any computer other than Commodore, IBM, or Macintosh in the column? We understand that Monty J. Haley, WJ5W, has developed two feature-laden digital communications terminal programs for the Tandy TRS-80 Color Computer 1, 2, and 3 to be used in conjunction with a TNC or multimode controller. The programs sport split-screen operation and provide special handling of TNC control codes; a built-in editor is included. Also included is a 40 KByte QSO buffer and ten user-definable macro keys.

CoPACT3 is designed for the Model 3 Color Computer only. It features an 80-column screen display, a selectable 2400 baud serial port data rate, and an additional 24 Kbyte transmit buffer.

The programs can be obtained on disk or tape from Monty W. Haley, WJ5W, Rt. 1 Box 210-B, Evening Shade, AR 72532. Price is \$21.95 postpaid for both programs.

**Aries-2 Update.** In the March 1989 column we took note of Aries-1, an IBM PC program that ties together multimode terminal units, computer-capable transceivers, and a real-time logging function. In addition to reading frequency and mode data from the transceiver, Aries-2 adds computer control of these units. It supports most transceivers made by ICOM, JRC, Kenwood, Ten-Tec, and Yaesu.

The logbook function in both products features fast data search capability along with automatic entry of date and time from the computer's clock. Frequency and mode are automatically entered into the log when using a compatible transceiver. Aries-2 supports log files limited in size only by available disk space, while Aries-1 is limited to about 1800 contacts per log file. Both products include a contest mode that offers instant dupe checking. Aries-2 adds the ability to sort logs by date, prefix, and country. With both programs you can print QSL labels, update QSO information with the log, and upload and download files through packet, RTTY, and other modes.

Both Aries-1 and Aries-2 include sample message files, a demo log, and a printed user's guide. Both are available either on 5.25 or 3.5 inch disks; for Aries-2, 640K memory and a hard drive are recommended. Aries-2 is priced at \$89.95.

A stand-alone IBM PC product, Bearing, is also available for determining bearing and range to DX locations; you can search by prefix or location. The master location database contains over 800 locations around the world and can be customized with a text editor with new prefix information or additional locations. It is priced at \$29.95.

For more details, contact Ashton ITC, P.O. Box 830, Dandridge, TN 37725-0830.

**AMSAT Software Update.** We've mentioned AMSAT and its wide variety of software satellite tracking several times in the column. A recent update from AMSAT shows that they now offer at least 16 different tracking and related software programs for a variety of computers, ranging from the Apple and C-64 to the IBM PC and Macintosh. Some of the programs AMSAT offers include Orbits I, II, and III for the IBM PC; N4HY Quicktrak 4.0, also for the IBM PC; C-64 Supertrak; Apple Quicktrak; Satellite

Helper for the Mac; Orbits for the C-128; C-Track 1 and 2 for the Radio Shack CoCo; and several others.

Probably the most ambitious of the software packages AMSAT offers is Instant Track, a full-featured, easy-to-use, high-end satellite tracker for the IBM PC, designed for those satellite aficionados who are concerned with program speed and capability. Instant Track, which offers all of the features of Quiktrak, lets you graphically display on a Mercator projection of the world the locations of the sun, moon, and day/night terminal line. The program shows you the position of your favorite satellite, giving you "instant visibility" before you issue the first keystroke. There's a menu of 200 satellites as well as a menu of some 1754 cities that shows you which cities are visible from the selected satellite. Instant Track also works in the background, tracking a satellite and pointing your antenna while running other programs.

Other features of the program include real-time display screens, high-resolution color EGA/VGA graphics, automated orbital element entry and time setting, path loss calculation, online help, and squint angle computation (the angle by which the satellite's antennas are pointed away from you).

Designed by Franklin Antonio, N6NKF, the program is priced at \$50 for AMSAT members and \$70 for nonmembers. For more information, contact AMSAT, P.O. Box 27, Washington, DC 20044.

**AEA Amiga AVT.** For you Commodore Amiga fans, AEA has introduced the AVT (Amiga Video Terminal) Master SSTV and FAX System to take advantage of many of the Amiga's outstanding color graphics capabilities. The AVT Master offers 55 SSTV modes, as well as WEFAX, NEWSFAX, and GOES FAX (with an optional board). Five separate receiver inputs are included as well as a telephone jack. All controls, including system audio output levels and input selection, are accomplished on-screen using the Amiga mouse.

A reported special feature of the AVT, which was designed by Ben Williams, AA7AS, is its compatibility with virtually every known commercial and experimental SSTV mode. This compatibility is said to include the new European modes, older color composites, black-and-whites, and 60, 120, and 240 LPM FAX transmissions. The system is also designed to be compatible with all Amiga paint programs, digitizers, scanners, and "frame grabbers" to let you add some artistic flexibility and style to your SSTV operating. Many other features are offered, too many to detail here.

The AVT is software driven, so there are no ROM or hardware updates to purchase later on, though updates are available from AEA and also via the Amiga Vendor forum on CompuServe for the cost of download time. The AVT is priced at \$299.95. For more information, contact AEA at 2006 196th St., Lynnwood, WA 98036.

**UltraVision 2.0.** We recently had the opportunity to do a "hands on" checkout of UltraVision 2.0 from Personics. This is a very complete graphics enhancement utility for EGA- and VGA-equipped PC systems that helps to "unlock" some of the capabilities of both EGA and VGA displays—capabilities, I was surprised to find, are hidden from most users.

Billed as a "supercharger" for EGA and VGA displays, the program fills the so-called "video support gap" by giving your application programs the ability to exploit your video display's unsung capabilities. UltraVision allows

you to completely control screen colors, see more than the standard 80 x 25 characters in many applications (up to screen sizes of 132 x 44 characters in some cases), load alternate screen fonts of your choice (20 are supplied), enjoy considerably improved screen writing and scrolling speeds, and benefit from improved image clarity on multi-scanning EGA monitors and all VGA monitors.

UltraVision is designed to work on nearly all EGA and VGA systems. However, some EGA boards require a plug-in "booster card" to take advantage of the program's extended features; the card is available to UltraVision users at no extra cost upon request.

UltraVision also allows you to redefine the screen colors used by most text and graphics based applications. With 64 colors from which to choose, the possibilities are almost unlimited. The ability to control colors is also useful on grayscale EGA and monochrome VGA displays, allowing you to easily avoid difficult-to-read color combinations by rearranging intensities and adjusting contrasts until the display looks right.

A particularly nice feature, one that I really appreciate in that I do a great deal of wordprocessing, is the ability to boost text resolution (sharpness) by more than 50% on EGA displays and 25% on VGA displays. My eyes noticed the difference immediately after setting up this feature on my own multi-scanning VGA display monitor.

UltraVision comes equipped with several utilities, one of which is an underline control program that, after a little tinkering, allows you to see on-screen underlining on your wordprocessor. (Underlining is a feature that is available on monochrome display adapters, but is normally disabled on most color EGA and VGA systems so that instead of underlining, you normally see such text in a color different from straight text.)

Another utility, the Directory Expander, enhances the standard DOS DIRectory command by allowing you to custom color code directory listings by file extension. This feature makes it easy to pick out different file types at a glance.

I was quite pleased with the program, and particularly liked the separate and thorough installation, reference, and applications guides. It's a good value at \$119.95 list. For more information, contact Personics Corporation, 63 Great Rd., Maynard, MA 01754.

Fig. 1 shows the UltraVision Main Menu, while fig. 2 is a screen print of the UVCOLORS program display, a handy utility bundled with UltraVision.

## Short Bursts

**PC-AT Battery Pack.** What do you do when your PC's internal battery dies? In many cases you don't do anything, since your computer effectively becomes brain-dead. This happens because the voltage produced by the battery maintains the small, nonvolatile CMOS RAM in which your computer's complicated setup information is retained. Without this configuration information, you'll be lucky to be able to boot with a floppy for minimal operation. Without the CMOS RAM, your PC won't know anything about its memory cards, display adapter, hard drive, or other hardware.

The CMOS RAM draws very little current so that the standard "coin batteries" should keep the circuit alive for at least a year. Supposedly

Active Color Set: **SYSTEM**      25 Line (F20) Font: SANS2  
 Palette Locking: TextOnly      36 Line (F14) Font: SANS2  
 Cursor Type: LINE      50 Line (F10) Font: SANS2  
 Screen Size: 80x25      63 Line (F8) Font: SANS2

Available Commands

↑↑↓	Move to next option	P	Preview current fonts
+ -	Change highlighted option	S	Save current settings
F1	Help	L	Load default settings
F3	Activate settings and exit	Esc	Cancel changes and exit

Fig. 1- Shown here is the UltraVision Main Menu, accessed by typing "UV" from the system prompt. The menu options vary depending on your video card and monitor, but the basic layout resembles this example screen. You can select one of 16 color sets, choose where the colors sets are applied using the palette locking feature, define the default text cursor type (underline or tall box), define the screen size, and set and preview on-screen fonts.

you'll know when your battery is failing. You may experience loss of time and/or date, loss of setup parameters, and "configuration error" or "setups are incorrect" warnings as the time of failure approaches.

However, actual failure of the battery can come without warning. Also, in information supplied by Rupp Corp., in many PCs the volt-

age-sensing network that is supposed to switch from the battery to the PC's own power supply often does not work properly. The result is that the battery can be drained even when the system is in use. (If your PC uses a rechargeable battery pack, great. You won't have to face this problem.)

Several manufacturers have offered solu-

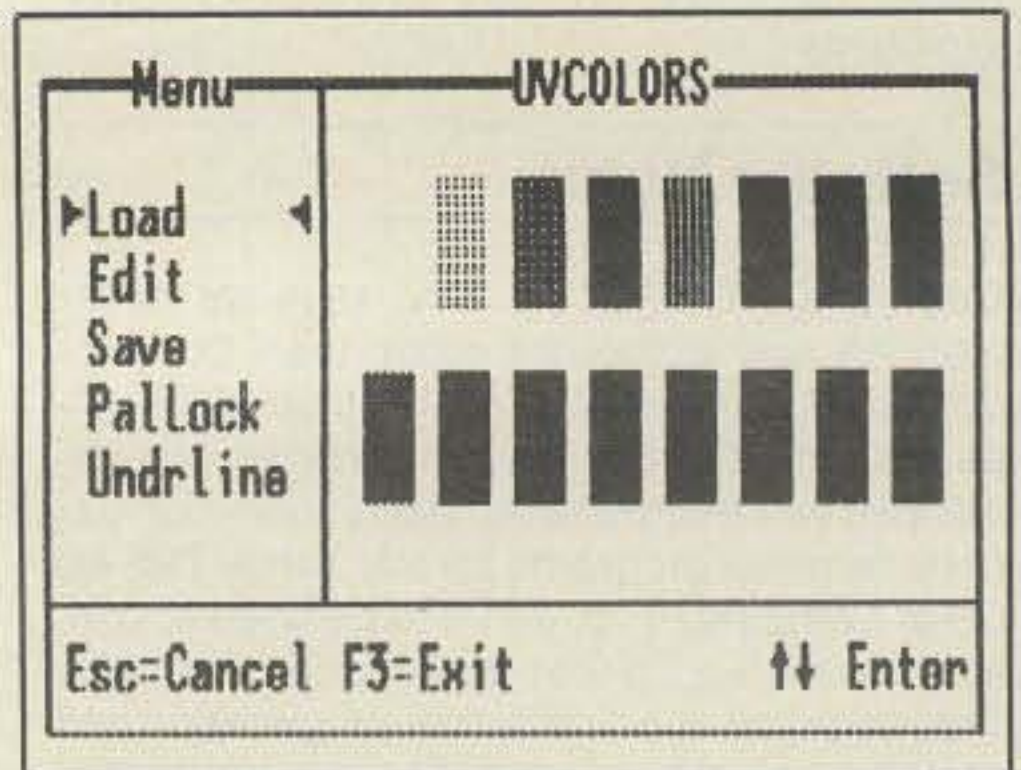


Fig. 2- Ultra-Vision UVCOLORS program display. This handy utility lets you explore the full extent of UltraVision's color controls by fine-tuning and setting the colors used by your applications. You can run the program interactively from the DOS prompt or run it in a resident pop-up mode to immediately see the effects of color changes you make while in an application program.

tions to this problem. Rupp has come out with its bAT Pak self-recharging battery for the IBM PC-AT and compatibles. The device plugs into a standard disk drive power connector and the external battery connector on the computer's motherboard. The bAT Pak attaches to the PC's power supply with a Velcro strip.

The device's rated life is 10 years and is priced at \$39.95. For more information and an informative fact sheet on PC backup battery failures, contact Rupp Corp., 835 Madison Ave., New York, NY 10021.

**What's In a PC's Name?** Where did the designators PC, XT, and AT come from? Their derivation may seem obvious, but perhaps not completely so. The names came from IBM, as the developer of the original 8088-based personal computer (PC) some 10 years ago, in 1981. Later on, a hard disk drive was added to the original PC to make it the PC XT, for eX-Tended. Since then the term XT has taken on a generic characteristic to refer to any PC having an 8086 or 8088 processor.

Later on came the IBM AT, for "Advanced Technology." The AT was based on the 80286 chip but eventually came to refer to any PC using a 286 chip. Eventually, after the introduction of the 386 chip, the term came to refer to any computer as "AT-compatible" that used the same type of plug-in boards as the 286-based AT.

More recently IBM introduced the Personal System 2, or PS/2, series of microcomputers. These PCs represent an entirely new product line that can use 8086, 80286, or 80386 chips. The distinguishing feature of the PS/2 is thus not its chip designator but its high-tech Micro-Channel Architecture (MCA). Incidentally, this architecture is patented so we should not see such a proliferation of IBM PS/2 clones as we did with the XTs and ATs. Thus, supposedly if you want to buy a PS/2, you'll buy an IBM, not a compatible.

**Wrapping It Up**

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

*Overheard:* Problems? They're just opportunities in work clothes!

**BUY—SELL—TRADE**  
 All brands new and reconditioned  
*Japan Radio Co., Ltd.*



**JRC** JST-135  
HF Transceiver

- All Modular Construction
- 150 W Output
- General Coverage Receiver
- 1 Chip Direct Digital Synthesis
- U/LSB, AM, FM, AFSK



**JRC** NRD-535  
The Ultimate HF Receiver



YOUR  
ACCESSORIES  
HEADQUARTERS

**JRC** ASK FOR SPECIAL SALES PRICES

Find out why thousands of customers have switched to us.

KENWOOD, ICOM, TEN-TEC, Astron, Cushcraft, Larsen, MFJ, Butternut, B&W, Hustler, Antenna Specialists, AEA, Ameritron, Van Gorden, ARRL, RF Concepts, Diamond, Kantronics, CallBook, Alpha Delta, Hell, Grundig, Uniden, Bearcat, Mirage, Ameco, Alliance, Dalwa, Hy-Gain & others

AUTHORIZED  
**AZDEN**  
DEALER



PT 2500 Amplifier **BW**

N4EDQ

Amateur Radio Sales & Service  
 4400 Hwy. 19-A  
 Mount Dora, FL 32757

FOR THE BEST DEAL!  
 1-800-828-6433

10:00 to 5:00 P.M. EST. (Mon.-Fri.)  
 Sat. 10:00 to 2:00 P.M.

CIRCLE 117 ON READER SERVICE CARD

# HUGE NEW CATALOG WITH PRICES!

- Communications Receivers
- Portable Receivers
- Amateur Transceivers
- HT's & Mobile Transceivers
- Amateur & SWL Antennas
- Scanners
- RTTY and FAX Equipment
- Books, Manuals & Accessories

Send \$1 to

**Universal Radio**  
1280 Aida Drive Dept. CQ  
Reynoldsburg, OH 43068  
Tel. 614 866-4267

\*\*\* PRESENTING \*\*\*  
**CABLE TV  
DESCRAMBLERS**  
\*\*\*\*\* STARRING \*\*\*\*\*  
**JERROLD, HAMLIN, OAK**  
AND OTHER FAMOUS MANUFACTURERS

- FINEST WARRANTY PROGRAM AVAILABLE
- LOWEST RETAIL / WHOLESALE PRICES IN U.S.
- ORDERS SHIPPED FROM STOCK WITHIN 24 HRS.
- ALL MAJOR CREDIT CARDS ACCEPTED

FOR FREE CATALOG ONLY 1-800-345-8927  
FOR ALL INFORMATION 1-818-709-9937

PACIFIC CABLE CO., INC.  
7325 1/2 Reseda Blvd., Dept. 968  
Reseda, CA 91335

CIRCLE 64 ON READER SERVICE CARD

## YOUR BIG FREE CATALOG!

Serving DX'ers since 1967 with the largest selection of hard-to-find & popular communications, SWL/scanner books and frequency registries: SWBC, BCB, Utes, Spy, Press, Weather, Military, Federal, Police, Aero, etc. Ask for our latest **BIG** catalog! (Sent to US/Canada/APO/FPO only.)

CRB Research  
P.O. Box 56-CQ  
Commack, NY 11725

CIRCLE 78 ON READER SERVICE CARD



## Out of State 1-800-882-1343

(213)390-8003 FAX 213-390-4393

HOURS M-F 9:00 - 5:30 SAT 9:00 - 5:00 SE HABLA ESPANOL  
QUICK SERVICE CENTER FOR REPAIR NEEDS

3919 SEPULVEDA BOULEVARD, CULVER CITY, CALIFORNIA 90230

### ICOM IC-781



HF Equipment	List	Jun's
IC-781 Super Deluxe HF Rig	\$5995.00	Call \$
IC-765 New, Loaded with Features	3149.00	Call \$
IC-735 Gen. Cvg. Xcvr	1099.00	Call \$
IC-751A Gen. Cvg. Xcvr	1699.00	Call \$
IC-725 New Ultra-Compact Xcvr	949.00	Call \$
IC-726 HF/50 MHz All Mode	1299.00	Call \$
<b>Receivers</b>		
IC-R9000 100 kHz to 1999.8 MHz	5459.00	Call \$
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call \$
IC-R71A 100 kHz - 30 MHz Rcvr	999.00	Call \$
<b>VHF</b>		
IC-228A/H New 25/45w Mobiles	509./539.	Call \$
IC-275A/H 50/100w All Mode Base	1299./1399.	Call \$
IC-229A/H, 25/50w, 2 Meter Mobile	449./479.	Call \$
IC-2GAT, New 7w HT	429.95	Call \$
IC-2SAT Micro Sized HT	439.00	Call \$
IC-901 New Remote Mount Mobile	1199.00	Call \$
<b>UHF</b>		
IC-475A/H 25/75w All Modes	1399./1599.	Call \$
IC-448A, FM, Mobile	599.00	Call \$
IC-4SAT Micro Sized HT	449.00	Call \$
IC-4GAT, New 6w HT	449.95	Call \$
IC-32AT Dual Band Handheld	629.95	Call \$
IC-3220A/H Dual Band Mobile	659./699.	Call \$
IC-2500A FM, 440/1.2 GHz Mobile	999.00	Call \$
IC-24AT New 2m/440 mini HT	629.95	Call \$
IC-2400 144/440 FM	899.00	Call \$
<b>220 MHz</b>		
IC-3SAT Micro Sized HT	449.99	Call \$
<b>1.2 GHz</b>		
IC-12GAT Super HT	529.95	Call \$

### KENWOOD TS-950SD



HF Equipment	List	Jun's
TS-950SD New Digital Processor HF	\$4399.95	Call \$
TS-940S/AT Gen. Cvg. Xcvr	2499.95	Call \$
TS-440S/AT Gen. Cvg. Xcvr	1449.95	Call \$
TS-140S Compact, Gen. Cvg. Xcvr	949.95	Call \$
TS-680S HF Plus 6m Xcvr	1149.95	Call \$
TL-922A HF Amp	1982.95	Call \$
<b>Receivers</b>		
R-5000 100 kHz - 30 MHz	1049.95	Call \$
R-2000 150 kHz - 30 MHz	799.95	Call \$
RZ-1 Compact Scanning Rcvr.	599.95	Call \$
<b>VHF</b>		
TS-711A All Mode Base 25w	1059.95	Call \$
TR-751A All Mode Mobile 25w	669.95	Call \$
TM-241A 50w Mobile FM	469.95	Call \$
TH-27A Compact, 2m, HT	419.95	Call \$
TM-731A 2m/70cm, FM, Mobile	749.95	Call \$
TH-77A 2m/440 HT	599.95	Call \$
<b>UHF</b>		
TS-811A All Mode Base 25w	1265.95	Call \$
TR-851A 25w SSB/FM	771.95	Call \$
TM-441A Compact 35w Mobile	479.95	Call \$
TH-47A Compact FM, HT	429.95	Call \$
TH-55 AT 1.2 GHz HT	524.95	Call \$
TM-541A Compact 1.2 GHz Mobile	579.95	Call \$
<b>220 MHz</b>		
TM-331A Compact Mobile	469.95	Call \$
TH-315A Full Featured 2.5w HT	419.95	Call \$

### YAESU FT-1000D



HF Equipment	List	Jun's
FT-1000D Top Performer	\$4399.00	Call \$
FT-747 GX Economical Performer	889.00	Call \$
FT-757 GX II Gen. Cvg. Xcvr	1280.00	Call \$
FT-767 4 Band New	2299.00	Call \$
FL-7000 15m-160m Solid State Amp	2279.00	Call \$
<b>Receivers</b>		
FRG-8800 150 kHz - 30 MHz	784.00	Call \$
FRG-9600 60-905 MHz	808.00	Call \$
<b>VHF</b>		
FT-411 New 2m "Loaded" HT	406.00	Call \$
FT-212RH New 2m, 45w Mobile	499.00	Call \$
FT-290R All Mode Portable	610.00	Call \$
FT-23 R/TT Mini HT	351.00	Call \$
<b>UHF</b>		
FT-712RH, 70cm, 35w Mobile	536.00	Call \$
FT-911 Compact 70cm HT	505.00	Call \$
FT-790 R/II 70cm/25w Mobile	681.00	Call \$
<b>VHF/UHF Full Duplex</b>		
FT-736R, New All Mode, 2m/70cm	2025.00	Call \$
FEX-736-50 6m, 10w Module	294.00	Call \$
FEX-736-220 220 MHz, 25w Module	322.00	Call \$
FEX-736-1.2 1.2 GHz, 10w Module	589.00	Call \$
FT-690R MKII, 6m, All Mode, port.	752.00	Call \$
<b>Dual Bander</b>		
FT-4700RH, 2m/440 Mobile	996.00	Call \$
FT-470 Compact 2m/70cm HT	576.00	Call \$
<b>Repeaters</b>		
FTR-2410 2m Repeaters	1154.00	Call \$
FTR-5410 70cm Repeaters	1154.00	Call \$
<b>Rotators</b>		
G-400RC light/med. duty 11 sq. ft.	242.00	Call \$
G-800SDX med./hvy. duty 20 sq. ft.	390.00	Call \$
G-800S same/G-800SDX w/o presets	322.00	Call \$

### ALINCO

DR-590



DR-590T, New Twin Band Mobile  
DR-570T, 2 Meter/70 cm Mobile  
DR-110T, Value Loaded, 2M Mobile  
DJ-160T, Feature Packed 2M Handy  
DJ-120T, Mini Size, Maxi Feature, 2M, HT

DJ-160T



### JUN'S BARGAIN BOX OVERSTOCK SALE

ICOM	
IC-3SAT, 220 MHz HT w/FREE BP82	\$349.95
IC-24AT, Dual Band HT w/FREE BP83	\$489.95
IC-229H, 2m, mobile	\$399.95
IC-725 Compact HF w/FREE FM UNIT	\$789.95
IC-RP2210, 220 MHz Repeater	List \$1,649 SALE \$995
KENWOOD	
TH-26AT, Compact 2m HT	CALL \$\$
YAESU	
FT-23R, Mini, 2m HT	\$239.95

## A LOOK AT THE WORLD AROUND US

### HF Mobiling Update

Our two recent "World of Ideas" columns featuring HF mobiling proved unbelievably popular. Thanks for your favorable letters and encouraging notes! Let's thus return to that subject again this month with more news on new items and hints for great hamming on the road. If you have only operated VHF mobile during the last few years, incidentally, now is the perfect time to expand your horizons. All the bands are alive with action. Twenty meters is the favored daytime band, with 17 and 10 meters running a close second. Seventy-five and 20 meters share the spotlight for nighttime mobile action. CW from the car is also rising in popularity, and with good reason. It "gets out" better than SSB, iambic keyers with dot/dash memory are super-easy to use while moving, and "slant mobile" designations are attention-grabbing aids for low-power DXing. That's enough soap-boxing, however. On to the details!

Let's begin by reviewing some beneficial to everyone inquiries on grounding and cabling, an often-shortcut area that really degrades mobile performance. First, visualize a mobile setup as the rolling equivalent to a home station using a ground-mounted vertical. Your car's metal frame serves the same purpose as buried-in-yard radials serve for simulating the vertical's "mirror image." Overlook that basic fact, and signal radiating efficiency drops at least 50%. Connecting to only your car battery's negative lead is also not effective grounding. Use your volt-ohm meter and check under the dash or front seat and close to the antenna's mount for solid-frame grounding points. Connect them to your rig's rear ground lug and the antenna mount's coax shield terminal with short, wide copper strap or braid removed from RG-8-size coax. Why flat strapping? It has more surface area than wire, and RF energy travels best along a conductor's surface (the skin effect). Copper strapping also beats wire for radials on ground-mounted verticals at home, but the cost of such large quantities is usually prohibitive.

If you use a trunk mount for your antenna (much preferred over bumper mounting, as it gets more metal under the an-



Photo 1— Sy, N4KEL, with his big-signal mobile. Setup runs a KW to phased verticals, and it is stiff competition for most home stations.

tenna's base), double check with your ohmmeter to ensure it grounds to the trunk lid and that lid is electrically connected to the car's frame. Some manufacturers paint body parts first, then install bolts, and thus insulate a lid or hood from the body. Adding your own ground straps solves that dilemma (you will also notice a lower SWR and wider bandwidth).

Although RG-58 or RG-8X cable is fine for mobile installations, the marine grade of RG-8X is noticeably better. It is low loss, less susceptible to moisture and heat damage, and more tolerant of pinching than other types. Remember to Coax Seal® its "pigtailed" leads at the antenna end. Can't find marine-grade RG-8X? Check with Press Jones, the "Wireman," at 1-800-727-WIRE.

Several folks inquired when my new *Modern Amateur's Mobile Handbook* will be available for sale. I checked with MFJ

Enterprises, and the projected date was September or early October, so you should now be able to order a copy by calling MFJ at 1-800-647-1800.

Does health-oriented hamming pique your interest? Go bicycle mobile! Elliot, WA4YDK, does exactly that, and he has wrangled WAS and DXCC using a 100 watt transceiver with motorcycle battery and Hustler whip on his bike. Listen on 20 meters SSB during late afternoons, and you will hear Elliot biking along. WA7YDK and several more bikers are also organizing a bicycle mobile club. Interested? For details write to Elliot Kleinman, WA4YDK, 4400 Hillcrest Drive #702, Hollywood, FL 33021, with an SASE.

Looking for a quick-assemble, big-signal multiband antenna to use while parked? Check out Cushcraft's new R5 half-wave vertical for 20, 17, 15, 12, and 10 meters. After assembly and checkout,

4941 Scenic View Drive, Birmingham, AL 35210

# TUCKER SURPLUS STORE

1717 RESERVE ST.  
GARLAND, TX 75042

HOURS:  
T, W, Th, F Noon-6PM  
Sat. 8:30 AM-1 PM

\*Ask for Hazen Smith  
in Dallas (214) 340-0631  
TX WATTS 1-800-749-4642 ex 135  
WATTS 1-800-527-4642 ex 135

ALL UNITS GUARANTEED OPERATIONAL WITH MANUAL  
ORDER WHILE SUPPLIES LAST!  
ALL EQUIPMENT F.O.B. GARLAND, TX - VISA & MASTERCARD OK - NO C.O.D.s

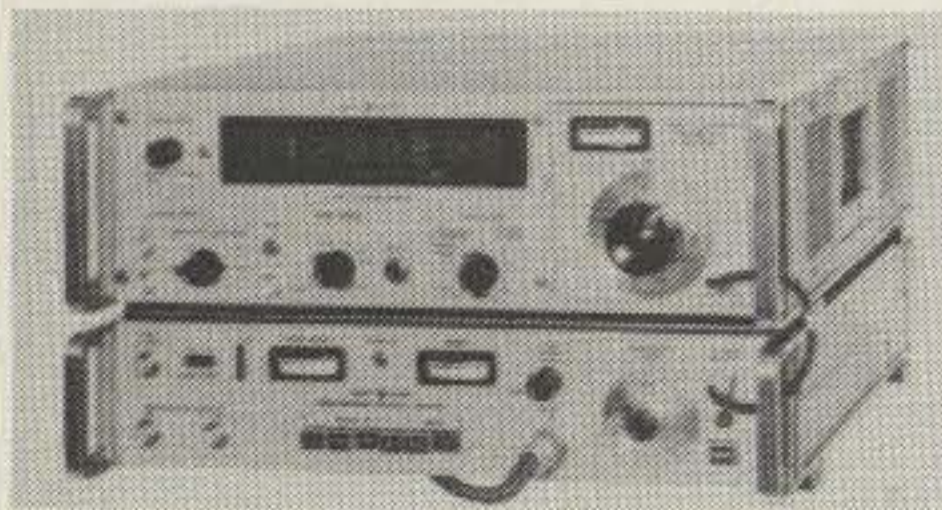
## FLUKE 803D AC/DC DIFFERENTIAL METER SPECIAL PRICE! \$99.00

- 0-500 V AC/DC RANGE
- ACCURACY OF  $\pm 0.02\%$  (DC) &  $\pm 0.1\%$  (AC)
- 1 M $\Omega$  INPUT RESISTANCE

## HP 2590A MICROWAVE FREQUENCY CONVERTER \$400.00

- 500 MHz TO 15 GHz FREQUENCY RANGE
- SENSITIVITY IS -20 dBm TO 10 GHz, -7 dBm TO 15 GHz
- AUTOMATIC GAIN CONTROL
- MEASURE FM DEVIATION, DEVIATION RATE AND AM MODULATION

This is a compact, all solid-state instrument that performs the functions of a transfer oscillator and a transfer oscillator synchronizer. Measures frequency drift over long periods, carrier frequency of pulsed signals and accurate CW frequency measurements.



2590A shown with 5245L Counter and 5253B Plug-In (sold separately).

## HP 5245L FREQUENCY COUNTER SALE PRICE \$250.00

Now you can own one of the most versatile frequency counters ever built! Almost everyone who has been in the electronics business for the last 30 years has used one at one time or another.

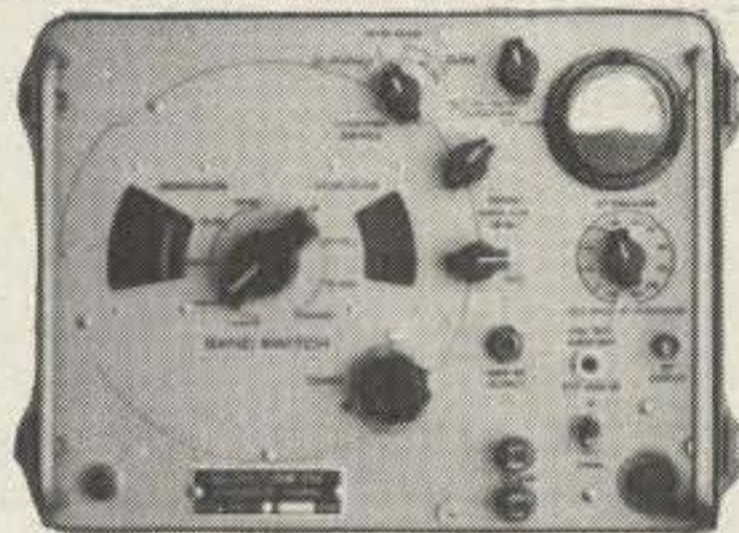
- DC to 50 MHz (Expandable to 18 GHz)
- Measures Period, Multiple Period and Average
- Measures Ratio and Multiple Ratio
- Accurate Time Base (2 Parts in  $10^{-10}$ )
- All Solid State Design

These won't last long at this price, so pick out a plug-in (or plug-ins) that will do your job, from the list below, then give us a call!

## URM-25F SIGNAL GENERATOR \$169.00

- FREQUENCY RANGE 10 kHz TO 50 MHz IN 9 BANDS
- 0.1  $\mu$ V TO 0.1 V INTO 50  $\Omega$
- 2 V INTO OPEN CIRCUIT
- 0 TO 50% AM MODULATION
- INTERNAL 400 Hz AND 1000 Hz MODULATION FREQUENCIES

This ruggedized unit is portable and lightweight (35 lbs). Contains a crystal calibrator for high accuracy applications. Complete with the lid; less accessories.



## BOONTON 71A CAPACITANCE/ INDUCTANCE METER \$150.00

- INTERNAL 1 MHz TEST SIGNAL
- 1 pF - 1000 pF FULL SCALE CAPACITANCE
- 1  $\mu$  H - 1 mH FULL SCALE INDUCTANCE
- ALSO MEASURES Q

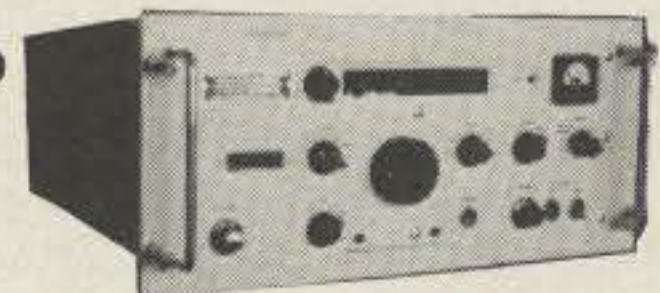


## COMMERCIAL HF RECEIVERS

- COLLINS 651S1 HF RECEIVERS - VARIOUS OPTIONS AVAILABLE FROM \$1,500.00
- RACAL 6390-1 HF RECEIVER - MADE ORIGINALLY FOR U.S. GOVERNMENT \$2,000.00
- RACAL 6217A HF RECEIVER - OLDER MODEL HF RECEIVER, SOLID STATE CONSTRUCTION \$750.00 (Not shown)



Collins 651S1



Racal 6390-1

- 5251A Frequency Converter \$ 50.00  
Increases counter range to 100 MHz at 50 mV sensitivity.
- 5252A Prescaler \$ 50.00  
Increases counter range to 350 MHz at 50 mV sensitivity.
- 5253B Frequency Converter \$ 70.00  
Increases counter range to 512 MHz at 50 mV sensitivity.
- 5254A Frequency Converter \$ 100.00  
Increases counter range from 300 MHz to 3000 MHz at 50 mV sensitivity
- 5255A Frequency Converter \$ 400.00  
Increases counter range from 3 GHz to 12.4 GHz at 100 mV sensitivity.



- 5261A Video Amplifier \$ 50.00  
Increases basic counter sensitivity to 1 mV at basic frequency.
- 5262A Time Interval Unit \$ 50.00  
For measuring pulse length, spacing, and delays.
- 5264A Preset Unit \$ 75.00  
Measures N x frequency, N X period, N X ratio, ratio, divides by N and preset counts.



- 5265A DVM Unit \$ 50.00  
Converts counter to a digital DC voltmeter with 10, 100, and 1000 V ranges.
- 5267A Time Interval Unit \$ 100.00  
Measures 1  $\mu$ sec to  $10^8$  sec with 0.1  $\mu$ sec resolution at 0.3 V sensitivity.

mark its tubing for quick field setup, and then slide concentric tubes down inside each other, place its whip-radials inside the smallest tube, and loosen the two "X" hat bolts. The collapsed package fits in a 4 foot by 1 foot area of your trunk and telescopes back up in only 5 minutes. Really! I can set up my R5 anywhere and be on the air within 7 minutes, and what a mobile signal it delivers! This antenna is perfect for overnight stops and vacationing.

### **N4KEL, Mobileer Extraordinaire!**

If you spend any reasonable amount of time enjoying 20, 15, or 10 meters, you've surely heard the big mobile signal of Sy Moskowitz, N4KEL. Sy runs a full kilowatt on SSB and CW to a self-designed 4 dB gain phased array atop his continuously traveling van shown in photo 1. He recently received the CQ DX Award endorsed 200 countries, all while mobile, so the setup obviously "gets out"!

N4KEL's antenna system consists of twin Hustler masts with modified upper sections to increase efficiency and clear overpasses. Fifteen meter resonators are employed for 20 meter operation, for example, and their length is electrically extended with dual-capacity hats. The hats are separated by a distance equal to their diameter to almost triple their total capacity, and mounted two coil diameters above the resonator(s) to minimize losses. I explained that explicitly, because Sy's design concept is applicable to numerous other mobile (and home) antenna systems.

Sy recently came by our QTH, and we discussed his theories on antennas. Bear in mind this chap holds three degrees, including a Masters in Engineering, and has designed numerous special items for well-known names such as Collins, Motorola, and NASA. In fact, the Lunar experiment transmitter used by NASA's Apollo 11 mission to detonate packages for measuring moonquakes was N4KEL's actual hand-wired prototype. Sy emphasizes that best mobile performance results when antennas are mounted high and above as much vehicle metal as possible. He also points out that coil losses and ground-path losses are the two major pitfalls of mobile setups, and they can degrade radiation of a signal up to 20 dB.

Sy's suggested solutions are using large-wire (KW) coils with a minimum number of turns plus capacity hats for loading and using the vehicle as one solid ground plane. Get the idea? Less coil, more capacity or whip, and good grounding yield greatest efficiency.

### **Lakeview Goes Bug Katching**

I recently checked out a prototype of

Lakeview Company's new Carolina Bug Katcher, and it is a really neat antenna. This multiband ham stick consists of a helically-wound lower section with open-air coil and base Inducta-Match plus a stainless-steel upper whip. It stands approximately 7½ feet tall and works 40 through 12 as shown in photo 2. The upper whip is exchanged with a shorter rod and the coil is bypassed for working 10 meters. You set the supplied coil clips for lowest SWR at your favored bands/frequencies during tune-up, and then band-switching involves simply moving the coil's clip lead. You can also add extra clips for fast CW QSYs, MARS operation, etc.

The base matching coil serves two functions: it lowers SWR and broadens bandwidth (technically, that results from a better feedpoint match). Two coil taps are sufficient here: one for 40 meters and one for the upper bands. The Inducta-Match, incidentally, is a good bandwidth-improving addition for single-band "Ham Sticks." Just unscrew their base, slip the coil into position, replace the stick, and connect the coil's clip lead to ground. Nice!

The Carolina Bug Katcher works like a champ, and it is great for WARC-WARC-WARCing along highways or byways. It is tall enough to radiate a quite respectable signal, yet short enough to clear low overpasses and stay on the car. The fiberglass base section and kilowatt-size coil make it slightly top heavy, so guying with light fishing line is a good idea.

Full production runs of the CBK are scheduled to begin this month. For more details check with WD4BUM/Lakeview Company, Rt. 7, Box 258, Anderson, SC 29624.

### **Outbacker Update**

Remember the new Australian-made Outbacker antenna I reviewed in the June issue? Importer Don Arnold, WD4FSY, reports they are now selling like crazy and are available in several vehicle-mating colors. Terlin's owner (the Outbacker's manufacturer) attended Dayton '90 and offered a free Outbacker to anyone who could break one by sheer muscle force. Several machos tried, but no antennas broke. Taking a lesson from that stint, I now have my own Outbacker installed on the car and love it (see photo 3). Furthermore, it makes a great "unconcealed weapon" for self-defense when visiting unfamiliar areas! I also dinked up a new model and dubbed it the "Outbacker Supreme." Here are the details in a nutshell. They mainly apply to the 4 foot model, but they also work on the 6 footer with 1 or 2 inch adjustments.

Substituting an approximately 3 foot whip for the Outbacker's standard 6 inch top spike steps up its performance rough-



*Photo 2- The brand-new Carolina Bug Katcher. Antenna works like a champ, and you can set its taps to favor frequencies on each band. Coil is 3½ inches in diameter and 5½ inches tall. (See text.)*



*Photo 3- The Australian-made Outbacker ready for action. No worries about dodging low limbs with this hefty critter. It whacks them right off!*

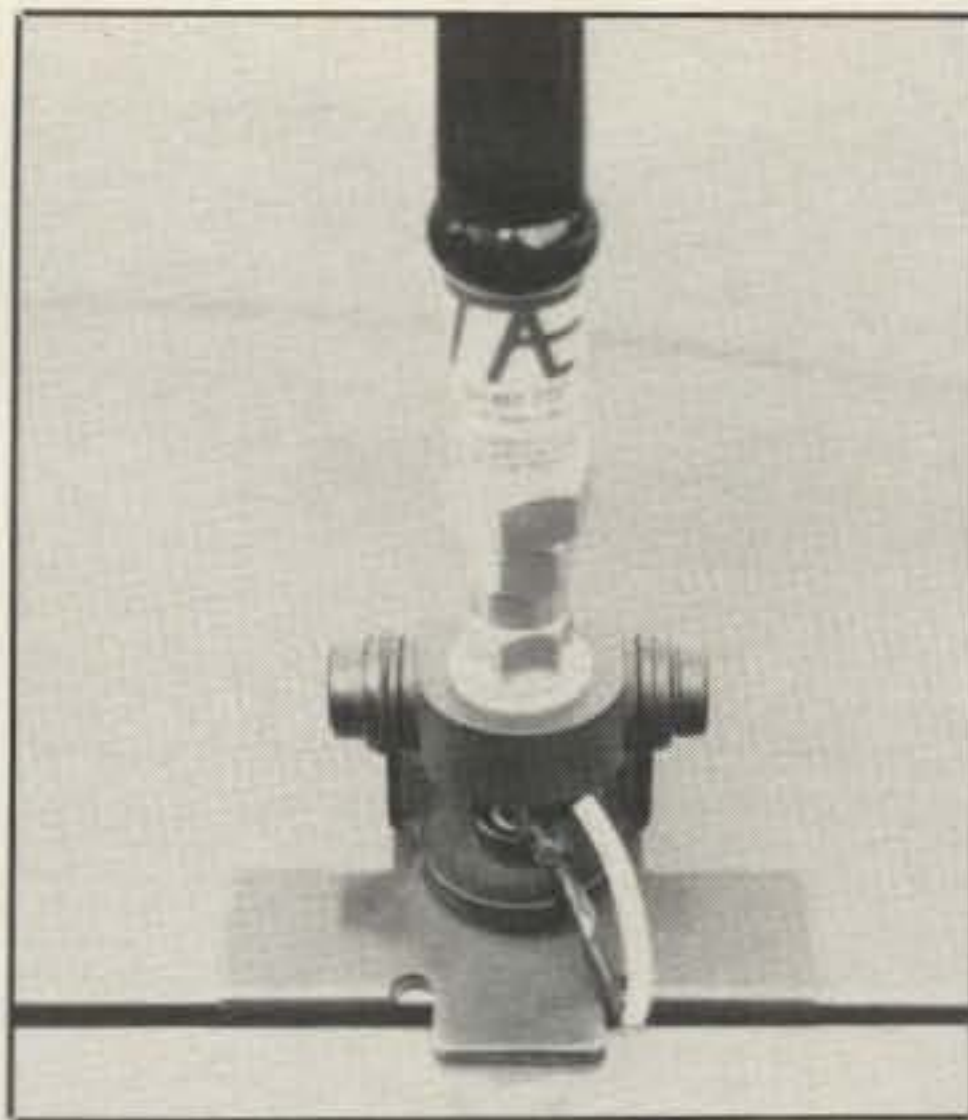


ly 3 dB and noticeably increases its bandwidth. This change really moves the Outbacker into the big league. Since it is a simple 2 minute modification (including SWR pruning time), you can switch between an Outbacker "standard" and "Supreme" for city or highway running. I found a replacement whip for Ten-Tec's little helium-filled antennas fits perfectly into the Outbacker. Just trim a few inches off its lower end before inserting it in the Outbacker. Then for 20 meter operation wind the "Wander Lead" to 15 meters and set the top whip to 33½ inches. For similar big signal results on 17 meters, use the Outbacker's 12 meter tap and 32 inches of whip. Likewise, using the 20 meter tap and 32 inches of whip works 30 meters in high style.

Additional tap-and-whip combinations will work for other bands and frequencies above 9 MHz. The key to spotting what works is using an antenna bridge and frequency counter. That concept will be explained later.

### Diamond's New Universal Mounts

Installing an HF antenna such as the previously discussed "Outbacker Supreme" or the upcoming Navy Specials on today's cars can be a formidable challenge. Every possible support is posi-



*Photo 4- Diamonds new K-400 tilt-to-any-angle trunk mount. This item is the perfect solution for mobiling with vans, hatchbacks, no-bumper cars, motor-scooters, or pogo sticks!*

tioned at some off-the-wall angle. Diamond's new K-400 mounts are the perfect solution. They fit on a trunk lid or hatchback lip and swivel in any direction to point your whip upright (photo 4). This rugged mount is the best news I have seen in a decade!

The new K-400 is available with a standard SO-239 receptacle for mating with Diamond's VHF/UHF gain antennas, or you can now order it with a 3/8-24 thread socket for HF whips. The K-400 is also available with ready-to-install coax, and it includes a short section of small teflon-insulated cable for clearing tight trunk openings. For more details on Diamond's goodies, contact RF Parts Company, 1320-16 Grand Avenue, San Marcos, CA 92069.

### New Goodies From The UK

Two new base-loaded mobile antennas recently arrived from their European manufacturer, GW4YYY, and Tony is considering marketing them in this country. These 4 foot tall antennas are called the "Navy Special," and they are shown in photo 5.

They are available in two models. One works 40, 30, and 20 meters, and the other model works 17, 15, and 12 meters. They look identical except for different colored base rings. Quite unique is the Navy Special's slide-between-indent base coil rod/whip support for push-pull, click-click band changing (an authentic Gillette antenna!). When mounted on a car's rain gutter, you can even reach out the window and change bands while in motion. Whew! The antennas require



**IC-765**  
Official Radio Of The World  
Radiosport Team Championships



**IC-575A/H**  
6 and 10 Meter Performance  
With Either 10 or 100 Watts

**ICOM**



**IC-2400A**  
DualBand FM With 45 Watts on 2 Meters  
and 35 Watts on 440 MHz

**IC-901**  
Dual Band FM With Remote Controller  
and Up to 6-Band Capability



**IC-2SAT**  
Mini 2 Meter Handheld With  
Built-in NiCd Batteries and Keyboard

**IC-24AT**  
Super Compact, 2 Meter/70 cm  
Dual Band With 40 Memories

Large Inventory of Everything ICOM—HF, VHF, UHF and Plenty of Accessories. When You Need Service, DOC's is Famous for Fast and Thorough Repairs. Call Today!

**DOC's Communication**  
702 Chickamauga Ave.  
Rossville, GA 30741

**404-866-2302**  
**404-861-5610**  
FAX 404-866-6113



# 1 Antenna 9 HF Bands No Tuner

If you want just one HF antenna to handle up to nine bands, the GARANT WINDOM ANTENNA should be your choice. Our famous Garant Windom Antennas come in three lengths: 67ft for up to 5 bands; 137ft for up to 8 bands; 255ft for up to 9 bands. Yes, one antenna with only one coax feedline can handle all 9 HF bands, i.e. 160-80-40-30-20-17-15-12-10M.

## No Tuner Needed

That's right. If you install our Garant Windom Antennas properly, you'll not need a tuner. Our customers and independent testers have confirmed this fact. The secret is in our special balun. It matches the low-impedance (50  $\Omega$ ) coax cable to the high-impedance windom-type antenna. For your convenience, our Garant Windom Antennas are sold with a 500W PEP and a 2KW PEP balun.

## Here's Proof

Read what our satisfied customers wrote us about their genuine Garant Windom Antennas. All originals are on file for your inspection, as the law requires it. Fred, W8YFK: "I purchased one of your GD-9/2KW antennas. It works great. Nine bands, no external tuner. Who could ask for anything more?" Howard, W3HM: on his GD-9/2KW: "The antenna is first class. It does all it was advertised to do. Now, I have one antenna, one feedline and all (9) HF amateur bands for the first time in 27 years of hamming." John, KA3SDO on his GD-8/500W: "Prompt delivery, helpful phone ordering and information, combined with a quality product. Garant truly has an unbeatable combination." Don, NOIGE: "I am very pleased with the shipping speed, service and the GD-8/500W antenna. This is my only antenna for 10 to 80 meters. What a great performing antenna. I am very pleased." John, WOHBE: "I was extremely anxious to put my new GD-8/500W on the air. The instructions make the assembly fast and simple. I was impressed by the low SWR on all bands and comparison tests have proved to me that the Garant GD-8 windom is far superior to any other wire antenna." For more letters with genuine call signs see our free data report.

## Free Data Report

We'll mail you free of charge our complete data report on all our Garant Windom Antennas. It contains more technical data, actual SWR curves, customer comments and our low factory-direct prices. We ship worldwide and accept VISA and MASTERCARD. All our genuine Garant Windom Antennas are sold with a 10-day money-back guarantee. They come also with a 3-Year Limited Warranty. You see, we believe in our products 110%. For your free data report write, phone or fax to:  
**Garant International, Inc.**, Dept. 603  
Box 890, Dearborn, MI, 48121, U.S.A.  
**Garant Enterprises**, Dept. 603, Box 2895,  
Thunder Bay, ON, P7B 5G3, Canada  
**Phone Hotline: 1-807-767-3888**  
**Fax Hotline: 1-807-767-0888**

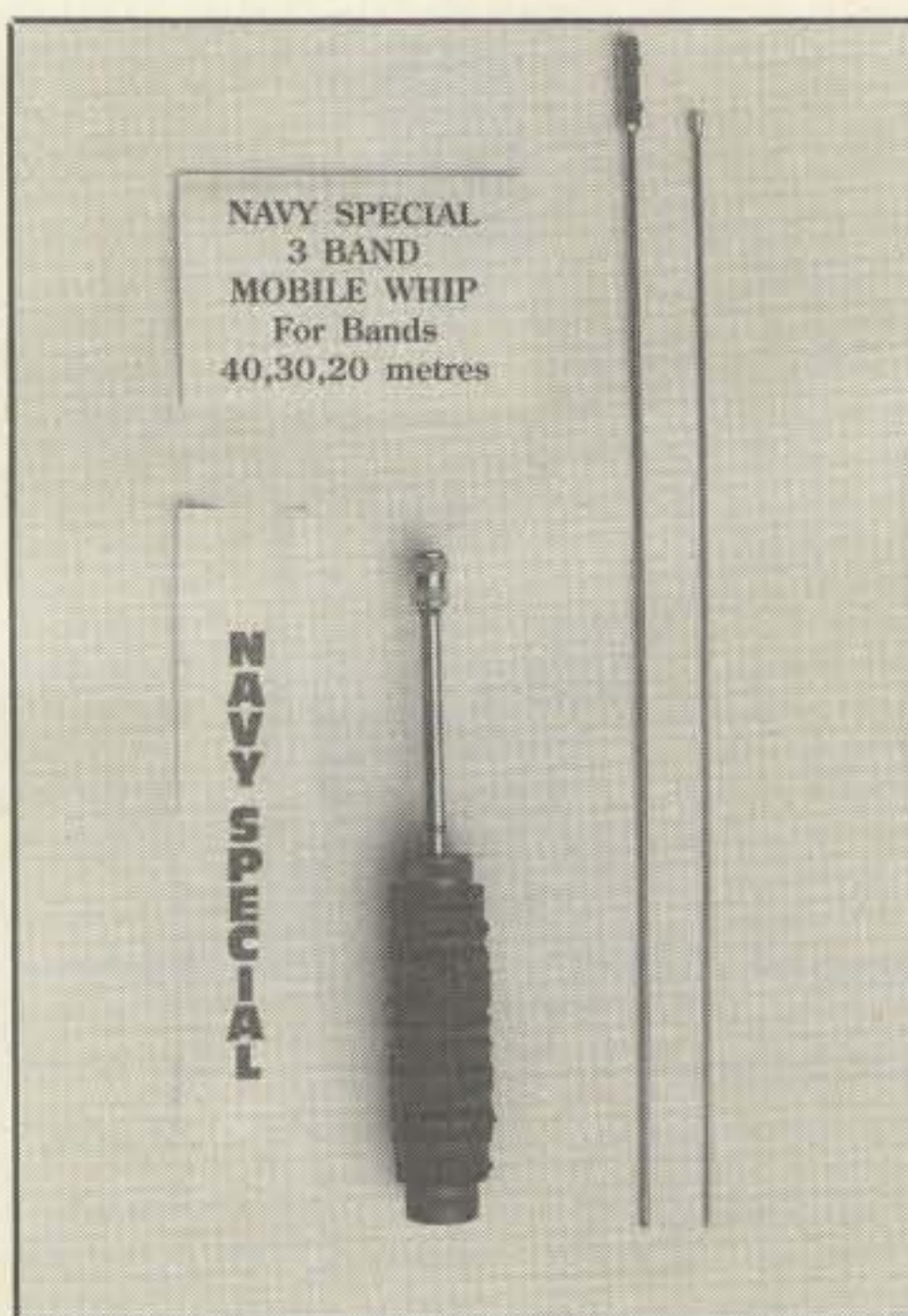


Photo 5- The new Navy Special triband mobile antenna being made by GW4YYY. Band changing involves sliding rod on base section up/down. Whip on the right stands 47 inches tall, with a coupler in the middle. This is a very rugged item made to withstand harsh English weather.

an SO-239 socket for mounting, and GW4YYY also has a neat SO-239 equipped gutter mount.

The Navy Specials are not big-signal band blasters, but I made several good contacts with them on 30, 17, and 15 meters. They should be attractive to weekend mobileers preferring not to mar the new family car with a serious HF installation.

Tony encourages using a good-quality antenna tuner with the Navy Specials, and I heartily second that fact. Their SWR often runs 3:1 or higher. MFJ's new 948 tuner is a good choice here. It is small, reasonably priced, and has a cross-needle peak-reading wattmeter with backlight for night use. I do not know the cost of the Navy Specials, but full details are available from Tony Allen, GW4YYY, 73 Crogen, Chirk, Clwyd, LL14-5BJ, United Kingdom.

## Great Antenna Tuning Aids

If you work with antennas of any type, mobile or fixed, you know that initial setup/tuning and modifying are time-consuming. I found the ideal way to cut that time from hours to minutes, and the news is too good to keep secret. It involves using MFJ's 204B battery-powered antenna bridge and the Digitrex 4500 digital frequency counter (see photo 6). This combination can be used at an antenna's feedpoint or coax end, and you do not need to even switch on your transceiver

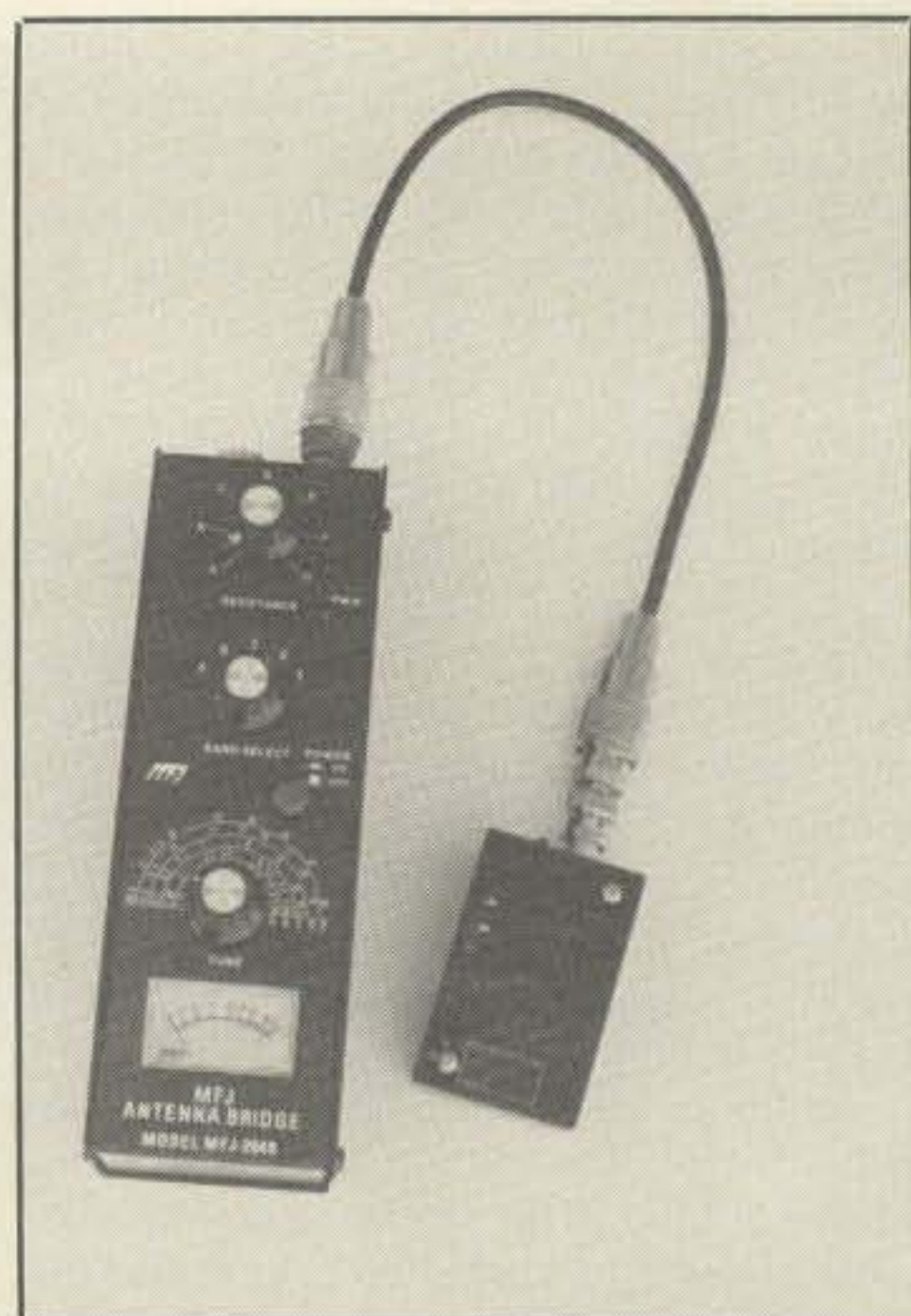


Photo 6- Our not-too-secret goodies for quick antenna tuning, pruning, and modifying. This MFJ antenna bridge and Digitrex frequency counter combo is great. It shows exact resonant frequency and impedance without even switching on your transceiver! (See text for details.)

before the antenna's impedance and resonant frequency are perfectly tuned. Just connect the antenna to the bridge, tune for a dip, and read its impedance on the top scale and its center frequency on the counter. Make an adjustment, recheck, and continue to perfection. This combination is terrific!

My first "Outbacker Supreme" mod for using a longer whip and 15 meter tap to operate 20 meters overshoot and hit resonance on 12.5 MHz. I had guesstimated that resonance would be higher in frequency, not lower, and SWR metering was useless. It was 5:1 across the whole band (naturally). Three quick adjustments while using the bridge and counter (5 minutes), and I "hit" 14.200 MHz. I then found similar settings for other bands (5 more minutes—one works fast in southern summer sun), fired up the rig (thank goodness for car air conditioning), and everything worked great. The bridge/tuner combo also cut Carolina Bug Katcher tuning to 7 minutes and let me find tuner settings for the Navy Specials before transmitting 1 watt. Nice!

## Sign Off

Once again we have moved at a fast pace and overflowed available space. There is a lot happening on the HF mobile scene, and good news warrants sharing. See you again next month

73, Dave, K4TWJ

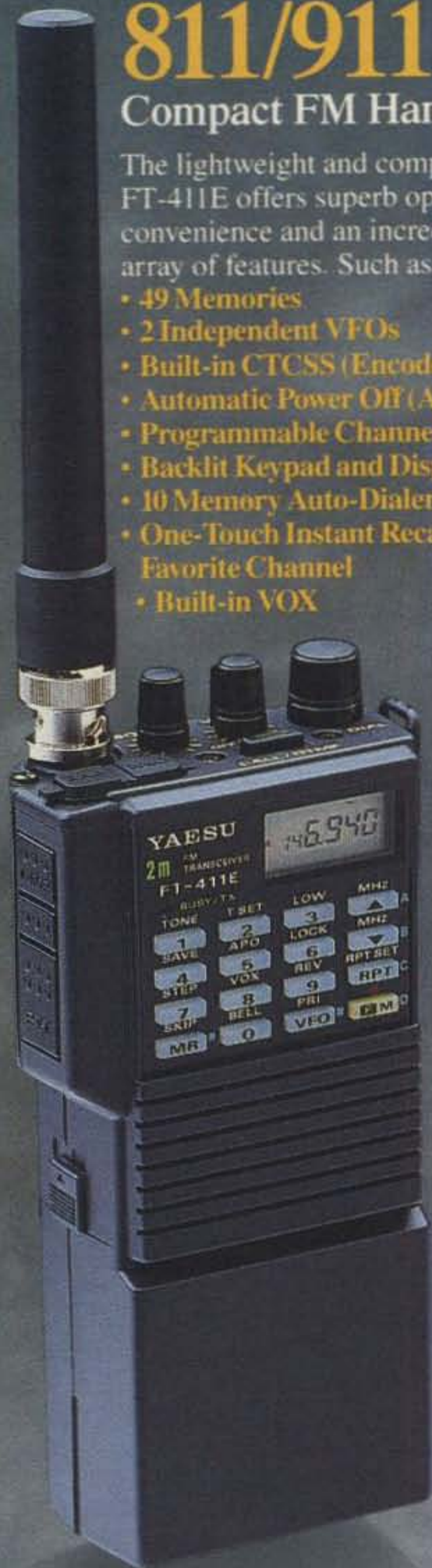
# Hold Your Own.

## FT-411E/ 811/911

### Compact FM Handhelds

The lightweight and compact FT-411E offers superb operating convenience and an incredible array of features. Such as,

- 49 Memories
- 2 Independent VFOs
- Built-in CTCSS (Encode/Decode)
- Automatic Power Off (APO)
- Programmable Channel Steps
- Backlit Keypad and Display
- 10 Memory Auto-Dialer
- One-Touch Instant Recall of Favorite Channel
- Built-in VOX



- 10 Battery Saving Sampling Rates
- PTT/Keypad Lock
- Includes: CSC-35 Vinyl Case, NC-28B 117 VAC Wall Charger, Belt Clip and FNB-17 Ni-Cad Battery.
- Accessories/Options: FNB-12S (5 Watts) Battery, MH-12A2B Label Speaker/Mic, MH-18A2B Mini Earpiece/Mic, NC-29 Desktop Quick Charger and NC-33 Desktop Gang Charger.

#### Specifications

**Frequency Range:** RX: 130–174 MHz, TX: 144–148 MHz (FT-411E); 430–450 MHz (FT-811); 1240–1300 MHz (FT-911)



**Power Output:** W/FNB-17; 2.5 Watts (FT-411E); 2.0 Watts (FT-811); 1.0 Watt (FT-911) — W/FNB-12S: 5.0 Watts (FT-411E); 5.0 Watts (FT-811); 1.0 Watt (FT-911)

**Channel Steps:** 5, 10, 12.5, 20 & 25 kHz

**Case Size:** 2.2(W)x5.0(H)x1.3(D) in.

**Weight (Approx.):** 13.4 oz. (FT-411E); 13.4 oz. (FT-811); 15.2 oz. (FT-911)

## FT-470

### Compact Dual Band 2m/70cm FM Transceiver

Compact... Powerful... Economically Priced. The FT-470 provides "true" Dual Band Operation so you can transmit on one band while monitoring or scanning on the other band.

#### Plus these features:

- 42 Memories
- 2 Independent VFOs
- Built-in CTCSS (Encode/Decode)
- Automatic Power Off (APO)
- Programmable Channel Steps
- Backlit Keypad and Display
- 10 Memory Auto-Dialer
- 10 Battery Saving Sampling Rates
- PTT/Keypad Lock
- Includes: CSC-43 Vinyl Case, NC-28B 117 VAC Wall Charger, Belt Clip and FNB-17 Ni-Cad Battery.
- Accessories/Options: FNB-12S (5 Watt) Battery, MH-12A2B Label Speaker/Mic, MH-18A2B Mini Earpiece/Mic, NC-29 Desktop Quick Charger and NC-33 Desktop Gang Charger.

#### Specifications

**Frequency Range:** RX: 130–180 MHz, TX: 144–148 MHz (VHF); 430–450 MHz (UHF)

**Power Output:** W/FNB-17; 2.3 Watts (144 & 430 MHz) — W/FNB-12s: 5.0 Watts (144 & 430 MHz)

**Channel Steps:** 5, 10, 12.5, 20 & 25 kHz

**Case Size:** 2.2(W)x6.0(H)x1.3(D) in.

**Weight (Approx.):** 14.8 oz.

## REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

### WARC-92 To Threaten Amateur Bands

The FCC has released its first thinking on the position it feels it should take at the upcoming World Administrative Radio Conference (WARC) to be held in Spain between February 3 and March 5, 1992. These global conferences date all the way back to 1865, when 20 European countries met to agree on how to exchange wireline telegraphic communications across international borders. Back in those days operators used simply to hand messages to their counterparts at national boundaries for further relay.

The International Telegraph Union was renamed the International Telecommunication Union in 1932 once other forms of communications became established. The ITU continues to this day as a specialized agency of the United Nations with a membership of more than 150 countries. The dilemma facing the ITU now is where to make room in the filled-up radio spectrum for emerging new communications—especially those delivered by satellite.

Our government system "of the people, by the people" requires the public not only to be kept informed, but also to participate in regulatory decisions. Toward that end, the FCC has issued their "Second Notice of Inquiry (NOI) Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum." The purpose of the NOI is to collect information to be used to prepare a Commission report that will recommend proposals to the U.S. Department of State delegation at WARC-92.

WARC-92 will address the Resolutions and Recommendations of three previous smaller ITU conferences—namely, the WARC for the *Planning of the High Frequency (HF) Bands Allocated to the Broadcasting Service*, the WARC for the *Mobile Services* and the WARC on the use of the *Geostationary Satellite Orbit and on the Planning of Space Services Utilizing It*. Additionally, the ITU recommended WARC-92 consider defining new space services and allocations to these services in frequency bands above 20 GHz.

The initial NOI (released in 1989) sought views on these topics and specifi-

cally requested comments on the projected frequency needs of the HF (3–30 MHz) broadcasting service, mobile services in the 500–3000 MHz range, high-quality audio or *High Definition Television* (HDTV) delivered by the Broadcasting-Satellite Service (BBS), and new space services above 20 GHz.

Formal comments were received from just about every major corporation and association with an interest in these issues, including the National Association of Broadcasters, Voice of America, United Parcel Service, National Academy of Sciences, Motorola, ARRL, COMSAT, NASA, National Public Radio, and many others.

The FCC noted that the steering council of the Industry Advisory Committee (IAC) to WARC-92 submitted a detailed report based upon information received from its various Informal Working Groups. ARRL Executive Vice President Dave Sumner, K1ZZ, represents amateur radio on that panel.

The second NOI runs to some 150 pages. There are three issues in the document that have the potential to greatly impact the U.S. amateur service. Affected could be the 40 meter amateur band, and amateur allocations at 420 MHz and 2.4 GHz. The impact is generated by the perceived need for:

1. additional HF broadcasting spectrum, especially at 7 MHz
2. a home for a Low Earth Orbiting Satellite Service, and
3. a Digital Audio Broadcast (DAB) band.

A fourth issue, the need for 900 MHz spectrum to accommodate emerging wireless personal communications such as CT-2 cordless telephones, could conceivably impact the 902–928 MHz amateur band. The FCC did say, however, they were proposing no change in the Mobile Service which has primary shared spectrum in the 860–902/928–942 MHz bands and secondary allocations for mobile services in the 902–928/942–960 MHz bands. About 20–25 MHz is required, and it appears more than enough spectrum is available in the primary allocation without affecting 902–928 MHz.

#### Allocation Issues Between 3 and 30 MHz

The Commission asked for the projected

frequency needs of the HF broadcast service, the basis for such projections, whether the projected allocations needed to be exclusive, and whether they should be regional or worldwide.

Fifteen commenters expressly support the need for additional spectrum for HF broadcasting. George Jacobs, W3ASK (owner of George Jacobs & Associates consulting engineering firm and CQ's Propagation Editor), as well as several other commenters, contend that worldwide HF broadcasting requirements greatly exceed the number of available channels in the spectrum currently allocated.

Jacobs submitted data showing that the ratio of available channels versus needed number of channels for a particular hour in a particular season. The data shows, depending upon band, that the ratio of needed channels to available channels varies from a high of over 5:1 at 6 MHz to a low of 2:1 at 15 MHz.

The Association of North American Radio Clubs (a shortwave listening organization) included an ITU report indicating the average ratio of needed to available channels over a 24 hour period at 6 MHz was 8.48:1. Both Jacobs and ANARC conclude that expansion of the current broadcast bands is necessary. Jacobs proposed a new band at 19 MHz and additional band segments in the 6, 7, 9, 11, 13, 15, and 17 MHz bands that are adjacent to existing HF broadcasting bands.

On the other hand, several commenters, including the American Radio Relay League, question the need for additional HF broadcast allocations, especially with the recent political changes taking place in the Soviet bloc. The ARRL felt that spectrum efficiency would be enhanced through the use of single-sideband (SSB) emissions.

The League also said that some broadcasters use several frequencies simultaneously to increase the probability of reception in their target areas. The ARRL states that this practice can be self-defeating because it produces increased co-channel interference, and concludes that if broadcasters were to reduce their number of simulcast transmissions, better reception would result.

#### FCC Discussion

Inadequate allocations for HF broadcasting have been an issue for many years.

National Volunteer Examiner Coordinator,  
P.O. Box 565101, Dallas, TX 75356-5101

# CALL 1-800-423-2604

**FRIENDLY SERVICE  
TEXAS STYLE!**

**SERVICE, INFO,  
TEXAS RESIDENTS  
(512)-454-2994**

**AUSTIN AMATEUR  
RADIO SUPPLY**

**Multi Store  
Prices!**

**HOURS**  
M-F 9:00 - 5:30 (PHONE)  
10:00 - 5:00 (WALK-IN)  
SAT 9:00 - 5:00 (PHONE)  
9:00 - 1:00 (WALK-IN)  
CENTRAL TIME

5325 NORTH I-35  
AUSTIN, TEXAS 78723



**ICOM**



IC765 • IC735 • IC725



IC229H • IC24AT • IC2SAT • IC2400A

**Special Sale Prices!**



**KENWOOD**



• TS950SD •  
TS940SAT • TS440SAT • TS140S



TM941A • TM731A • TM241A  
TH75A • TH225A • TH27A

**Special Sale Prices!**



**YAESU**



FT1000D • FT767GX • FT757GX/II



FT212RH • FT470 • FT411E

**Special Sale Prices!**



**ANTENNA  
ROTATORS  
ON SALE!**

ALLIANCE  
HD-73 In Stock!

TELEX  
CD45-II • HAM-IV  
TAILTWISTER

YAESU  
G400RC

**LARSEN  
DUAL BAND  
ANTENNA  
ON SALE!**

Your Choice.  
Mag Mount  
Trunk Lid  
Mount  
Hole Mount



DR-590T  
**Now In Stock!**  
DR-570T  
**A Great Buy!**

**ALINCO**



DR-110T • DR-112T  
2M - 45 Watt  
**Super Value!**



**DJ-160T**  
Full Featured  
2 Meter  
Handheld  
Always  
Competitive  
Pricing!

**MFJ  
ANTENNA TUNERS  
& ACCESSORIES**



986 • 949D • 941D • AND MORE...

**New  
Low  
Pricing**



MFJ 1270B • 1278 • 1278T



AEA PK-232MBX • PK-88

**New  
Low  
Pricing**



KANTRONICS KAM

Since no new provisions for HF broadcasting were made at WARC-79 in the more popular bands at 6/7 MHz, the U.S. took a formal reservation and reserved its right to take the necessary steps to meet the needs of its HF broadcasting services.

At the time of WARC-79 most HF broadcasting was conducted by the federal government. The Commission only had four licensed private HF broadcasters. There are currently 19. The FCC said they were not convinced that the recent political changes in the world have eliminated the need for additional HF broadcasting spectrum.

Jacobs proposes an addition of 450 kHz at 7300-7750 kHz. The FCC said it recognizes "The amateur community is also interested in the 7 MHz band. WARC-79 maintained the worldwide amateur service allocation at 7000-7100 kHz as well as the amateur service allocation at 7100-7300 kHz in Region II. The ARRL now proposes to correct what it terms the incompatible allocation at 7100-7300 kHz by allocating the band worldwide for the amateur service and shifting the existing Region I and III broadcasting allocation to 7300-7500 kHz, also on a worldwide basis. . . . ARRL's proposal has merit, except that it fails to add additional allocations to broadcasting in Regions I and III, and it provides for an addition of only 200 kHz in Region 2."

### **40 Meter Amateur Band: 6900-7200 kHz?**

The FCC believes ". . . that this situation can best be addressed by proposing to make the existing amateur and broadcasting allocations worldwide. In our opinion, the best way to accomplish this is for both allocations to shift somewhat. We propose that the amateur receive 300 kilohertz at 6900-7200 kHz and that the broadcasters receive 200 kilohertz at 7200-7400 kHz. We consider the changes to the amateur allocations to be consequential (important) in nature and thus permissible under the WARC-92 agenda."

"On sharing bands, the majority of commenters agree that it is very difficult for other services to share with the broadcasting service in the HF band because broadcast stations use high power transmitters and highly directional antennas. Commenters generally agree that broadcast allocations should be exclusive and on a worldwide basis."

### **New HF Hobby Allocations**

In addition, the ARRL proposed that if the agenda for WARC-92 permits, the United States should pursue the following new amateur allocations: 50-100 kilohertz in

the vicinity of 5 MHz, 200 kilohertz near 10.150 MHz, 50 kilohertz near 14.350 MHz, 150 kilohertz near 18.168 MHz, and 150 kilohertz near 24.890 MHz.

The ARRL also suggested that as propagation changes hour by hour, it would be desirable for HF broadcasters to move to real-time, dynamic signal selection methods rather than continue their reliance on propagation predictions and published schedules. According to the ARRL, monitoring of reception in the target area for immediate feedback to the broadcaster would reduce interference by deactivating frequencies that cannot be heard in the intended reception area.

### **Legitimize Illegal Freeband Operation?**

One individual, Brian Cassidy, proposed in his comments the creation of an international "Freeband" at 27.410 and 27.970—between CB channel 40 and the bottom of the 10 meter amateur band. Cassidy contends that thousands of U.S. hobbyists currently operate in this band illegally and contribute much to the economy. Cassidy stated that the band has been used by hobbyists all over the world for over 15 years and that a U.S. allocation would reduce interference problems and improve the hobby.

The FCC ruled the ARRL's and Cassidy's ". . . proposals were not consequential and, therefore, are outside the WARC-92 agenda. Accordingly we will consider them no further." The issue of "consequence" is interesting. Apparently, the needs of radio hobbyists are considered unimportant. The FCC also believes the ARRL's dynamic signal selection suggestion addresses a service-oriented rather than an allocations matter: ". . . we decline to advance this proposal at this time."

### **Low-Earth Orbiting Satellites**

Several firms are interested in obtaining allocations for low earth orbiting (LEO) satellites. This technology, by the way, was pioneered in the amateur-satellite service by AMSAT. Volunteers in Technical Assistance, Inc. (VITA assists third-world nations with communications support) is interested in the development and global provision of a low-cost, store-and-forward, satellite-based packet radio system for computer-to-computer information transfer. Two commercial firms (ORBCOMM and Starsys, Inc.) have already petitioned the FCC to establish an LEO Mobile Satellite Service.

The FCC said they ". . . believe we should propose allocations to support low-earth orbit satellite systems that represent new technologies." Spectrum, however, is non-existent since it is already allocated at the frequencies re-

quested. The FCC did suggest a secondary allocation for the LEO Mobile Satellite Service in the 137-138 MHz and the 148-149.9 MHz bands—just above and below the amateur 2 meter band. The Commission believes, however, that a secondary allocation for LEO MSS would not attract the financial and other resources needed for the construction and implementation of an extensive satellite system.

"Therefore, we propose that the bands 420-421 MHz and 930-931 MHz be used for LEO satellites. The 930-931 MHz band would provide the uplink for the 420-421 MHz downlink." The amateur service operates on a secondary basis between 420-421 in the United States and other countries. "We believe the existing users in the lower one megahertz of the band can be accommodated within the 421-430 MHz band." The FCC has requested information from the public on this assumption. The Commission also acknowledged that the Executive Branch did not agree with using 420-421 MHz for LEO satellite downlink because of the adverse effect on existing radiolocation operations.

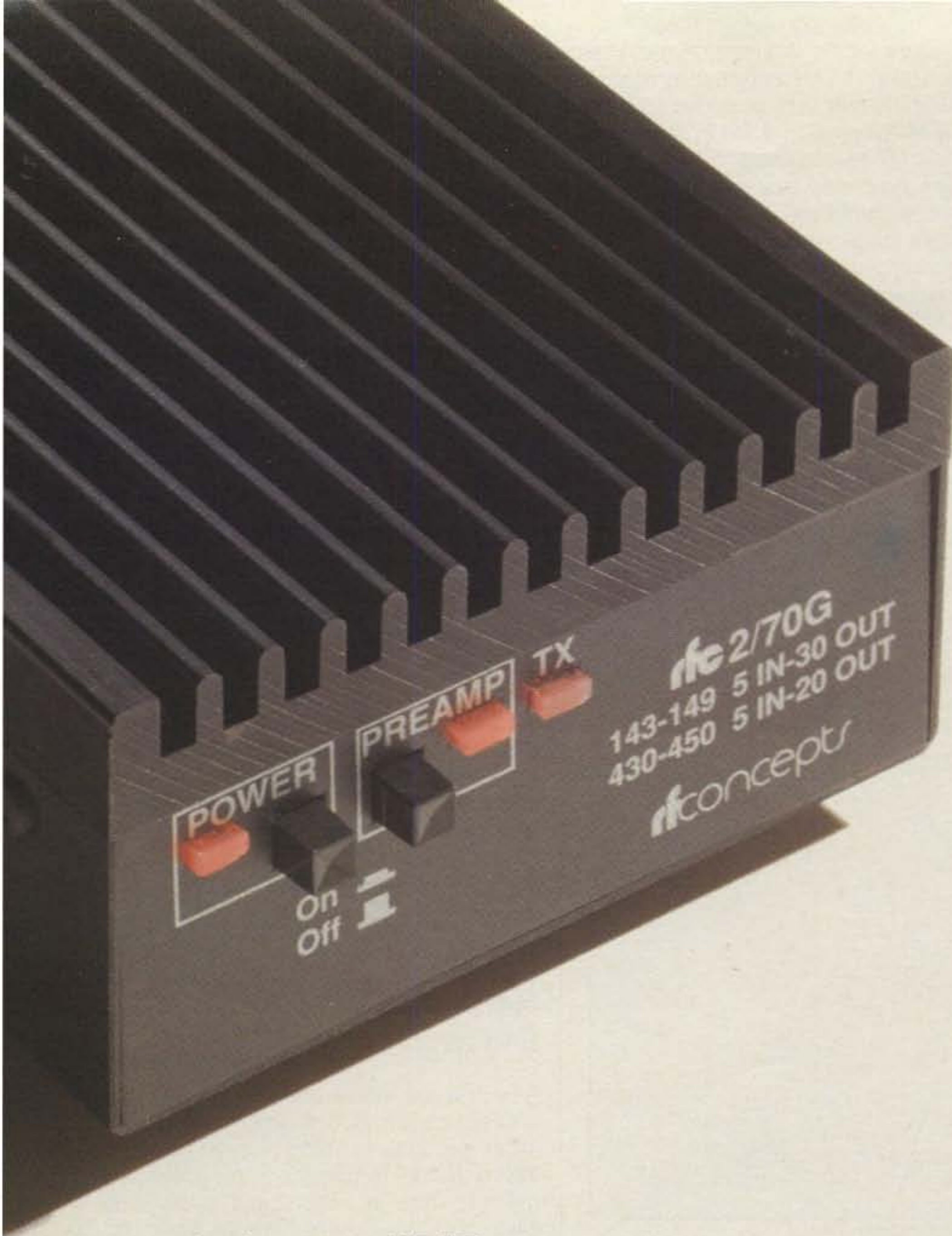
### **Broadcasting-Satellite Service (Sound)**

A WARC-92 agenda item will consider the allocation of frequency bands to the broadcasting-satellite service (BSS) in the 500-3000 MHz range. The FCC has been looking into the need for such a service that could be used to provide wide-area high-quality radio service to listeners using portable and automobile receivers.

The League said that sharing spectrum with satellite/digital radio broadcasting ". . . presents a difficult problem if the receiver can be physically located anywhere and requires a strong signal." The National Association of Broadcasters opposes direct satellite radio broadcasting because of the damage it feels it would do to the current system of local AM and FM radio stations.

The FCC recently issued a separate Notice of Inquiry seeking comment concerning BSS (Sound) or digital audio broadcasting (DAB). While it still remains to be resolved, it appears that a satellite or terrestrial DAB service would be in the public interest.

"The question of where to locate this service is not an easy one given the debate among the commenters. Besides where to locate the spectrum, there is also some question as to the amount of spectrum that is required for BSS (Sound) with a corresponding terrestrial broadcasting service. Matters are further complicated by the question of whether or not BSS (Sound) can share [spectrum] with other services."



**rfconcepts DualBand**

## revolutionary AMP

Designed for use with dual band hand-helds (HT's), the rfconcepts DualBand Power Amplifier represents a revolutionary step in the state of the art. This dual band amp and preamp combination is the first to amplify both 2m and 70cm automatically.

The DualBand Amp senses power output from your HT through dual narrow band peak detectors using fast switching low insertion loss relays for automatic keying (RF sense and transmit).

Features including PIN diode protected twin GaAsFet preamplifiers for extended range in fringe areas, and an all-component PC board mount design for reliable performance and serviceability, make the DualBand ideal for both mobile and ham shack applications.

For a detailed technical specification sheet, call your rfconcepts dealer or contact rfconcepts direct.

The rfconcepts DualBand, extra power for both 2m and 70cm, automatically.

rfconcepts - Division of Kantronics - P.O. Box 11039, Reno, NV 89510, 702.827.0133



Studies have shown that up to 100 MHz of spectrum would be required for BSS (Sound) including accommodation of terrestrial sound broadcasting within the same allocation.

Three specific RF bands have been proposed by the FCC as the future home of satellite/terrestrial digital radio, and the Commission is bracing itself for the criticism that is sure to follow. The situation is similar to constructing new prisons. Everyone agrees they are needed, but please, not in my backyard.

The three bands the Commission is looking at as the home for digital radio broadcasting are 728-788 MHz, 1493-1525 MHz, and 2390-2450 MHz. The last band is a ham band which will prove very valuable to the amateur service as satellites become commonplace. Two of the three options impact the amateur and amateur-satellite services.

The international Radio Regulations provide for a Television Broadcasting Satellite Service in the UHF-TV spectrum

between 620-790 MHz. Television broadcasters, however, are opposed to a hybrid satellite/terrestrial DAB service at 728-788 MHz (channels 57-66) since they say they need this spectrum to implement high-definition television. The FCC has a long-standing freeze on the allocation of new UHF television stations pending the expected selection of a land-based HDTV system in 1993. The FCC also mentions a BSS(Sound)/UHF-TV coordination problem with Canada and Mexico if 728-788 MHz is chosen.

The second option focuses on the 1435-1530 MHz band, which is used heavily for aeronautical mobile telemetry. The FCC proposes to reallocate 32 megahertz (1493-1525 MHz) to BSS (Sound) and terrestrial broadcasting. Flight test and aeronautical telemetry operations would then be reallocated to the 2390-2420 MHz band. The displaced amateur and amateur-satellite band would be reaccommodated only above 2420 MHz. The ISM band would be re-

duced to 2420-2480 MHz.

The 2300-2450 MHz band is internationally allocated to the Fixed, Mobile and Radiolocation Services with Amateur secondary. In the United States 2450 MHz (plus/minus 50 MHz) is designated for ISM, industrial, scientific, and medical devices. Many microwave ovens and medical diathermy units churn away at 2.45 gigs.

Amateur radio operators use the 2300-2310 MHz and 2390-2450 MHz segments only on a secondary basis. The third option would be to reallocate the 2390-2450 MHz band to the Broadcasting Satellite Service (Sound) with a corresponding terrestrial broadcasting service. All other services (including amateur radio) would be vacated except ISM equipment. The ISM allocation would be reduced to 2420-2480 MHz—i.e., still 2450 MHz center frequency, but with only a 30 MHz guard band on either side.

This third option proposes to retain the 2300-2310 MHz amateur secondary allocation only. This means that the U.S. amateur service would lose another valuable band, 2390-2450 MHz, and would receive nothing in return. The FCC seeks "... comments on the feasibility of using the 2390-2450 MHz band for BSS (Sound) ..."

### Morse Code Going Engineers Next?

As you know, Morse code proficient radio officers aboard ocean-going vessels are in the process of being phased out. The international requirement for on-board maintenance of shipboard radio and electronic equipment may be next. ITU rules (to which the United States has taken exception) mandate on-board maintenance personnel certified to repair such equipment.

The Radio-Electronics Officers Union and the American Radio Association (another shipboard radio operator's organization), of course, both oppose such a measure. The Commission believes the most effective means of maximizing equipment availability is by duplication-of-equipment as occurs with avionics installed on aircraft. Comments on the WARC-92 Second NOI closed on December 3, 1990, and we are now in the reply period.

### Personal Communications Services

Ironically, while the FCC was contemplating using the 13 cm amateur band for digital broadcasting, the ARRL is cautioning the Commission that amateurs need this band for future use and not to allocate this band to still another service, PCS.

**the ULTIMATE PADDLE**



- Stainless Steel Adjustable Spring for Different Fists
- Non-Skid Feet
- Nylon & Stainless Self Adjusting Needle Bearings
- Stainless Fasteners
- Gold Plated Solid Silver Contact Points
- Large Clear Plastic Handles
- Unmatched Responsiveness

**BENCHER, INC.**  
333 W. Lake St. Chicago, IL 60606  
312/263-1808 FAX 312/263-3750

*We Didn't Invent CW.  
We Perfected It.*

CIRCLE 124 ON READER SERVICE CARD



# JOIN ARRL

## BENEFITS FOR YOU

QST, QSL Bureau Awards, Low Cost Insurance Operating Aids, Government Liaison and More—Much More!

### MEMBERSHIP APPLICATION

Name \_\_\_\_\_ Call \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ Prov./State \_\_\_\_\_ PC/ZIP \_\_\_\_\_

\$30 in U.S. \$42 elsewhere (U.S. funds) Licensed amateurs or age 65 or over, upon submitting proof of age, may request special dues rate of \$24 in the U.S. \$36 elsewhere in U.S. funds. Persons age 17 and younger may qualify for special rates, write for application. For postal purposes, fifty percent of dues is allocated to QST, the balance for membership.

VISA, MC, AMEX, Discover # \_\_\_\_\_  
Signature \_\_\_\_\_ Expires \_\_\_\_\_

The American Radio Relay League  
225 Main St. Newington, CT. 06111 USA

CO

CIRCLE 37 ON READER SERVICE CARD



The League's comments on establishing new Personal Communications Services (PCS) were filed on the same day that the FCC released its Second NOI on WARC-92. PCS contemplates new consumer services such as advanced "second generation" cordless telephones and portable radio systems for personal use (General Docket 90-314).

The League cautions the FCC not to allocate the choicest spectrum for first- and second-generation equipment when they are simply a stepping stone to the third generation. The League said it was especially concerned about the 2300-2310 MHz and 2390-2450 MHz band since the Amateur Service must continue to have access to spectrum sufficient to carry out its service objectives now and in the future.

"Like all other services, the amateur services have migrated to higher frequencies over the years, for several reasons: necessity, development of new system applications, and technical opportunity . . . . The 2300-2310 MHz and 2390-2450 MHz segments are the remainder of what was until recently a contiguous amateur band of 2300-2450 MHz."

The League says hundreds of experimental stations operate in the lower part of the 2300-2310 MHz segment and there are several amateur satellites operating in the segment just above 2400 MHz. Amateur-satellite use of the 13 cm

band is permitted only in the band 2400-2450 MHz in accordance with footnote 664 of the international Radio Regulations.

"The fact that 2400-2450 MHz is an industrial, scientific and medical (ISM) band, and that many domestic microwave ovens operate on the center frequency of 2450 MHz, makes the 2400-2450 MHz band increasingly difficult to use as the upper frequency limit of 2450 MHz is approached. For this reason, amateur-satellite frequency usage has been concentrated just above 2400 MHz. The amateur service is relying upon access to the 13 cm band for widespread packet radio networking at T-1 speeds (1.544 Mbit/s) and higher. Bandwidth sufficient to support a nationwide system is not available in the amateur bands below 2300 MHz."

"Accordingly, . . . the American Radio Relay League, Inc., respectfully requests that, regardless of the determination of the desirability of creation of new PCS systems, no amateur bands, including 902-928 MHz, 2300-2310 MHz or 2390-2450 MHz, be considered for primary or secondary allocation for PCS use, or for reaccommodation of displaced users from any spectrum reallocated for PCS use."

The bottom line to all of this is that the radio spectrum is an extremely scarce and valuable natural resource. There simply is not enough to go around and

once again amateur spectrum is under attack.

## Ham Radio Software

In one of our recent columns we mentioned that we had developed amateur radio license preparation software for IBM-compatible PCs. A five-disk set contains all 1931 questions, multiple choices, and answers appearing in all five amateur licenses, Novice through Extra class.

Not only are you able to study at your computer for the written exams, but you can learn the Morse code and prepare for all telegraphy tests as well. You can even take practice tests of every written and code test right at your keyboard if you wish! Your PC will automatically score the examination and highlight your weaknesses requiring further study. No guess work. You know exactly when you are able to pass. The software may even be used by VEs to prepare properly constructed examinations.

We have been absolutely overwhelmed by the response! The phone starting ringing almost immediately, and we have now shipped hundreds! Also included is a 200-page *Radio Amateur Licensing Handbook* and a complete FCC Part 97 Rule Book. Cost is \$39.95 from: The W5YI Group, P.O. Box 565101, Dallas, TX 75356, or call toll free 1-800-669-9594 to order on a credit card. 73, Fred, W5YI



**ELECTRONIC DISTRIBUTORS CO.**  
325 Mill Street • Vienna • VA 22180  
Ph 703-938-8105  
FAX 703-938-6911

For more information contact your local dealer



### Cross Needle SWR/Power Meters for All Bands



Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-101 "PEP"	1.8-150 MHz	15/150 W/1.5 kW	SO-239 (M)
CN-103 "	140-525 MHz	20/200 W	M or N type
DP-810 "Digital"	1.8-150 MHz	0-1.5 kW	M type
DP-820 "	140-525 MHz	0-150 W	N type
DP-830 "	1.8-525 MHz	0-1.5 kW/0-15 W	N type
NS-660A/PA	1.8-150 MHz	30/300 W/3 kW	M type
NS-663BM/BN*	140-525 MHz	30/300 W	M or N type

### POWER SUPPLIES



CS-201

MODEL PS14011	
Input Voltage	117 V AC ± 10%
Output Voltage	13.5 V
Output Current	12 A
Volt. Fluctuation	Less Than 1%
Ripple Voltage	Less Than 3 mV
Protection Circuit	14.2 A
Pwr Consumption	350 W max.
Dimensions	5 x 4 x 8 in.
Weight	11 lbs.

Other Models: PS304, PS120M, RS308D, RS40X

### Coaxial Switches

	CS-201 2 Position	CS-201G II 2 Position	CS-401 4 Position	CS-401G 4 Position
Frequency:	500 MHz	1.3 GHz	800 MHz	800 MHz
Connectors:	SO-239	N type	SO-239	N type
Isolation:	+60 dB	+60 dB	+50 dB	+50 dB
Power Rating:	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW



### MOBILE/BASE CROSS NEEDLE SWR/POWER METERS

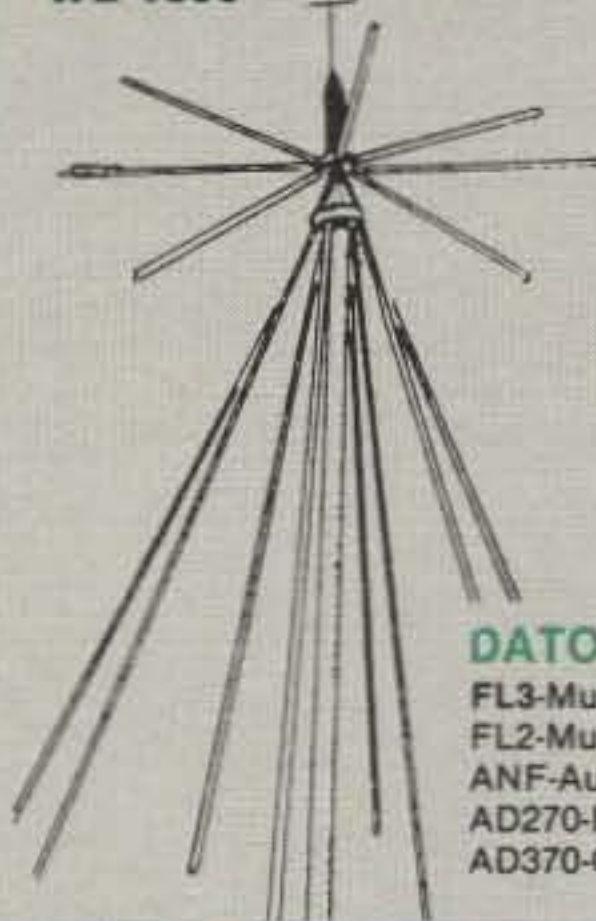


Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-410M*	3.5-150 MHz	15/150 W	SO-239
CN-460M*	140-450 MHz	15/150 W	SO-239
CN-465M*	140-450 MHz	15/75 W	SO-239
CN-520**	1.8-60 MHz	200 W/2 Kw	SO-239

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



WB 1300



The ultimate wide-band omnidirectional antenna for hours of listening pleasure. Not only a great receiving antenna, it can transmit on 50 MHz, 144 MHz, 430 MHz, 900 MHz and 1200 MHz. Stainless steel materials complete with mounting hardware. Type "N" connectors. Only 5'6" tall which enables indoor installations for apartment dwellers.

Frequency:  
Receive—25-1300 MHz  
Transmit—50, 144, 430, 900  
& 1200 MHz

Max. Pwr: 200 W  
Length: 5'6"  
Connector: "N" Type  
Mast Dia.: .98"-2"  
Weight: 2.2 lbs.  
Model: #WB1300

### DATONG ELECTRONICS LIMITED

FL3-Multi Mode Audio Filter With Auto-Notch  
FL2-Multi Mode Audio Filter (Same As FL3 w/o Auto-Notch)  
ANF-Automatic Notch Filter  
AD270-Indoor Active Antenna, 200 KHz-30 MHz  
AD370-Outdoor Active Antenna, 200 KHz-30 MHz

Also Distributors Of:



# THE NEW LOOK OF POWER

THE ICOM  
IC-4KL  
HF AMPLIFIER



Icom projects modern amplifier technology to new heights with the futuristic design of the IC-4KL HF linear amplifier. The All Solid State and Fully Automatic IC-4KL performs magnificently.

Visionary station design provides simple installation, the IC-4KL's RF/PS unit rolls conveniently into nearby corners for remote location and quiet operation. Only the handsome remote control featuring dual multi-function meters for SWR and output watts is visible to the eye.

Crucial elements such as a Built-In Automatic Antenna Tuner, Automatic Band Selection for Instant Band Switching, 100% Duty Cycle and Full CW Break-In supply the IC-4KL user the maximum advantage. Add the popular EX-627 and the IC-4KL even selects the proper antenna!



Reach the ultimate in HF signal performance, add the IC-4KL to your station. You'll soon find yourself commanding the airwaves! Supported by an unrivaled service policy, four factory service centers and a one-year warranty, the IC-4KL is far and away the leading HF amplifier available today.

For full details call the Icom Brochure Hotline at 1-800-999-9877.

CORPORATE HEADQUARTERS:  
ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004  
CUSTOMER SERVICE HOTLINE (206) 454-7619  
CUSTOMER SERVICE CENTERS: 3150 Premier Drive, Suite 126, Irving, TX 75063  
1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349  
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada  
2380-116th Ave. N.E., Bellevue, WA 98004

All stated specifications are subject to change without notice or obligation.  
All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 4KL1190

  
**ICOM**  
First In Communications

# THE LAST WORD IN PERFORMANCE

THE ICOM  
IC-781  
HF TRANSCEIVER



Nothing compares to the captivating experience of operating the finest transceiver on the market, the IC-781. The exhilaration of operating the IC-781 is matched only by the luxury of its crystal clear communications.

Designed for rigorous operation, the IC-781 is the result of extreme dedication, exceptional craftsmanship and precision engineering. The IC-781 fuses the perfect blend of features such as driving power, incredible clarity, a Multi-Function CRT Display, Spectrum Scope and Icom's exclusive DDS System to achieve unbeatable HF operation worldwide.

Whether you aspire to DX, contest or enjoy legendary performance, the IC-781 inspires countless hours of devoted attention. Backed by a service commitment second to none, four factory service centers and a one-year factory warranty, the IC-781 characterizes Icom's dedication to excellence.

**For full details call the Icom Brochure Hotline at 1-800-999-9877.**

CORPORATE HEADQUARTERS:  
ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004  
CUSTOMER SERVICE HOTLINE (206) 454-7619  
CUSTOMER SERVICE CENTERS: 3150 Premier Drive, Suite 126, Irving, TX 75063  
1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349  
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada  
2380-116th Ave. N.E., Bellevue, WA 98004  
All stated specifications are subject to change without notice or obligation.  
All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 7811190

**ICOM**  
First In Communications

CIRCLE 176 ON READER SERVICE CARD

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

## Long Life for Your Amplifier Tubes!

**H**ave you priced a medium-power transmitting tube recently? Wow! The popular 6146B is listed at \$15 in a recent ad. The larger 3-500Z runs about \$145 and the 8877 soars above \$800! You might beat these prices at a hamfest or fleamarket, but what is the condition of the bargain tube? Is it gassy? Is it a "leaker"? Does it have a warranty? Risky business buying an orphan, I say.

I note that transmitting tubes are being exported from the People's Republic of China and are for sale on the American market. I've noted the following imports: 6146B, 811A, 572B, 4CX250B family, 3-500Z, 4CX1000A, and 8877. Doubtless there are more. One of the brand names under which these tubes show up is "Penta." If in doubt, examine the tube and carton. U.S. regulations require that the country of origin be clearly marked on each imported item.

Since the imports are less expensive than the American equivalents, the buyer can save a few hard-earned dollars by purchasing them. How do the imports perform in service? How long will they last? What is the warranty? Time will tell.

If you have experience with the imported tubes, drop me a note and let me know your results.

### Filament Voltage Control

In any event, whichever brand or make of tube you use, it is a wise idea to run it under conditions that provide maximum life. One of the easiest ways to damage any power tube is to over-volt or stress the filament, or heater. The manufacturer's voltage limits should be strictly observed. A widely used limit is plus or minus 5 percent of the nominal voltage. Nominal filament voltage is carefully balanced by the tube manufacturer between maximum emission and filament life. The higher the voltage, the greater the emission and the shorter the filament life. Conversely, the lower the voltage, the less the emission and the longer the life. Too-low filament voltage, however, is damaging to the tube. The 5 percent limits avoid both of the extremes that limit tube life.

\*48 Campbell Lane, Menlo Park, CA 94025

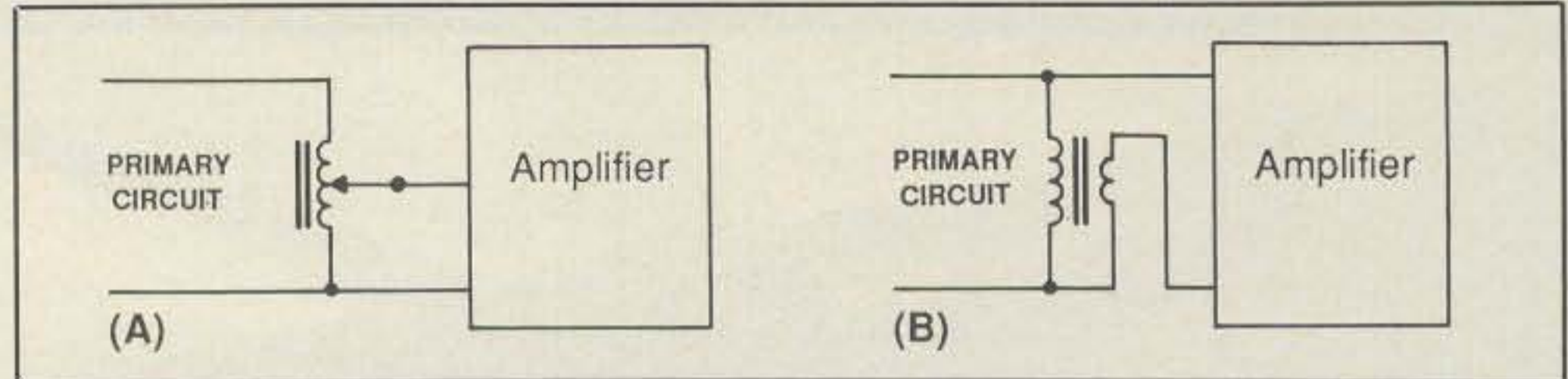


Fig. 1—Primary voltage control. (A) Variable-voltage transformer. (B) Low-voltage autotransformer boosts or reduces line voltage.

Generally speaking, in linear amplifier service it is safer to under-volt than over-volt the filament. Peak emission in linear service is less than that required in class-C service, so it is possible to run the filament on the low side of nominal value. As an example, my 3-500Zs are rated at 5 volts, plus or minus 5 percent. The filament limits are therefore 4.75 and 5.25 volts. I run them at 4.9 volts. That's only 2 percent low—a safe margin, provided I monitor my primary voltage to make sure the filament does not drop below the minimum recommended value of 4.75 volts.

Cathode-type tubes such as the 8877 and 3CX800A7 can also be run slightly below the nominal value. Again, a 2 percent drop from the nominal value is satisfactory, provided the voltage is carefully monitored.

Most public utilities hold residential primary voltage between 115 and 125. That's a range of nearly 10 percent. It is important to know your primary voltage and its fluctuations if you wish to control your secondary voltage. My primary voltage occasionally goes as low as 116 volts. Usually it runs about 124 volts. I have to keep a sharp eye on my primary circuit voltmeter.

If your amplifier has a separate filament transformer, you may be able to bring the primary leads out to a small variable voltage transformer ("Variac"). A good RMS responding AC voltmeter the calibration of which is known will permit you to monitor the line voltage. If the filament winding is on the plate transformer, you'll have to use a variable voltage primary transformer capable of handling the maximum power level of the amplifier, or use a small, low-voltage, high-current transformer to buck or add to the primary line voltage so the end result is the filament voltage you wish to achieve (fig. 1).

Calibration of your AC voltmeter is important. You can't measure a 2 percent tolerance with a 5 percent meter. A digital voltmeter can be used to do the job. If you have an old moving-coil AC meter, you possibly may be able to get it checked for accuracy at the calibration lab in a nearby university or electronics company. You can identify this type of meter as the scale is compressed at the low-voltage end.

Avoid the old volt-ohmmeters. Most of them use a DC meter and a diode rectifier to measure AC. Their accuracy is questionable.

### Grid Dissipation

Another important factor that influences tube life is grid dissipation. Husky glass tubes, such as the 3-500Z, have a large grid well separated from the filament. The maximum grid dissipation rating for the 3-500Z is 20 watts. The level for two tubes is 40 watts. Under normal SSB service average grid dissipation is well below these figures, and there is an ample safety factor if the tube is not abused by overdriving it. Continued high drive level can over-heat the grid and warp it, eventually leading to a grid-to-filament short.

High- $\mu$ , external anode power tubes such as the 8874/3CX400A7 and the 3CX800A7 by virtue of their compact design and close internal spacing have low limits of grid dissipation. The maximum rating for the 3CX800A7 grid is 4 watts. For the 8874 it is 5 watts. In both tubes grid-to-cathode spacing is very small, and the grid structure is heated by radiation from the cathode. This heating is taken into account when the maximum grid dissipation rating is established. However, if the filament is over-volted,

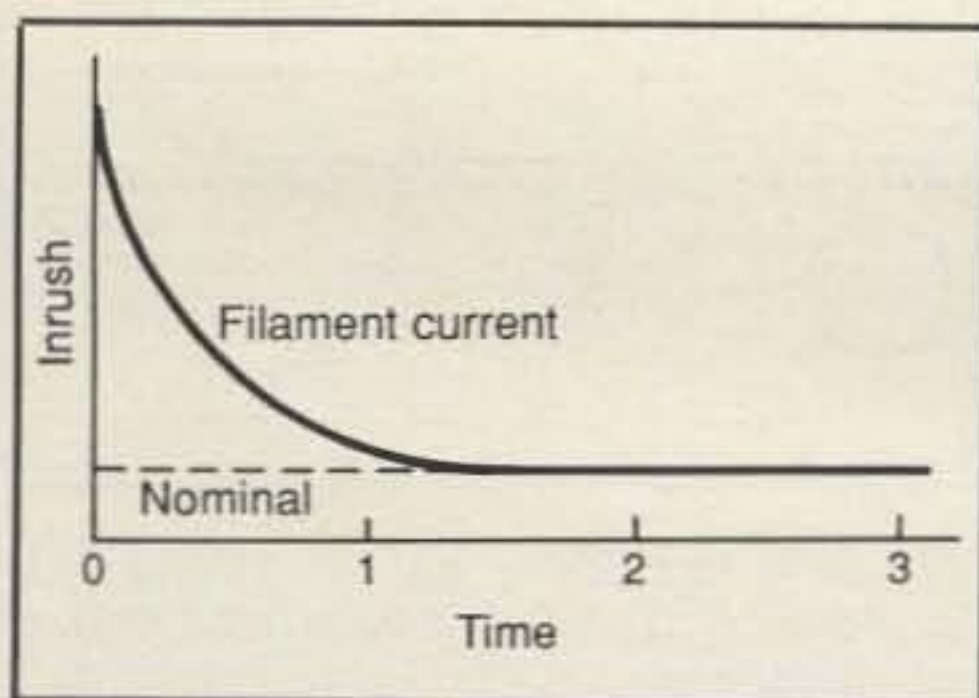


Fig. 2—The time it takes filament inrush current to drop to the nominal value is about 1 second.

filament temperature rises, and grid temperature rises accordingly. As a result, grid dissipation is diminished. Overvolting the filament and overdriving the grid is a combination to be avoided, as it is guaranteed to shorten tube life.

The 8877 has a grid dissipation level of 25 watts. Even so, the grid structure can be overheated by a zealous operator with a 100 watt exciter, plenty of speech processing, and all knobs to the right!

The bottom line is simple. Monitor your filament voltage. Hold it on the low side of the nominal value. Don't overdrive your linear amplifier. A grid current meter is a "must." Monitor it at all times. Don't forget voice peaks read on the meter are considerably lower than the peak current values because of meter inertia. Observe the maximum grid current limit established by the tube manufacturer. Don't exceed it!

### Filament Inrush Current

Tubes incorporating a thoriated tungsten filament (811A, 3-500Z, 4-1000A, etc.)—that is, the so-called quick-heating types—should be protected from filament inrush current, as should the larger cathode-type tubes such as the 3CX800A7, 8877, 4CX1000A, etc. This protection is not needed for smaller tubes such as the 6146B or 4CX250B.

When cold, the tungsten filament has about one tenth the resistance of the filament occurring at the operating temperature. Thus, when first energized, the filament draws about ten times the rated current for a portion of a second—until the filament reaches operating temperature. As the filament temperature climbs to the operating level, the inrush current quickly drops to the normal amount (fig. 2). Inrush current is only limited by the ability of the filament transformer and associated wiring to respond to the sudden current surge.

The results of excessive inrush current can be severe. Many tube manufacturers provide a maximum inrush rating for their tubes. The maximum inrush for the 3-

500Z, for example, is twice the operating current. This is 14.6 amps, so inrush current should be limited to less than 29.2 amps. However, when cold, the 3-500Z will draw nearly 145 amps for a fraction of a second, if the filament transformer and wiring are capable of supplying this enormous drain! Most small transformers "sag" under such a drastic load and tend to limit 3-500Z filament inrush current to 40 or 50 amps per tube. Unfortunately, this is not good enough.

In some amplifiers the filament winding for the power tube is placed on the same transformer core as the plate winding. Since this transformer carries the full input of the amplifier, its power-handling capacity is high and it will provide nearly the full filament inrush demand of the tube, unless precautions are taken.

The reason filament inrush current is so damaging is that the tremendous surge of energy passing through the filament creates a large magnetic field about it. This field can physically collapse the filament, or severely distort it, eventually shorting it to the grid, or causing it to break, given enough inrush cycles. The inrush current passing through the glass seals of the filament moreover can lead to severe stresses which eventually may crack the glass.

### On-off Filament Cycling

Amateur operation is particularly prone to this type of tube damage, as the amplifier may be turned on and off several times a day. This can add up to over a thousand on-off cycles of the filament per year. Broadcast stations, which rarely turn off the filaments of their power tubes, achieve much greater tube life than do the amateurs who continually cycle the tube filaments in normal operating practice.

Some time ago I heard that a large tube company had a problem with 3-500Zs, or so they thought. It seems an amateur had returned six 3-500Zs in a period of a few weeks. The tubes all had grid-to-filament shorts. The unhappy amateur repeatedly demanded replacements, as the tubes were within warranty. What was going wrong? Why was this particular fellow having so much grief? Did he have parasites in his amplifier? Was he overvolting the filaments?

What to do? Why would one operator have so much tube trouble when other operators were reporting good tube life? The 3-500Z was a reliable tube and had a good track record.

There must be some problem that was not understood.

The engineer concerned with the tube called the amateur. He turned out to be a nice fellow, puzzled at what was going on. He was queried about his amplifier—a well-known, popular make, well engi-

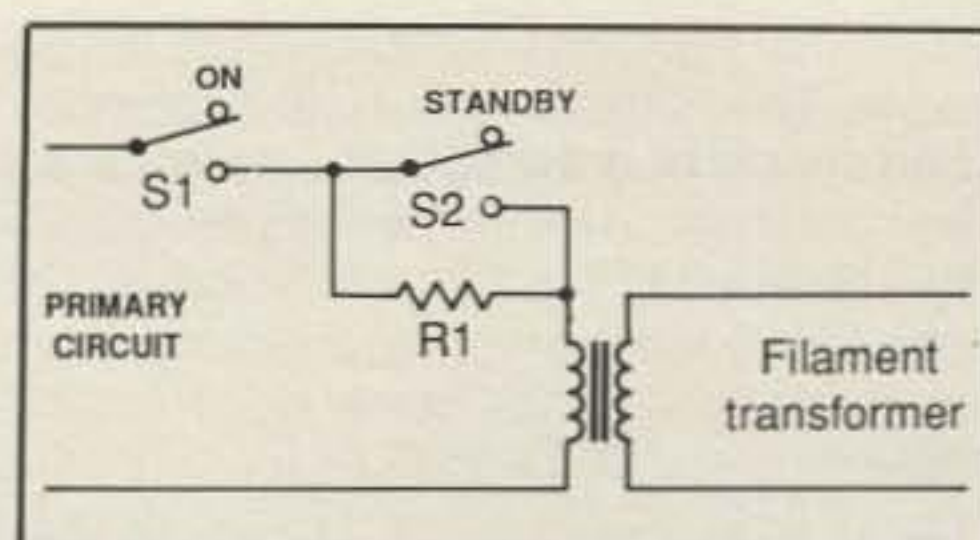


Fig. 3—Inrush protection is provided by switch S2, which is closed a few seconds after S1. R1 is chosen to provide about 30 percent normal filament voltage.

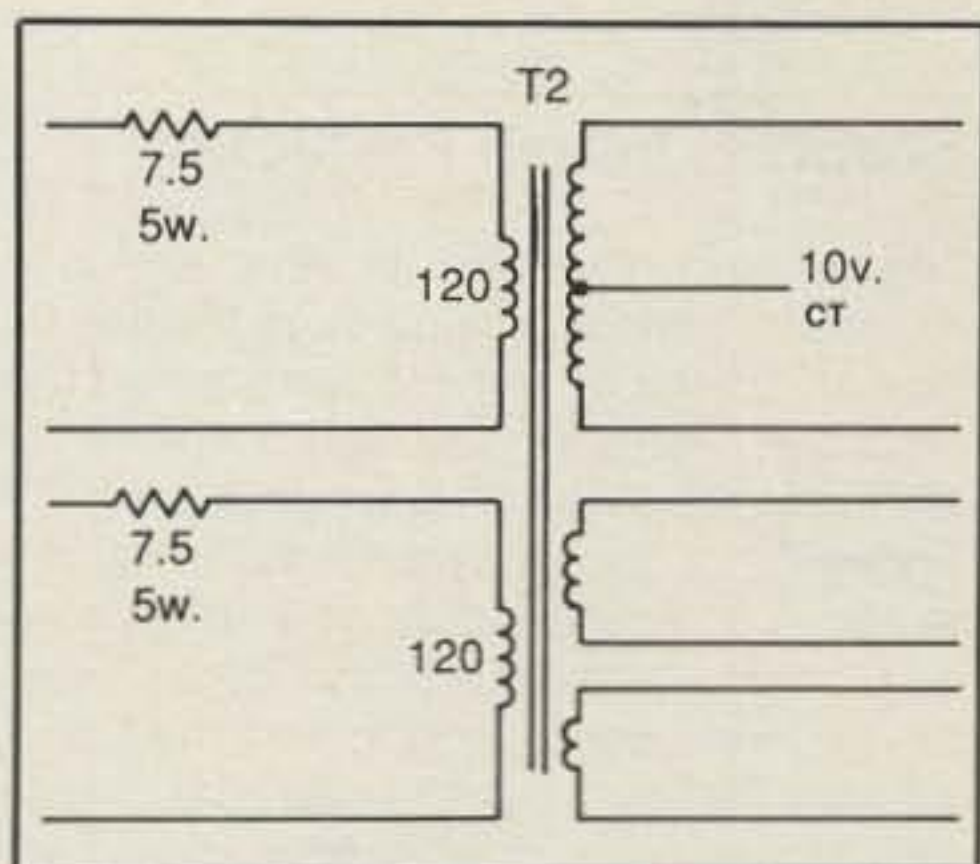


Fig. 4—Filament control resistors installed in the TL-922A amplifier.

neered, with no known parasitic problems. The amateur had measured his line voltage. It seemed okay.

Toward the end of the conversation he boasted to the engineer that he was saving a lot of money on his electric bill. The primary circuit of his amplifier was connected via a big relay to the VOX circuit of his transceiver! Everything was off until the VOX was actuated! Since the tubes were quick-heating, they were turned on and off with the VOX! During a QSO the tubes may have gone on and off a hundred times!

The engineer patiently explained that it was not good engineering practice to turn the tubes on and off with the VOX. He drew the analogy of turning an electric light on and off. Bulbs that were left on lasted longer than those subjected to multiple on-off cycles.

He pointed out that the money the amateur saved in electricity was eaten up by the expenditure in glassware!

Sure enough, a year or so later a note was received from the amateur saying the tubes were operating okay. He had removed the filaments from the VOX circuit and all was well!

### Standby Operation

Well, amateurs cannot afford to let their amplifier filaments run 24 hours a day in standby mode. Indeed, there are good

technical reasons why this should not be done. The filament of a tube in standby condition (not drawing plate current) can be "poisoned" by long periods of inactivity. This sounds like a no-win situation. On one hand, keep on-off cycles to a minimum. On the other hand, don't let the tube sit in standby condition for long periods of time.

There's no hard and fast answer. I usually turn off my amplifier if I think it will not be used during the next hour. Other operators set a two hour limit on standby condition. There's no magic answer. But I wouldn't let my amplifier sit in standby for hours at a time.

## Filament Inrush Protection

The home-builder can do several things to protect his tubes against excessive filament inrush current. He can start up the amplifier filaments through a series resistor placed in the primary circuit (fig. 3). This resistor reduces the filament voltage to about 30 percent of normal. It is shorted out manually, or by a time-delay relay, after a few seconds. In addition, the smallest size filament transformer that can do the job without overheating should be

used. This will restrict the current the filament transformer can supply during a current surge.

It is difficult to measure filament inrush current, and it may be a tough job to retrofit a time-delay circuit in an existing amplifier. The circuit can be fitted externally, however, so that both filament and high voltage are step-started. That will help to protect the high-voltage diodes and capacitors as well as the tube filaments.

## A Self-Protecting Filament Circuit

My line voltage is often quite high, so I took the precaution of measuring the filament voltage in my amplifier (an early model Kenwood TL-922A) at the tube socket. It measured 5.23 volts key-up, almost outside the upper voltage limitation of the 3-500Z. This left little margin for error, as I knew my line voltage could soar a few volts during the day. The solution was to place primary filament voltage dropping resistors inside the amplifier (fig. 4). Kenwood had thoughtfully provided a few empty terminals on a nearby strip, so the resistors are easily retrofitted into the amplifier. The resistors drop the filament

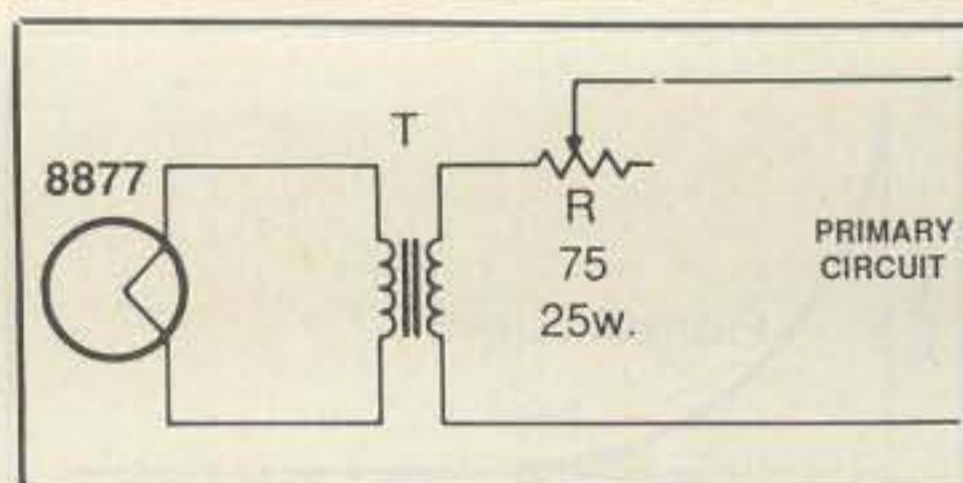


Fig. 5—T is a 6.3 volt, 10.5 amp transformer. Adjust R to provide 5 volts at tube socket. Slider-type resistor is recommended.

voltage to normal and also reduce filament inrush current to within limits. The normal "sag" of the filament transformer, plus the resistors, does the job.

## Using a Higher-Than-Normal Voltage Filament Transformer

This brings up an interesting solution to filament inrush current. It was applied to an 8877 amplifier. The 8877 filament requires 5 volts at 10.5 amps. The filament is tungsten, encased in a cylindrical cathode. Maximum inrush current can be as high as 100 amps, if precautions are not taken. In most cases inrush current is considerably less due to the "sag" of the filament transformer under overload. Even so, it can be higher than the recommended maximum value of 20 amps.

A simple solution is to use a 6.3 volt, 10.5 amp filament transformer, with an adjustable power resistor in the primary circuit to reduce the loaded filament voltage to 5.0 volts (fig. 5) at the tube socket. When the tube is turned on, the IR-drop across the primary resistor prevents a high level of inrush current.

Conclusion: Proper control of filament voltage can lengthen the life of your expensive amplifier tubes. Remember: An ounce of prevention is worth a pound of cure!

## The Dead Band Quiz

As the name implies, the Dead Band Quiz is something to occupy your mind when the band is dead! The quiz may cover any subject—amateur radio, mathematics, literature, or whatever. Some of the quizzes are easy, while others are more difficult. Here's a medium-tough quiz for you.

In the book Ronnie Martindale says, "Love to Ann, mind." In the made-for-TV movie (starring Alec Guinness) Ronnie says, "Love to Ann. Everybody's love to Ann."

What is the name of the work? Who is Ann? To whom did Ronnie make this remark? If you know, mail your answers on a QSL card to me and I'll list the sharp-eyed readers/viewers of this fascinating story in an upcoming column. Good luck!

73, Bill, W6DDB

### "ONLINE" U.S. CALL DIRECTORY

Hamcall service gives you all hams via your computer & modem. Updated each month! Only \$29.95 per year. Unlimited use - you pay for phone call.

#### BUCKMASTER PUBLISHING

Route 3, Box 56  
Mineral, Virginia 23117  
703/894-5777 visa/mc 800/282-5628

## BLACK DACRON® POLYESTER ANTENNA ROPE

- UV-PROTECTED
- HIGH ABRASION RESISTANCE
- REQUIRES NO EXPENSIVE POTTING HEADS
- EASY TO TIE & UNTIE KNOTS
- EASY TO CUT WITH OUR HOT KNIFE
- SIZES: 3/32" 3/16" 5/16"
- SATISFIED CUSTOMERS DECLARE EXCELLENCE THROUGHOUT U.S.A.

LET US INTRODUCE OUR DACRON® ROPE TO YOU • SEND YOUR NAME AND ADDRESS AND WE'LL SEND YOU FREE SAMPLES OF EACH SIZE AND COMPLETE ORDERING INFORMATION.

Dealer Inquiries Invited

MANUFACTURED BY  
**synthetic textiles, inc.** 2472 EASTMAN AVE., BUILDING 21  
VENTURA, CALIFORNIA 93003  
(805) 658-7903

CIRCLE 91 ON READER SERVICE CARD

## C.A.T.S.

Rotors, Parts and Repair Service  
Reconditioning Large or Small

American Made Rotors  
Repairs-\$15.00\*  
Rebuilds-\$35.00\*

All parts in stock for immediate delivery.  
New units for sale. Trade-ins welcome.

## C.A.T.S.

7368 S.R. 105 Pemberville, OH 43450  
Call N8DJB at (419) 352-4465 10:00-5:00

\*LABOR ONLY-PARTS & SHIPPING ADDITIONAL

## ASSOCIATED RADIO

8012 CONSER BOX 4327  
OVERLAND PARK, KANSAS 66204

CALL 913-381-5900

FAX 913-648-3020

## EVERY DAY A HAMFEST

WE'LL BUY YOUR EXTRA RIG STATIONS - ESTATES ETC.

## BUY—SELL—TRADE

All Brands new and reconditioned.



Send \$3.00 for our current catalog and wholesale sheet.



# EEB The Professional Amateur Store

Minutes From  
Washington, D.C.



NOVEX HAND SET

- DTMF dial pad
- Back lit dial
- Speaker vol. control
- Cellular look
- Wired for current 8-pin mic.

ICOM, Kenwood, Yaesu

Others Call

\$89.95 + UPS.

## NOVEX SPEAKER MIC.

DMC537I  
DMC537K  
DMC537Y



ICOM, Kenwood,  
Yaesu

- Hi quality audio
- Hi-lo audio switch
- 3.5 mm earjack
- Rotating clip
- Split plugs allows use as mic. or speaker

• Why pay more? \$24.95

## CUSHCRAFT

AR270 VHF/UHF	\$74.95
AR/2AR220/AR450	29.95
ARX2 R. Ranger	36.95
ARX2B/ARX220B +	
ARX450B R.R.IIs	43.95
AR6/AR10 Ringos	43.95
124WB Boomer 4 el	43.95
215WB Boomer 15 el	95.95
A147-4 FM yagi	36.95
A449-6 FM yagi	35.95
AOP-1 Oscar pkg	183.95
TEN3 10M 3 el	99.95
A3S TriBand 3 el	299.95
A4S TriBand 4 el	373.95
AP8 HF Vert	172.95
R5 HF Vert	246.95

AND MUCH, MUCH MORE!

## LARSEN

NMO150 2M, Mobile	\$28.95
NMO220 + NMO450	28.95
NLA150 2M, Mobile	28.95
NLA220 + NLA450	28.95
LM150 2M, Mobile	25.95
LM220 + LM450	25.95
NMO2/70 Dual	39.95
NLA2/70 Dual	38.95
NMOMM Mag. Mt.	20.95
NLAMM Mag. Mt.	19.95
LMMM Mag. Mt.	17.95
NMOK Perm. Kit	12.95
NLAK Perm. Kit	9.95
KD4270 Dual Duck	24.95

AND MUCH, MUCH MORE!

## HUSTLER

6BTV 6 band trap vert	\$147.95
5BTV 5 band trap vert	125.95
G7-144 Fix stat. 2mt colinear	125.95
MO-1/MO-2 mobile masts	22.95
RM10/RM15 10m/15m resonator	12.95
RM10S/RM15S super resonator	17.95
RM20/RM20S std. & super resonator	16.95/22.95
RM30 20mt. std. resonator	17.95
RM40/RM40S std. and super resonator	18.95/26.95
RM75/RM80 75 or 80 std. resonator	19.95
RM75S/RM80S 75 or 80 super resonator	37.95
BM-1 bumper mt.	16.95
SSM-2 stainless ball mt.	18.95
SSM-3 spring	17.95
QQ2 quick disconnect	15.95
FX2 2mt 5/8 mag. mt.	24.95
HOT trunk mt. w/swivel ball	17.95
MO3 mobile mast	17.95
MO4 mobile mast	19.95
RM12 12m standard	12.95
RM17 17m standard	16.95

AND MORE!

## BUTTERNUT

HF6VX 80-10 vertical kit	\$149.95
HF2V 80-40 vertical	139.95
RMKII roof mtng. kit	52.95
TBR160S 160m add on	54.95
MPS mtng post sleeve	7.95
HF5B HF mini beam	232.95

## VAN GORDEN

PD8010 Dipole	\$35.95
PD8040 Dipole	33.95
PD4010 Dipole	31.95
D10 10M Dipole	23.95
D40 40M Dipole	26.95
D80 80M Dipole	27.95
Allbander	28.95
G5RV 3.5-30 MHz	49.95
Balun 1:1/4:1	14.95

Call for VG accessories and for more antennas.

## AEA

ISOLOOP *New*	\$299.95
Isopole 144 2M	55.95
Isopole 440 UHF	83.95

## PRO-AM

605 Ball mount	\$18.00
PHF10 10m resonator	18.95
PHF15 15m resonator	18.95
PHF20 20m resonator	18.95
PHF40 40m resonator	18.95
PHF75 75m resonator	19.95
PHF160 160m resonator	69.95
AB5 5 band kit	89.95
PAQM mini mag 2m	21.95

## UNTEENNA

CR2AM 2M mag. mt.	\$44.95
CR2AP 2M perm. mt.	42.95
CR2/4AM dual band mag. mt.	59.95
CR2/4AP dual band perm. mt.	57.95

## ROHN

20G 10' sect.	\$52.95
20AG top sect. 9'	74.50
25G 10' sect.	68.00
25AG2 top sect. 9'	85.50
45G 10' sect.	161.00
45G2 top sect. 9'	176.25
AS25G access shelf	28.00
AS45G access shelf	70.00
TB-3 thrust bearing	71.00
M200 10' mast	18.00
SB25G short base	32.70
SB45G short base	70.20
EF2545G gin pole	396.00

AND MORE!

## CABLE & CONNECTORS

Belden 9913 Low Loss	per/ft.	.69 cts.
RG213 (4063)		.39 cts.
RG8/U (9095) Extra Flex.		.45 cts.
RG8X (9091) Mini		.22 cts.
RG59/U 72 OHM		.14 cts.
PL259/Silver		.99/1.49
N-Male for 8/U 8261		4.79
BNC(M)UHF(F) 2900		5.55
Low Loss eqv 9913		.69 cts.

## HY-GAIN ROTORS & ANTENNAS

\*SPECIAL HOLIDAY PRICING\*

		Rotating	Brake	
Model	Sq. Ft.	TQ	TQ	CALL FOR SPECIAL PRICES
T2X	20	83	750	
HAM IV	15	66	417	
TH7DX3	7 Ele	Triband	SS.	

LIMITED STOCK



## CREATE DESIGN

CreateRoof Towers Constructed Of High Grade Aluminum With Galvanized Steel Bracing For Added Stability And Strength. Will Easily Accommodate Your Antenna Requirements. Three Sizes Of Roof Towers Will Support VHF Antennas. HF Tri-Banders. And Oscar Systems. Rotators Easily Mount Inside The Tower. An Optional Thrust Bearing (CK46) is Recommended. Specifications Are Subject To Change Without Notice Or Obligation.

\*Subject To Availability



CR-30

Model	Height	Maximum Antenna Wind Load in FT 2	Base Width	Max. Vert. Load Lbs.	Tower Weight Lbs.	CAPLICE OSR
CR-18	5'10"	21 @ 90 MPH	31 1/2"	440	28	
CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	
CR-45	14'9"	23 @ 90 MPH	39"	881	55	
CK-46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2 1/2"					

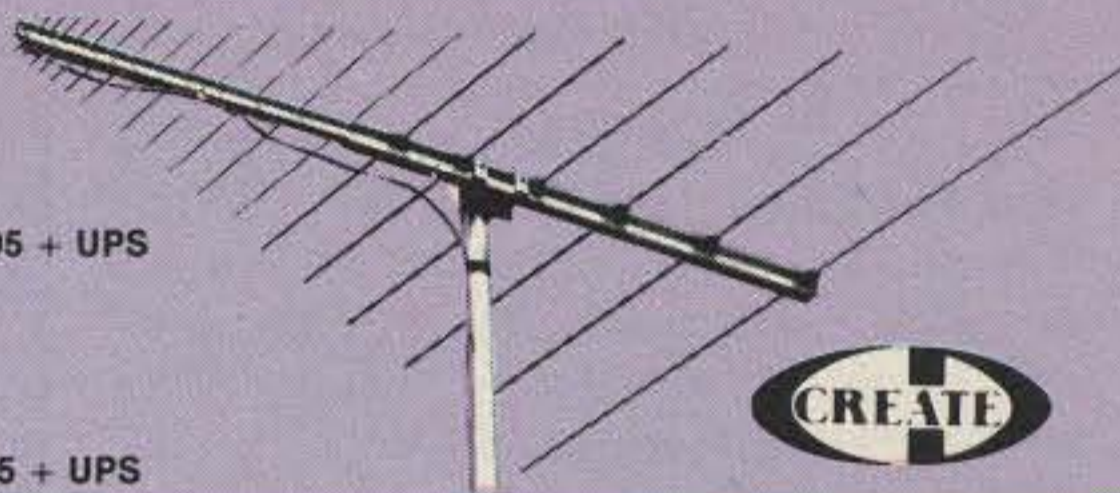
For Safety's Sake All Towers Should Be Guyed. \*U.P.S. Not Included

## CLP 5-130-1

- 50-1300 MHz
- 23 Elements
- Longest 9'10"
- Boom 5'9" \$239.95 + UPS

## CLP 5-130-2

- 108-1300 MHz
- 19 Elements
- Longest 4'6"
- Boom 4'6" \$139.95 + UPS



## NEW EMOTO ROTATORS NOW IN U.S.

- World's Finest Rotators Are Here
- 80% Of All Hams In Japan Use Emoto
- Highest Quality—Special Features—Compare

Model	Sq. Ft.	Roto TQ	Brake TQ	Note	Sale
105TSX	10.9	37 ft.#	215 ft.#		\$193
747SRX	21.8	50	502	H.S.	416
1105MSX	27.3	57	717		534
1105MSAX	27.3	57	717	P.S.	599
1200FXX	27.3	143	1290	H.S.	618
1300MSAX	32.7	215	1792	P.S.	1,061
1800FSX	38.2	287	2150	P.S.	3,055

H.S. HiSpeed P.S. Pre-Set #10 SASE Full Line Details

## DATONG

- FL3 Multi Mode Audio Filter w/Audio Notch
- FL2 Multi Mode Audio Filter
- ANF Automatic Notch Filter
- AD270 Indoor Receiving Antenna 200 kHz-30 MHz
- AD370 Outdoor Receiving Antenna 200 kHz-30 MHz

CALL FOR PRICES

## ICOM

IC735 HF Xcvr	IC781 HF Xcvr
IC751A HF Xcvr	IC228H VHF Mobile
IC765 HF Xcvr	IC2SAT 2m HT

AND MUCH MORE!

## KENWOOD

TS140S HF Xcvr	TM231 VHF Mobile
TS440S HF Xcvr	TM731 VHF/UHF Mob.
TS950S/D HF Xcvr	TH25AT 2m HT

AND MUCH MORE!

## YAESU

FT747GX HF Xcvr	FT212RH VHF Mobile
FT757GXII HF Xcvr	FT411E 2m HT
FT767GX HF Xcvr	FT470 VHF/UHF HT
FT1000/D HF Xcvr	

AND MUCH MORE!  
CALL FOR PRICES

**YAESU**  
**ICOM MFJ**  
**BIRO**  
**ASTRON**  
**ARRL**  
**DAIWA**  
**ALINCO**  
**KENWOOD**



ELECTRONIC EQUIPMENT BANK  
323 MILL STREET N.E.  
VIENNA, VA 22180

ORDERS: 800-368-3270  
LOCAL TECH: 703-938-3350  
FAX: 703-938-6911

- PRICES SUBJECT TO CHANGE
- PRICES DO NOT INCLUDE FREIGHT
- SORRY NO CODS
- RETURNS SUBJECT TO 20% RESTOCK FEE

## "HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

### Printed Material—Part III of IV

**H**ere is the third segment of this four-part article. Each segment includes data which is helpful to newer amateurs.

**KA3B 6 Meter Report.** Harry Schools publishes a comprehensive monthly report of worldwide 6 meter activities. Review of a recent issue revealed that it is filled with 12 pages of information for 6 meter operators. It includes operating news from all continents, beacon update facts from four continents, new equipment news, swap listings, schedule requests, and European QSL data. The first-class-mail annual subscription rate is \$20 to Canadian and USA addresses. The DX airmail rate is \$25 per year. The address is *The KA3B 6 Meter Report*, 1606 South Newkirk Street, Philadelphia, PA 19145.

**K3UKW Used Equipment List.** Anthony Musero, K3UKW, publishes a free used-equipment list of amateur radio equipment and accessories. He buys, sells, and trades items. He has offered this service for 18 years. If you want a copy of his current list, send a self-addressed, stamped envelope with your request. The address is 1609 South Iseminger Street, Philadelphia, PA 19148-1010. His telephone number is 215-271-8898, and it is best to call him from 7-9 PM Eastern time weekdays, or daytime during a weekend.

**K8BZ Beam Headings.** Steve Woelfing, K8BZ, offers a set of beam headings to more than 375 locations (relative to your location) for \$8. It includes short (direct) and long (reverse) path bearings, plus distances to all DX points. Send an SASE if you want a sample sheet. His address is 202 Hockaday, Gladwin, MI 48624.

**Larsen Antennas Catalog.** Their catalog is filled with their superb line of base station, mobile, and portable antennas, most of which are for use in the VHF (30-300 MHz) and UHF (300-3000 MHz) ranges. Types of antennas are illustrated and explained. Terms and identifications are detailed. Mounting styles and series designations are covered by illustrations and text. Illustrations and tables provide easy comparisons between commonly used coaxial cables and coax connectors. Couplers, hardware, hole drill/saw, power distributors, and radio mounts are

\*45527 Third Street East, Lancaster, CA 93535-1802



Here is 56-year-old Andy Andrews, KC4OSN, of Pulaski, Virginia. He uses a Drake TR-4 with 10 and 40 meter dipoles. Andy has had many DX and domestic contacts. He is going to move to Hillsville, Virginia in the Blue Ridge Mountains, where he will have plenty of room to erect antennas. Andy thanks R.D. Blevins, KT4Z, for giving him a good start in amateur radio.

some of the accessories shown in their catalog. The catalog and its associated price list can be requested by writing to Larsen Electronics, Inc., P.O. Box 1799, Vancouver, WA 98668.

**Long Skip.** The Canadian DX Association publishes this monthly newsletter for its members. A sample copy can be purchased for \$2, or 4 IRCs. The address is Box 717, Station Q, Toronto, Ontario M4T 2N7, Canada.

**Merchant Marine Radio Operating Synopsis.** Ray Redwood, KA5HCX, has written a book that covers merchant marine radio operating from its infancy to the present time. The name of his 376-page book is *QTC* (I have a message for you). Ray devoted four years of his life to preparing this book. The table of contents lists 49 subjects. The book includes 108 illustrations, with more than half of them being photographs. The contributions of de Forest, Fleming, Hertz, Marconi, Maxwell, Tesla, and other pioneers are covered in Ray's book. Radio aspects of the Morro Castle and *Titanic* disasters make very interesting reading. Ray's book

sells for \$8.95 and \$15 each for paperback and hardbound versions, respectively. An additional \$3 is required to pay shipping charges. The address is Sequoia Press, 2502 Cockburn Drive, Austin, TX 78745 (telephone 512-442-1311). This book is aimed at the general public; you do not require a knowledge of radio to enjoy reading it. The demise of marine radio operators started a few years ago, and the code operating portion of it will become almost extinct when the Global Maritime Distress and Safety System starts to be implemented during 1993. Ray's book provides a fine history of this disappearing profession.

**MFJ Catalog.** The 16-page MFJ 1991 Ham Catalog is available free to people who request it. You can call the toll-free number 800-647-1800 to request this catalog, or it can be requested by writing to MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762.

**Military Equipment Manuals.** Operation and maintenance manuals for several types of military communications equipment can be bought from D. Testa, P.O. Box 9064, Newark, NJ 07104. Write for details and include your SASE.

**Morsum Magnificat.** The December 1989 *CQ* includes an item I wrote about *Morsum Magnificat*, which I have found to be a superb publication about code. United States addressees can now use Access, Eurocard, MasterCard, or Visa to pay *MM* subscriptions by credit card. The cost of a one-year subscription is \$14 or \$17 for surface or airmail delivery, respectively. Subscriptions (with payments) should be mailed to *Morsum Magnificat*, 8A Corfe View Road, Corfe Mullen, Wimborne, Dorset BH21, England. Show your card number, card expiration date, and name (exactly as it appears on your credit card). If you are a code enthusiast, I am confident you will enjoy every issue of *Morsum Magnificat*.

**National Contest Journal.** Tom Taormina, K5RC, edits the *National Contest Journal*. He is a contest operator with three decades of experience. His address is Box 800228, Houston, TX 77280-0228 (telephone 713-461-8873). Contest information can be sent to his home address. The *NCJ* one-year (6 issues) domestic (USA) subscription rate is \$10. Subscriptions should be mailed to



- Confused by today's electronics?
- Looking to learn and develop your building skills?
- Want to explore beyond Amateur communications?

**CALL  
TOLL FREE  
(800) 457-7373**

**COMMUNICATIONS QUARTERLY** THE JOURNAL OF COMMUNICATIONS TECHNOLOGY

Collector's Edition

Fall 1993

Just \$27.95 for a one year charter subscription (USA only.\* )  
Save \$2.00 off the regular yearly rate.

COMMUNICATIONS QUARTERLY will push the technical envelope to the limit. Articles will be selected from only the very best available. State-of-the-art electronics like direct digital synthesis, digital signal processing and computer control will be fully investigated and explained so that you can take advantage of these new technologies. COMMUNICATIONS QUARTERLY will also have articles that cover high speed data communications, the latest in antennas using computer designed models, plus much more. COMMUNICATIONS QUARTERLY is the publication you've been looking for. Challenge yourself technically. Stay up-to-date with all the latest developments in the fast paced world of electronics.

**Act now. Subscribe Today!**  
\*Foreign surface \$39.95 per year.  
Air mail rates upon request.

■ A Communications System Using Gunplexer Transceivers  
 ■ Digital Signal Processing: Working in the Frequency Domain  
 ■ The Enhancement of HF Signals by Polarization Control  
 ■ High Dynamic Range Receiver  
 ■ Basic Concepts of Scattering Parameters  
 ■ Transmitter IMD Measurements on Utility-Grade Spectrum Analyzers  
 ■ Interface Your Computer to the "Poor Man's Spectrum Analyzer"  
 ■ Super Narrowband Techniques Equalize Power Inequity on 1750 Meters



**COMMUNICATIONS QUARTERLY**

a publication of CQ Communications Inc., 76 North Broadway, Hicksville, NY 11801 USA

NCJ Circulation, ARRL, 225 Main Street, Newington, CT 06111.

**National Electronic Trading Post.** If you want to advertise items you have for sale (or need), you can do so in the *National Electronic Trading Post*. Personal (non-business) advertisements are run at no charge. This flyer is published two times per month. A one-year domestic (USA) third-class-mail subscription costs \$12, whereas \$17 pays for a first-class domestic subscription. Subscriptions for Canadian and Mexican addresses cost \$17 per year. Advertisements are separated into 23 categories. Subscription requests should be mailed to *National Electronic Trading Post*, RD 1, Box 1201, Ruffs-dale, PA 15679-9707.

**Nuts & Volts Magazine.** This magazine is of interest to people who want to buy or sell any type of electronic equipment. The domestic subscription rates are \$12 (1 year) and \$21 (2 years) for third-class mail, and \$20 per year for first-class mail. The address is P.O. Box 1111, Placentia, CA 92670. Their toll-free ordering (only) number is 1-800-783-4624.

**Palomar Engineers.** Palomar Engineers offers an RFI (radio frequency interference) tip sheet and a catalog at no charge. Their address is Box 455, Escondido, CA 92025 (telephone 619-747-3343).

**Pasternack Enterprises Catalog.** Pasternack Enterprises is a manufacturer of coaxial products. Their catalog lists an outstanding assortment of A/B coaxial switches, amplifiers, attenuators, breakout cables, cable assemblies (all connector combinations in several lengths of cables), coaxial cables, coaxial-cable cutting tool, coaxial-cable stripper, connector adapters, connectors (all types with various quantity discounts), crimping tools, detectors, impedance-matching pads, power dividers, terminations/shorts, and waveguide-to-coax adapters. Their address is Pasternack Enterprises, Coaxial Products Division, P.O. Box 16759, Irvine, CA 92713 (telephone 714-261-1920).

**Pirate Radio Stations.** Unauthorized radio broadcasting has existed since before the start of authorized radio broadcasting. *Pirate Radio Stations* is a 182-page book about such stations and their activities. As an amateur radio operator, I do not condone illegal transmissions. However, I believe radio enthusiasts should know as much as possible about all facets of radio. This book provides an in-depth introduction to worldwide renegade broadcasting. The price is \$12.95, plus shipping charges. The book can be purchased from Tab Books, Blue Ridge Summit, PA 17294-0850. If you would like to hear such a broadcast, you could request a newsletter showing broadcast times and frequencies, which is what I have done. A few sources of such news-

letters are AM Press/Exchange (Route 1, Box 281, Woodlawn, TN 37191), EPB-Panaxis Productions (P.O. Box 130, Paradise, CA 95967-0130), and 2600 Enterprises (Box 752, Middle Island, NY 11953-0752). It is advisable to include a self-addressed, stamped envelope with such a request.

**Pocket-Size Reference Data Book.** Sequoia Publishing offers a 3.2 by 5.4 by .6 inch 480-page general-reference data book that sells for \$11.95 each prepaid (USA). The section headings are air, automotive, cable/chain/rope, carpentry/construction, chemistry/physics, computers/printers, conversion factors (3200 of them), electrical, general information (24 lists), geology, glues/solvents/paints/finishes, hardware, mathematics, mining/milling, money/currency, physical constants, plumbing/pipe, steel/metals, surveying/mapping, tools, water, weights of materials, and welding. This book contains information helpful to engineers, handy-men, students, and travelers. It includes a lot of material that is of interest to amateurs. Its 18-page index enables you to easily locate desired data. The "Pocket Ref" can be ordered from Sequoia Publishing, P.O. Box 620820, Littleton, CO 80162.

**QEX.** The ARRL experimenter's exchange publication is *QEX*. It is edited by Paul Rinaldo, W4RI, and it is published monthly. The annual (12 issues) subscription rates are \$10 to ARRL members and \$12 to non-members. The ARRL's address is 225 Main Street, Newington, CT 06111.

**QSL Managers List.** Lars Erik Bohm, SM5CAK, and Osten Magnusson, SM5DQC, publish a list of past and present QSL managers. Its title is "The Most Complete QSL Managers List Ever Printed," which is accurate. Copies of the basic (1963-1986) list can be purchased from Bill Early, WA9AEA, P.O. Box 401, McHenry, IL 60050-0401. The price to USA addressees is \$25 each, whereas the cost to non-USA addressees is \$35 each. The 1987-1989 updating supplement is also available from Bill at \$10 (USA) or \$15 (non-USA) per copy. The full-size supplement can be purchased from Lars for \$12, whereas a half-size version of the same information is sold by Lars for \$8.

Lars also publishes a monthly QSL managers data sheet which is priced at \$20 for a one-year, prepaid, airmail subscription.

It is okay to send checks to Bill, but please do not send them to Lars because Swedish banks charge a lot to cash them. Cash is required. The address is L.E. Bohm, Stora Angesby, S-59196, Motala, Sweden.

**Radio in the 1920s!** Sixty-five years of amateur radio and broadcasting experience provided the basis for many interesting stories in this radio journal by

W9CRC. The price is \$8.90 prepaid. The address is R & R Press, 1011 Linda Drive, Kokomo, IN 46902.

**A Radio Journal 1912-1940.** Russ Rennaker, W9CRC, has written a 69-page history of radio during the 1912-1940 time span. The address is R & R Press, 1011 Linda Drive, Kokomo, IN 46902.

**Radiokit Catalog.** The Radiokit catalog lists items which are of interest to all amateurs. It is particularly useful to experimenters and homebrewers. It advertises antennas (plus their accessories, coils, and rods), baluns, cabinets/chassis/panels, capacitors, coaxial cables/switches/relays, connectors, dials/drives/couplers, diodes, ferrites/beads/toroids, filters, hardware, inductors/chokes, integrated circuits, kits/modules, knobs/insulators, linear amplifiers, potentiometers, resistors, rotators/control cables, S-meters, sockets, terminals, transformers, transistors, transmitting tubes, plus wire/cable. The catalog price is \$1 and the address is Radiokit, P.O. Box 973, Pelham, NH 03076.

**The Radio Works Catalog.** This catalog is filled with top-quality products being sold at low prices. It features baluns, cable, connectors, and many high-performance wire antennas. Jim Thompson, W4THU, continually expands and improves his product line. The catalog price is \$2. The address is The Radio Works, Box 6159, Portsmouth, VA 23703. Their telephone number is 804-484-0140. Their FAX number is 804-483-1873.

## Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Any single item is available at no charge to anyone who supplies a self-addressed and stamped envelope. When a single item is being requested, it is advisable to supply a large (at least 9 by 12 inch) envelope and to include a couple of extra stamps (loose in your envelope) in case extra postage is required. Some items are long. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

# REMEMBER

MARCH 15, 16 AND 17 IS HAMCATION FUN TIME

AT THE

NEW FAIRGROUNDS IN ORLANDO, FLORIDA.

Commercial Exhibitors  
Seminars  
FCC Exams

Swap Tables  
Meetings  
Tailgating

Lots of RV Parking and Handicap Parking on the fairgrounds.

**LOWER** prices

Advance Tickets \$6.00, all postmarked after February 21 and at the door \$8.00

Swap Tables \$25.00-Tailgating \$10.00

**ARRL STATE CONVENTION**

CALL (407) 657-9052 FOR YOUR RESERVATION **Now**



Sponsored by  
The Orlando Amateur Radio Club  
P.O. Box 547811  
Orlando, FL 32854-7811

CIRCLE 80 ON READER SERVICE CARD

## TNR The Battery Store

If You're Serious About Radios  
You Want The Best Batteries!

### Sanyo Battery Inserts

#### ICOM

BP-2.....\$14.00	PB 2500.....\$18.00
BP-3.....15.00	PB 2600.....18.00
BP-5.....21.00	PB 2400 (Tabs) 15.00
BP-7.....23.00	PB 2100.....12.00
BP-8.....21.00	

#### Kenwood

### Complete Replacement Battery Packs

#### Yaesu

FNB-1.....\$24.00	FNB-11.....57.00
FNB-2.....24.00	FNB-12.....47.00
FNB-4.....58.00	FNB-14.....48.50
FNB-10.....37.00	FNB-17.....39.50

#### ICOM

BP-2.....\$36.50	BP-7.....65.00
BP-3.....35.50	BP-8.....65.00
BP-5.....42.50	BP-11.....65.00

Add \$3.00 Shipping

### SPECIAL!

Sanyo "AA" Nicad Batteries.....\$1.50 each

Complete Line of Sanyo Nicads, Gell Cells,  
Lithium, Cordless Telephone, Camcorder and  
Computer Batteries

MasterCard VISA FREE CATALOG

**1-800-346-0601**

FL Residents Add 6% Sales Tax

TNR Technical, Inc.

279 Douglas Ave., Suite 1112

Altamonte Springs, FL 32714

(407) 682-4311

USE  
YOUR

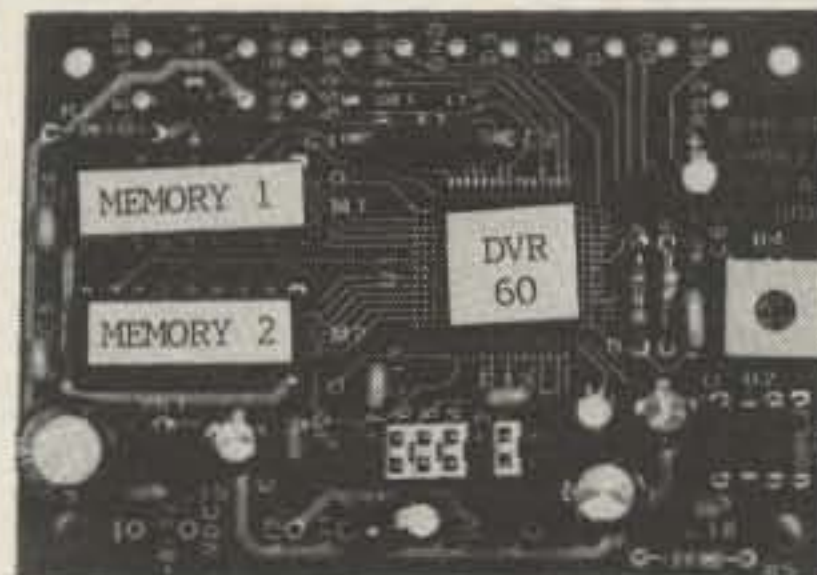
F  
R  
E  
E

I  
N  
F  
O  
R  
M  
A  
T  
I  
O  
N

C  
A  
R  
D

## The Radiokit DVR-60 Digital Voice Recorder

State of the art surface mount technology provides unequalled price/  
performance benefits in a unit that measures only 2 1/4" x 3 1/2" inches.



PRICE  
\$149.95

### Numerous Amateur/Commercial/Educational Applications:

- Repeater ID and Messaging • Simplex Repeater • Voice Mailbox
- Contester/DXER Voice Messaging, Interface with Popular Contest Logging Programs.
- Missed or Busted Call Playback. Works on ANY Audio Signal.
- Instant Replay of Emergency or Traffic Messages. • Home Security
- Talking Sign • Public Address System—Emergency Announcements

### Specifications:

- Up to 16 Variable Length Messages
- 60 Seconds Recording/Playback Available as Shipped, User Expandable to 4 Minutes.
- Message Buffers Completely Soft Sektored
- Random Access Playback
- Selectable Continuous Loop on Record
- Manual or Computer Controlable
- 32KBPS Sampling Rate for Natural Sounding Audio
- Selectable Input Gain Levels, 0, 20, or 46 dB. 2V PP Max
- Message Select: Up to 4 Lines Binary Code
- Signal to Noise Ratio 55 dB • Power Requirements 9-15 VDC @ 50 ma Peak
- Distortion Less Than 2% THD • Completely Wired and Tested. NOT a Kit.

1 Meg x 1 Drams \$9.95 ea.  
30 Seconds Per DRAM

The DVR-60 is provided with full documentation. Four holes are provided on the PC board for mounting convenience. All input/output lines and component designations are clearly silk screened on the board.

OEM and Dealer Inquiries Welcome

Custom Design and Production Facilities Available

RADIOKIT • P.O. Box 973-C • Pelham, NH 03076

(603) 635-2235

CIRCLE 65 ON READER SERVICE CARD

CIRCLE 72 ON READER SERVICE CARD

## CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

### Packet Radio Is Easy!

**T**he best part of our hobby is the least complicated. However, there are some pitfalls that can be avoided provided we are supplied with "good" information prior to undertaking a venture into . . . packet radio!

Having received the new packet or multi-mode data controller for Christmas, you are likely ready to get started with this new and wonderful hobby of packet radio. For many it is a real treat, but for a few it is a chore. With this month's installment of the "Packet User's Notebook" my intent is to remove the "chore" from your entry into packet radio.

My sincere goal in this and every month's column is to assist the newcomer through and over every obstacle he or she may encounter after opening the TNC (terminal node controller) carton. As most readers of this column are aware, many of my books and most of my articles about packet radio emphasize the most important component needed by the entry-level packeteer. Although this component is by its nature an intangible, it is a necessary ingredient when the time comes for its application. The components I refer to are the interface schematics and drawings that outline the manner in which we model our packet station.

Notice that the second time I used the term *component* it was plural. The reason? Well, there are two kinds of interface connections involved with the packet station. They are (1) computer-to-TNC interface cable and (2) transceiver-to-TNC interface cable.

### The Shortest Distance Between Two Points

The first point above is the easiest, but sometimes the most expensive. I'll elaborate.

Many times the packet controller manufacturer will use one of the unused pins of the RS-232 port to apply a non-standard EMF. If the TNC is supplied power from an external source, it can pass through the TNC and out the external

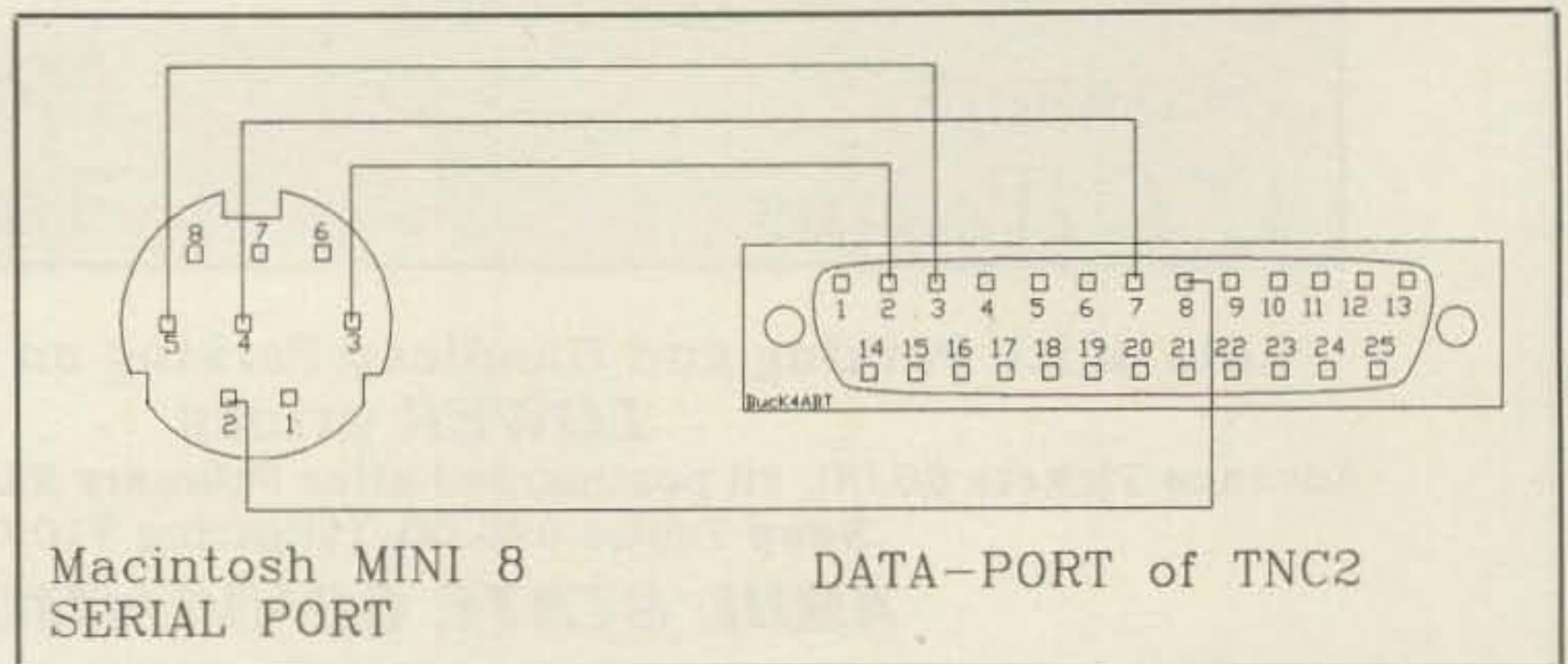


Fig. 1- Interface drawing Macintosh Mini 8 serial port to data port of TNC-2.

communications port of the TNC into the computer. This EMF may meet with another EMF within the computer that is *not* complemented by the foreign EMF. Thus, possible damage could occur. For this reason I caution you that some COTS (commercial-off-the-shelf) computer interface cables may not be the least expensive answer to your needs.

(While in the "caution mode," neither myself nor the publishers are responsible for accidents, injury, or damages that occur from the use of the information contained in this column.)

My aim is to use the tried and proven interfacing techniques and methods as often as possible. Because the world of serial ports and RS-232 comports is constantly changing and the various connec-

tors are so different, I can only provide the data that was current at the time of this compilation.

### The Computer-To-TNC Interface

The computer-to-TNC schematics are provided as guides to illustrate the manner we use to interface the more popular computers to a TNC.

Some companies use what are often called the "standard comport" connectors, while others support connectors that make locating the mating connector a "scavenger hunt" in itself. I'll never understand why the various computer makers can't make our lives a bit easier by either including an extra connector or two with the system or using a connector that

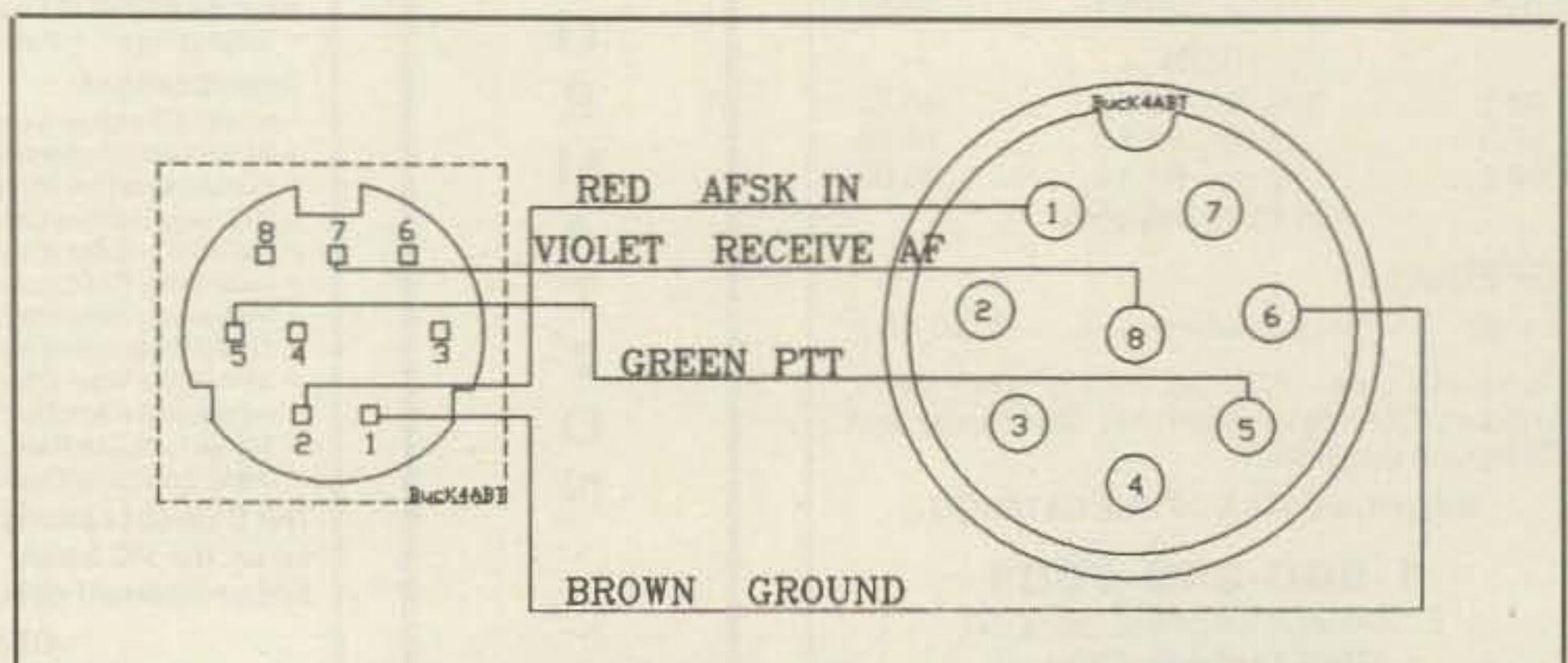


Fig. 2- PacComm HandiPacket to ICOM IC-28A. Note that receive audio is available at pin 8 (center pin) of the IC-28 mic I/O.

506 Pheasant Ridge Drive, Warner Robins, GA 31088

is in use and readily available to the end user.

### Parts Vendors Take Note!

While on the "apple box" I might add that it is also obvious that some computer and parts stores do not sell connectors that tend to favor or complement a brand of computer that they do not sell or support. This adds an extra expense and effort for me and a loss to the local parts store when I go to my phone and place a long-distance call to a supplier in Atlanta for the needed but hard-to-find connector.

There are other computer serial-port problems that come to mind as I write this month's column. A friend has a Macintosh and a terminal program called "RED-RIDER." Much of her system works great. The part causing some concern to us, however, was the lack of interface data from the computer and the TNC supplier. Not only did we need hardware handshaking data, we needed the simple comport data. When possible I like to use full-support, hardware handshaking.

It took awhile and a couple of long-distance phone calls to finally come up with the correct serial-port wiring scheme. Although it is not hardware handshaking in the normal sense, it did satisfy our interface requirement between the Macintosh and the TNC. The (maze) illustration shown in fig. 1 is the result of my findings.

### On The Other Hand . . .

The transceiver manufacturers have their act together (I wish we could say that for the TNC makers), and it is paying off in sales. The next time you purchase a transceiver—either HF, VHF, UHF, or any combination of these—you may notice a tendency to favor the transceiver with the now common, or "standard," 8-pin MIC connector on it. I too find that I have a tendency to migrate to the radios that utilized the 8-pin microphone port connector.

### Transceiver OEMs Read Between These Lines

It is also a fact that I sometimes favor the transceivers that provide the audio output at the microphone connector, along with the normal PTT and AFSK inputs (see fig. 2). This feature alone enables the use of only one cable from the TNC to transceiver, instead of a wire from the TNC to the rear (external speaker) of the radio, and a second cable from the TNC to the microphone connector on the front of the transceiver.

With this kind of support from the OEMs our interfacing problems are minimized, and the installation looks and performs better. Say what!? "Performs bet-

NOTE: PIN 1 IS ATTACHED TO SHIELD MESSENGER WIRE AT THE TERMINAL (DTE) END, ONLY.

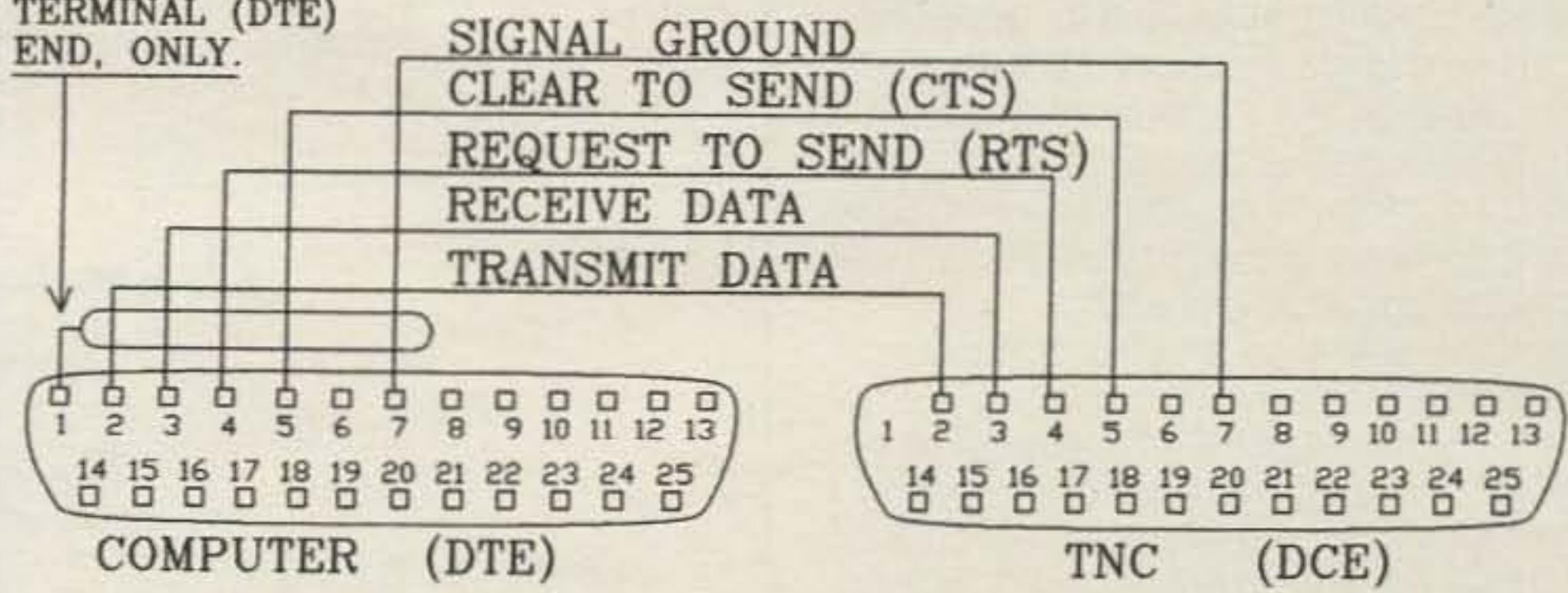


Fig. 3- Pin-out connections between an IBM PC (or clone) and a TNC showing the two grounds described in the text.

ter," the man says. Yes, they perform better because you have lessened the chance of external noise and induced magnetic disturbances by placing all the input and output signals through a single shielded cable.

As a matter of fact, we have even curtailed another possible menace called the "ground-loop," since both cables would have been grounded at the transceiver end of the cable and at the external speaker output plug.

In the case of the few transceivers without this aforementioned feature, we must compensate (bite the bullet) and keep the I/O radio-to-TNC interface cables as short as possible.

### While on the Subject Of Shielded Cables . . .

When you build the cables for the computer-to-TNC interfaces shown in this article, please try to use shielded, multi-

conductor data cable. After I ran into a computer-generated noise problem, I began to give strong consideration to the source of the noise. It took a few minutes with an old RF/AF "sniffer" to isolate the source of the noise. It was coming from a non-shielded serial cable that connected the DB-25 multi-port switch box and the PC.

The next day I was to conduct a packet forum at the annual Madison, Georgia Hamfest, so I made it a point to stop by CSRA Communications and purchase 100 feet of 5-conductor, number 24, stranded, shielded cable. I specified the 5-wire shielded cable, but Jeff Kelly, KF4ZB, recommended that I use the 5-wire with foil shield and a ground messenger wire. This indeed gave me what I needed to handle all my communication signals, hardware handshaking, shielding, and DTE grounding requirements.

I use the following signals: Transmit Data, Receive Data, Request To Send, Clear To Send, Signal Ground, and Equip-

## Magnificent Alinco Deals!

### ALINCO 45W 2M Xcvr. YOUR CHOICE!

DR-110T  
\$299.00

Red LCD Readout

DR-112T  
\$309.00

Black LCD  
W/Orange Backlite



Williams Maintains High Volume Purchasing Power.  
And no Big Store Overhead to Drive Up YOUR Cost!  
It's No Accident Williams is the Nation's #1 ALINCO Dealer!

ALINCO DJ-160T 2M H/T...\$259.00

ALINCO DJ-560 2/70 Twin Band...\$399.00

We Stock ALL ALINCO Accessories!

#### OTHER ALINCO MODELS SPECIALLY PRICED

DR-590T, Remotable Twin-Bander, Xcvr. .... \$629.00  
DR-570T, 2/70 Twin Bander, Xcvr. .... \$549.00  
DJ-120T, Micro, 10 Ch., Tunable 2M H/T ..... \$209.00  
DJ-460T, 20 Ch. 440 MHz H/T ..... \$269.00

FREE SHIPPING! (Pays for your Phone Call) N.C. Residents add 5% Sales Tax. SEND CHECK OR MONEY ORDER for Quoted Price, or Phone for CODs ONLY. Add \$3.50 for Phone CODs. NO CREDIT CARDS. Prices and availability subject to change without notice or obligation.

Now 17 Years of Service To The Amateur Public!  
**WILLIAMS** RADIO SALES  
600 LAKE DALE ROAD  
COLFAX, N.C. 27235

ORDERS ONLY - NOON to 5:00 PM  
**(919) 993-5881**  
ORDERS & TECHNICAL 7 to 10 PM

ment Ground (DTE end only). I do *not* use the shield as the signal ground. It is used as equipment ground, and in my application I tie it to ground (pin 1 if DB-25, or pin 5 if DB-9) at the terminal end only. If a DB-9 is implemented at the DCE (TNC) end of the interface cable, I do *not* tie the equipment ground wire (shield) to 5. I use only the signal ground wire.

In the drawings and illustrations that accompany this month's column I've defined the signal paths with respect to signal ground and *not* to equipment ground. I mention this for the following reason only. Although it may seem a bit trivial, I adhere to the old adage that says, "An ounce of prevention is worth a pound of cure."

If by chance the computer (DTE) is at one location and the TNC (DCE) at another location even within the same household, there could be a potential difference between the two devices. If the EMF is high enough, the small wire used in the ground/shield of the cable could become hot and may even cause damage. It is up to the user to make sure this is not the case if he or she plans to implement the equipment ground. This is another reason why I tie the shield to equipment ground only at the "DTE" end of the cable.

**Author's Note:** Do not confuse the signal ground with the equipment ground. Regardless of what you may have been told, "They are not the same!"

**WD4BUM'S**

**1/4 WAVE 2 METER  
MAGNET MOUNT  
ANTENNA  
CAT # M-300**

**ONLY  
\$15.00**

Complete with strong black powder coated magnet & 15 ft. RG58 coax. A PL259 is installed.

**FREE**

interchangeable whips for 220 and 440 MHz are included.

CHECK, M.O., VISA OR MC TO:  
**LAKEVIEW COMPANY, INC.**

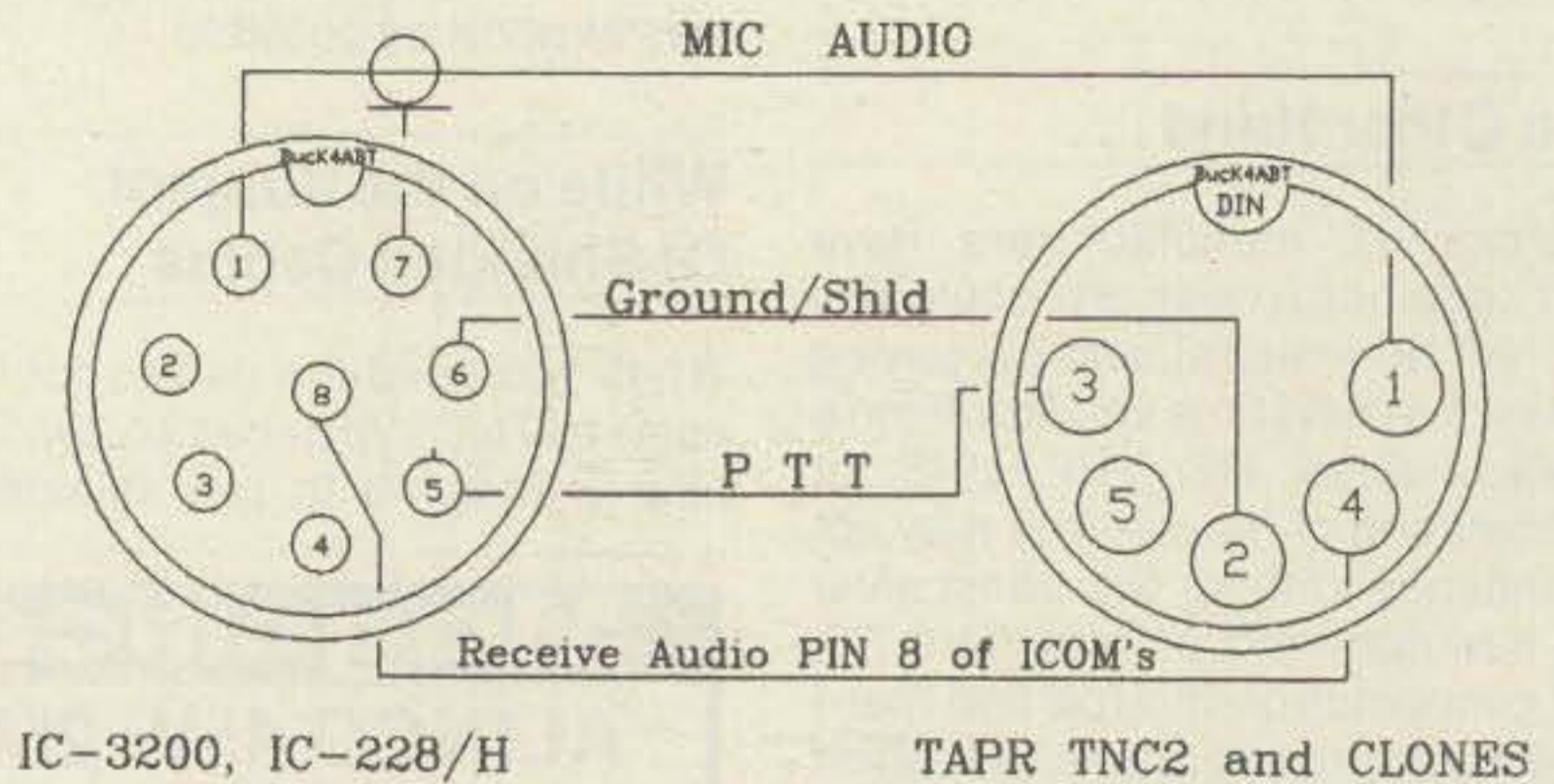
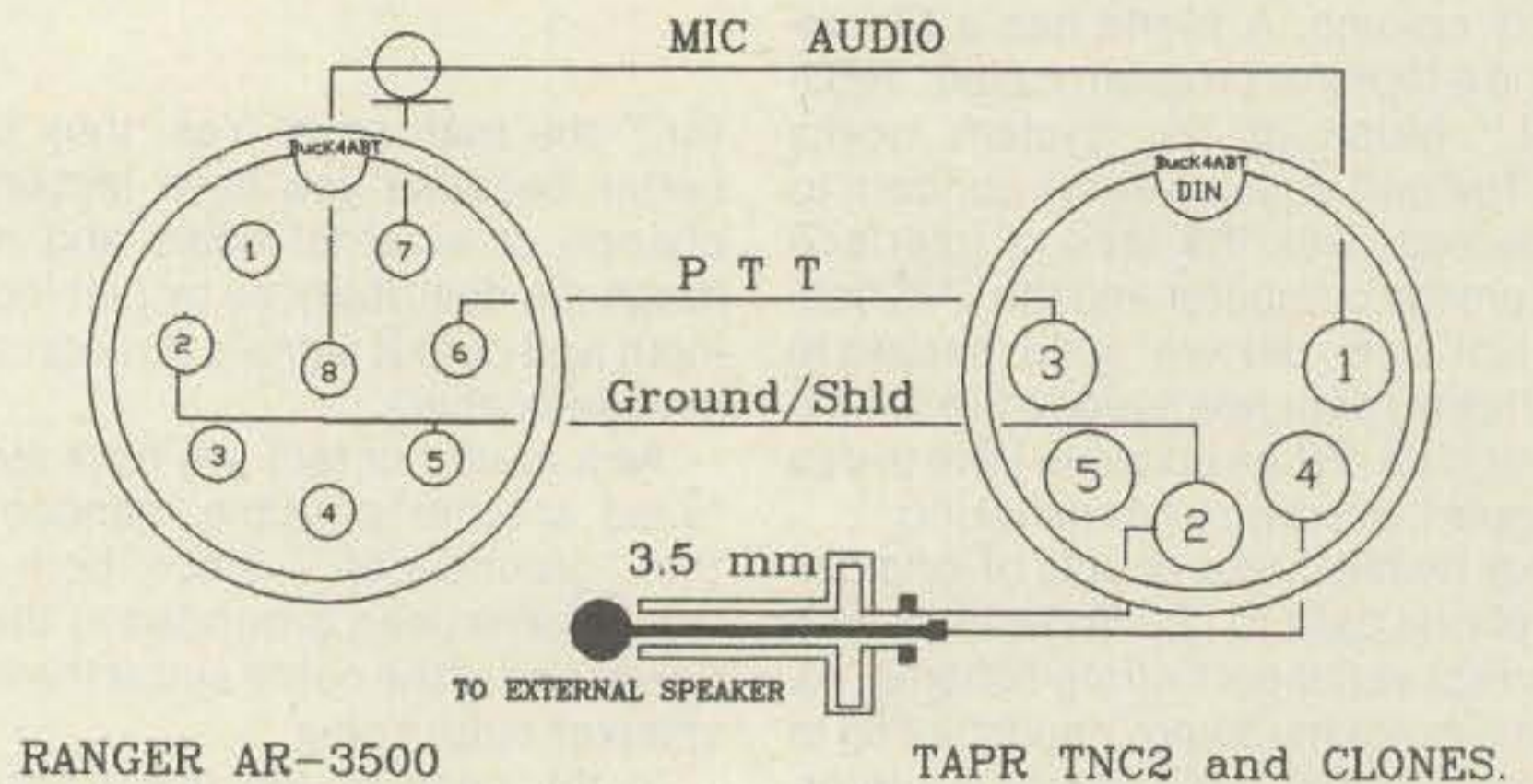
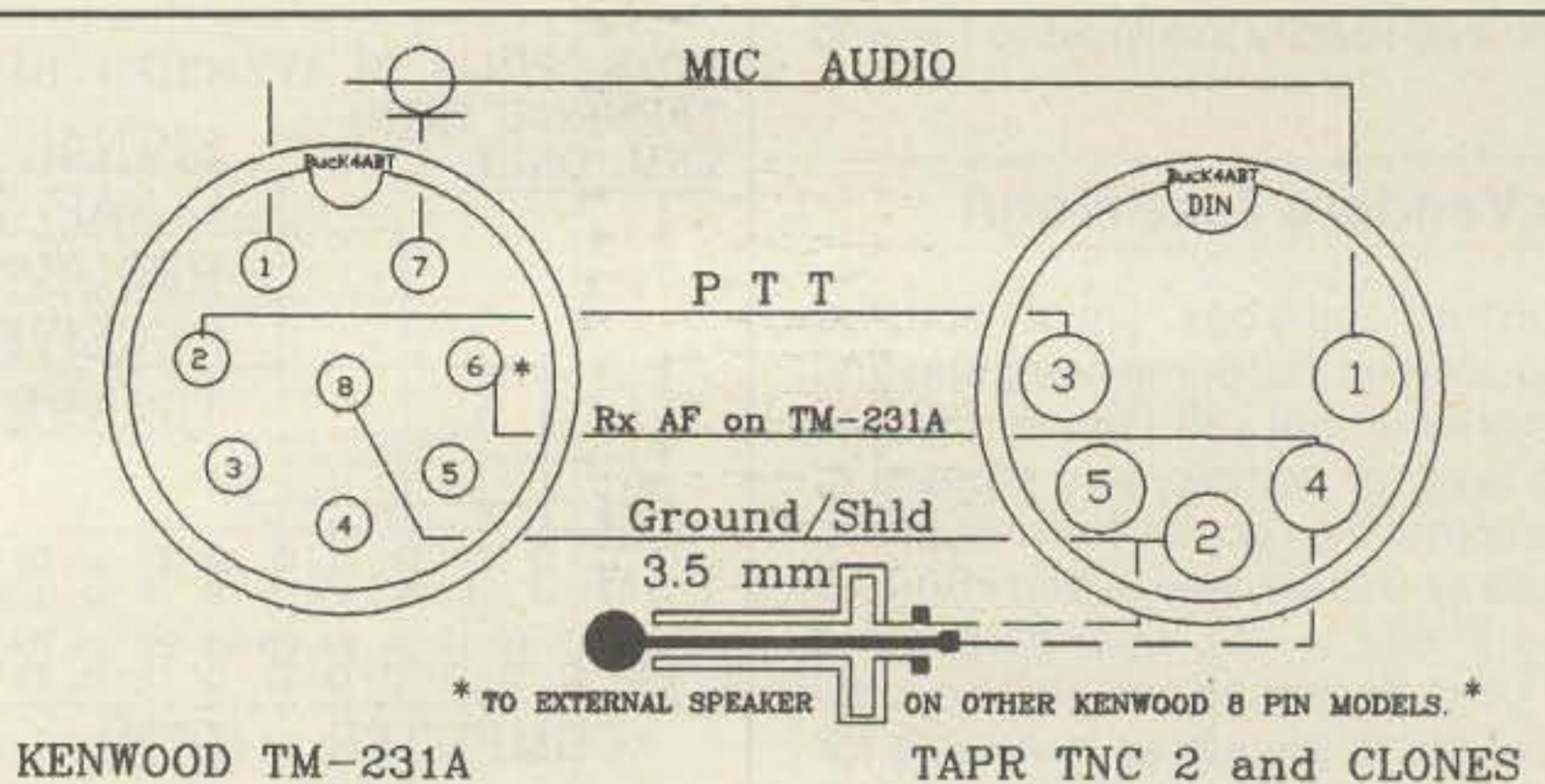
Route 7, Box 258  
Anderson, SC 29624  
1-803-226-6990

Add \$4.00 for shipping & handling  
South Carolina residents add sales tax  
Catalog available • Dealers welcome

CIRCLE 126 ON READER SERVICE CARD

### Free Product Information

Readers can obtain free information on products advertised, as well as for some editorially mentioned products. Simply circle the appropriate number printed below an advertisement onto the CQ "Free Information Service" card bound into this issue. After filling in your name and address, just mail the postpaid card. Your request will be forwarded directly to the advertiser with a mailing label prepared by our reader-service department.



For the Notebook. Shown here are transceiver-to-TNC interfaces for the Kenwood TM-231A, Ranger AR-3500, and IC-3200/IC-228H to TAPR TNC-2 and clones.

With reference to the IBM PC or clones, and the usual DB-25 connector that is implemented as the serial port, there are two grounds. Pin 1 is defined as "equipment ground," or "earth ground," while pin 7 is referred to as the "signal ground" or "data ground." Hence, we have the reason for my purchase of the five wire, with the sixth wire being the shield wire grounded at the terminal end (DTE) only (see fig. 3).

By including several other TNC-to-computer and TNC-to-transceiver drawings, I hope we have been successful at making your New Year's beginning a happy one. In any case, you are now able to understand the methods used to inter-

face that new Christmas gift to your transceiver and computer. Or was it the other way around?

### Here's Looking At You

If you have an extra photo of your packet station that we may have, please send it along to my address. We will use these photos from time to time in this column. Give your station a debut into the packet community. You may find that your packet station becomes a pattern for others to follow.

That's it for this month. Happy Packeting!

73, de BucK4ABT

# uniden®

## \$12,000,000 Scanner Sale

Uniden Corporation of America has purchased the consumer products line of Regency Electronics Inc. for \$12,000,000. To celebrate this purchase, we're having our largest scanner sale in history! Use the coupon in this ad for big savings. Hurry...offer ends January 31, 1991.

### \*\*\*MONEY SAVING COUPON\*\*\*

Get special savings on the scanners listed in this coupon. This coupon must be included with your prepaid order. Credit cards, personal checks and quantity discounts are excluded from this offer. Offer valid only on prepaid orders mailed directly to Communications Electronics Inc., P.O. Box 1045 - Dept. UN14, Ann Arbor, Michigan 48106-1045 U.S.A. Coupon expires January 31, 1991. Coupon may not be used in conjunction with any other offer from CEI. Coupon may be photocopied. Add \$12.00 for shipping in the continental U.S.A.

COUPON

COUPON

- RELM RH606B-A ..... \$419.95
- RELM RH256B-A ..... \$294.95
- Bearcat 800XLT-A ..... \$229.95
- Bearcat 200XLT-A ..... \$229.95
- Bearcat 100XLT-A ..... \$179.95
- Bearcat 70XLT-A ..... \$139.95
- Bearcat 55XLT-A ..... \$99.95
- Bearcat 210XLT-A ..... \$164.95
- Uniden CARD-A1 ..... \$144.95
- Uniden RD3XL-A1 ..... \$144.95
- Uniden RD9XL-A ..... \$119.95

### \*\*\*VALUABLE COUPON\*\*\*

## Bearcat® 760XLT-A

List price \$499.95/CE price \$254.95/SPECIAL 12-Band, 100 Channel • Crystalline • AC/DC Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz. The Bearcat 760XLT has 100 programmable channels organized as five channel banks for easy use, and 12 bands of coverage including the 800 MHz band. The Bearcat 760XLT mounts neatly under the dash and connects directly to fuse block or battery. The unit also has an AC adaptor, flip down stand and telescopic antenna for desk top use. 6-5/16" W x 1 1/2" H x 7 3/4" D. Model BC 590XLT-A1 is a similar version without the 800 MHz band for a new low price of only \$194.95. Order today.

## NEW! Uniden® Telephones

- AM470D-A Uniden answering machine ..... \$69.95
- AM484-A Uniden answering machine ..... \$49.95
- AM488V-A Uniden answering machine ..... \$49.95
- AM480-A Uniden answering machine ..... \$49.95
- AM480-A Uniden answering machine ..... \$69.95
- FP300-A Uniden feature phone ..... \$34.95
- FP302-A Uniden feature phone ..... \$49.95
- FP320S-A Uniden feature speakerphone ..... \$49.95
- FP322S-A Uniden feature speakerphone ..... \$59.95
- XE570-A Uniden cordless phone ..... \$74.95
- XE422S-A Uniden cordless speakerphone ..... \$109.95
- XE777S-A Uniden cordless speakerphone ..... \$109.95
- BT100-A Uniden Trimstyle phone ..... \$17.95
- KT280-A Uniden Family phone with 911 feature ..... \$29.95
- FF150-A Uniden Executive phone ..... \$39.95

## RELM® RH256B-A

List price \$587.50/CE price \$299.95/SPECIAL 16 Channel • 25 Watt Transceiver • Priority The RELM 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-A is available for \$429.95. A UHF 15 watt, 16 channel version of this radio called the RU156B-A is also available and covers 450-482 MHz, but the cost is \$454.95.

### \*\*\* 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 810E to the 310E handheld, there is no better Citizens Band radio on the market today.

- PRO310E-A Uniden 40 Ch. Portable/Mobile CB ..... \$83.95
- PRO330E-A Uniden 40 Ch. Remote mount CB ..... \$104.95
- ER100-A Uniden Emergency CB Mobile ..... \$49.95
- GRANT-A Uniden 40 channel SSB CB mobile ..... \$166.95
- PC122-A Uniden 40 channel SSB CB mobile ..... \$119.95
- PRO510XL-A Uniden 40 channel CB Mobile ..... \$38.95
- PRO510AXL-A Uniden CB Mobile with antenna ..... \$49.95
- PRO520XL-A Uniden 40 channel CB Mobile ..... \$56.95
- PRO640E-A Uniden 40 channel SSB CB Mobile ..... \$137.95
- PRO810E-A Uniden 40 channel SSB CB Base ..... \$174.95

### \*\*\* Uniden Radar Detectors \*\*\*

Buy the finest Uniden radar detectors from CEI today. RD3XL-A Uniden 3 band radar detector ..... \$159.95 RD8-A Uniden visor mount radar detector ..... \$89.95 RD9GTL-A1 Uniden "Passport" size radar detector ..... \$99.95 RD9XL-A1 Uniden "micro" size radar detector ..... \$124.95 RD27-A Uniden visor mount radar detector ..... \$54.95 RD99GT-A Uniden remote mount radar detector ..... \$119.95 CARD-A1 Uniden credit card size radar detector ..... \$159.95

## Bearcat® 200XLT-A

List price \$509.95/CE price \$239.95/SPECIAL 12-Band, 200 Channel • 800 MHz. Handheld Search • Limit • Hold • Priority • Lockout Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz. The Bearcat 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz band and 100 channels, order the BC 100XLT-A for only \$189.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adaptor and earphone. Order your scanner now.

## Bearcat® 800XLT-A

List price \$549.95/CE price \$239.95/SPECIAL 12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC Bands: 29-54, 118-174, 406-512, 806-912 MHz. Now...nothing excluded in the 800-912 MHz band. The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9 1/4" x 4 1/2" x 12 1/2". With nothing excluded in the 806-912 MHz band, this scanner is an excellent choice for law enforcement agencies. If you do not need the 800 MHz band, a similar model called the BC 210XLT-A is available for \$178.95.

## NEW! Bearcat® 147XL-A

List price \$189.95/CE price \$94.95/SPECIAL 10-Band, 16 Channel • No-crystal scanner Priority control • Weather search • AC/DC Bands: 29-54, 136-174, 406-512 MHz. The Bearcat 147XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions. A mobile version called the BC560XLT-A featuring priority, weather search, channel lockout and more is available for \$94.95. CEI's package price includes mobile mounting bracket and mobile power cord.

## NEW! Ranger® RCI2950-A

List price \$549.95/CE price \$249.95/SPECIAL 10 Meter Mobile Transceiver • Digital VFO Full Band Coverage • All-Mode Operation Backlit liquid crystal display • Auto Squelch RIT • 10 Programmable Memory Positions Frequency Coverage: 28.0000 MHz to 29.6999 MHz. The Ranger RCI2950 Mobile 10 Meter Transceiver by Ranger, has everything you need for amateur radio communications. The RF Power control feature in the RCI2950 allows you to adjust the RF output power continuously from 1 watt through a full 25 watts output on USB, LSB and CW modes. The RCI2950 also features a noise blanker, roger beep, PA mode and more. The Mic Gain Control adjusts the gain in transmit and PA modes to maximize talk power. Digital VFO. Built-in S/RF/MOD/SWR meter. Frequency selections may be made from a switch on the microphone or the front panel. There is even a repeater split switch for repeater offsets. The RCI2950 lets you operate AM, FM, USB, LSB or CW for full mode operation. The digitally synthesized frequency control gives you maximum stability. There's also RIT (Receiver Incremental Tuning) to give you perfectly tuned signals. With memory channel scanning, you can scan ten pre set frequencies to keep track of all the action. An optional CTCSS tone board is available (order # RTONE) for \$59.95. For technical questions, call Ranger at 714-858-4419. Order your Ranger RCI2950 from CEI today.



BC760XLT  
800 MHz.  
mobile scanner  
SPECIAL!

### \*\*\* Extended Service Contract \*\*\*

If you purchase a scanner, CB, radar detector or cordless phone from any store in the U.S. or Canada within the last 30 days, you can get up to four years of extended service contract from Warrantech. This service extension plan begins after the manufacturer's warranty expires. Warrantech will perform all necessary labor and will not charge for return shipping. Extended service contracts are not refundable and apply only to the original purchaser. Warrantech does not have an extended warranty plan for handheld scanners. For mobile or base scanners, CB radios or radar detectors a 1 year extended warranty is \$19.99, two years is \$39.99 and four years is \$59.99. Order your service contract today.

### OTHER RADIOS AND ACCESSORIES

- BC55XLT-A Bearcat 10 channel scanner ..... \$114.95
  - AD100-A Plug in wall charger for BC55XLT ..... \$14.95
  - PS001-A Cigarette lighter cable for BC55XLT ..... \$14.95
  - VC001-A Carrying case for BC55XLT ..... \$14.95
  - BC70XLT-A Bearcat 20 channel scanner ..... \$159.95
  - BC172XL-A Bearcat 20 channel scanner ..... \$134.95
  - BC1-A1 Bearcat Information scanner with CB ..... \$119.95
  - BC310A-A Bearcat Information Radio ..... \$79.95
  - BC330A-A Bearcat Information Radio ..... \$104.95
  - UC102-A Regency VHF 2 ch. 1 Watt transceiver ..... \$114.95
  - UC202-A Regency VHF 2 ch. 2 Watt transceiver ..... \$149.95
  - VM200XL-A Uniden Video monitoring system ..... \$179.95
  - BP205-A Ni-Cad batt. pack for BC200/BC100XLT ..... \$39.95
  - FBE-A Frequency Directory for Eastern U.S.A. .... \$14.95
  - FBW-A Frequency Directory for Western U.S.A. .... \$14.95
  - RFD1-A MI, IL, IN, KY, OH, WI Frequency Directory ..... \$14.95
  - RFD2-A CT, ME, MA, NH, RI, VT Directory ..... \$14.95
  - RFD3-A DE, DC, MD, NJ, NY, PA, VA, WV Dir. .... \$14.95
  - RFD4-A AL, AR, FL, GA, LA, MS, NC, PR, SC, TN, VI ..... \$14.95
  - RFD5-A AK, ID, IA, MN, MT, NE, ND, OR, SD, WA, WY ..... \$14.95
  - RFD6-A CA, NV, UT, AZ, HI, GU Freq. Directory ..... \$14.95
  - RFD7-A CO, KS, MO, NM, OK, TX Freq. Directory ..... \$14.95
  - SMH-A Scanner Modification Handbook ..... \$14.95
  - ASD-A Airplane Scanner Directory ..... \$14.95
  - SRF-A Survival Radio Frequency Directory ..... \$14.95
  - TSG-A "Top Secret" Registry of U.S. Govt. Freq. .... \$14.95
  - TTC-A Tune in on telephone calls ..... \$14.95
  - CBH-A Big CB Handbook/AM/FM/Freeband ..... \$14.95
  - TIC-A Techniques for Intercepting Communications ..... \$14.95
  - RRF-A Railroad frequency directory ..... \$14.95
  - EEC-A Embassy & Espionage Communications ..... \$14.95
  - CIE-A Covert Intelligence, Elect. Eavesdropping ..... \$14.95
  - MFF-A Midwest Federal Frequency directory ..... \$14.95
  - A60-A Magnet mount mobile scanner antenna ..... \$34.95
  - A70-A Base station scanner antenna ..... \$34.95
  - USAMM-A Mag mount VHF ant. w/ 12' cable ..... \$39.95
  - USA-K-A 3/4" hole mount VHF ant. w/ 17' cable ..... \$34.95
- Add \$4.00 shipping for all accessories ordered at the same time. Add \$12.00 shipping per radio and \$4.00 per antenna.

### BUY WITH CONFIDENCE

To get the fastest delivery from CEI 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. On all credit card orders, the ship to address must exactly match the credit card billing address. If the billing address is a P.O. Box or a P.O. Box Zip Code, UPS can not deliver to that address. When this occurs, the order must be shipped by mail at a higher cost to you. To avoid this extra charge, you may mail us a check with your order. 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 or equivalent product substituted unless CEI 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. CEI warehouse in Ann Arbor, Michigan. No COD's. Most items listed have a manufacturer's warranty. Free copies of warranties on these products are available by writing to CEI. Non-certified checks require clearance. Not responsible for typographical errors.

Mail orders to: Communications Electronics, Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add \$12.00 per scanner for 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 two times continental U.S. rates. If you have a Discover, Visa, American Express or MasterCard, you may call and place a credit card order. 5% surcharge for billing to American Express. Order toll-free in the U.S. Dial 800-USA-SCAN. In Canada, dial 800-221-3475. FAX anytime, dial 313-971-6000. If you are outside the U.S. or in Michigan dial 313-973-8888. Order from CEI today. Scanner Distribution Center™ and CEI logos are trademarks of Communications Electronics Inc. Sale dates 7/15/90 - 1/31/91 AD #071590-A Copyright © 1990 Communications Electronics Inc.

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.  
For orders call 313-973-8888 or FAX 313-971-6000

## 1991 EDITIONS

### 1991 RADIO AMATEUR CALLBOOKS

#### NORTH AMERICAN EDITION

Fully updated and edited to include all the latest FCC and foreign government call signs and address to Hams in North America. Includes plenty of handy operating aids such as time charts, QSL bureau addresses, census information and much more. Calls from snowy Canada to tropical Panama. Now is the time to buy a new Callbook when you'll get the most use out of your investment. © 1990.

CB-NA91 Softbound \$29.95

#### INTERNATIONAL EDITION

QSLs are a very important part of our hobby. All sorts of awards, including the coveted DXCC, require confirmation of contact before the award can be issued. Of special interest, addresses are being added daily for Hams in the USSR and other countries. While by no means complete, it's a start and will be of tremendous help in getting QSLs. Handy operating aids round out this super book value. © 1990.

CB-I91 Softbound \$29.95

#### BUY 'EM BOTH SPECIAL

CB-NAI91 REG. \$59.90 ONLY \$54.95 SAVE \$5.00

#### THE 1991 ARRL HANDBOOK

Revised and updated with the latest in Amateur technology, now is the time to order your very own copy of the world famous ARRL HANDBOOK. In addition to being the definitive reference value for your Ham shack, there are plenty of projects for every interest in Amateur Radio - from antennas for every application to the latest state-of-the-art projects - you'll find it all in the 1991 HANDBOOK. Over 1100 pages. ©1990.

AR-HB91 Hardbound \$24.95

## NEW BOOKS

#### WEATHER SATELLITE HANDBOOK New ARRL 4th Edition

by Ralph Taggart, WB8DQT

Taggart has long been recognized as one of the foremost experts on weather satellite picture reception. This new edition of his famous book has been updated and expanded to include all the latest information on satellite picture reception. Subjects covered include a complete section on what satellites are in orbit, everything you'd want to know on what kind of antenna, receiver, video formats and displays to use, plus much more! You get all the information you need to get your satellite system up and running. © 1990 4th Edition

AR-WSH Softbound \$19.95

#### PRACTICAL ANTENNA HANDBOOK

BY Joe Carr, K4IPV

A comprehensive blend of theory and practical antenna applications make this new book by noted author Carr, a valuable book to have on hand. Features detailed analysis and construction information for all kinds of antennas, an explanation of the secrets of radio propagation, theory and use of transmission lines, a comprehensive overview of the radio spectrum as well as 22 BASIC programs for designing antennas. Learn from an expert - get this book today. © 1990 1st edition 448 pages

T-3270 Softbound \$21.95

#### QRP CLASSICS The Best QRP Projects from QST and ARRL Handbook 1975 to 1990

Put together with the QRP enthusiast in mind. Find out how to build receivers, transmitters, antennas, accessories, power supplies and just about everything you need to get on and operate a QRP station. Includes a section on design hints for amplifiers, matching networks, electronic switching and direct conversion receivers. © 1990 1st edition 228 pages

AR-QRPC Softbound \$11.95

#### PASSPORT TO WORLDBAND RADIO 1991 Edition

Brand new, fully revised and expanded. Now includes a bigger and better SWL'S buyer's guide. Also includes all the latest broadcast schedules from countries around the world. Great reference text for Hams as well as the serious SWL and casual listener ©1990

IBS-RD191 Softbound \$16.95



# CALL TOLL FREE (800) 457-7373

## 8AM-5PM EST



## ANTENNAS

#### ARRL UHF/MICROWAVE EXPERIMENTER'S MANUAL

MS-DOS Program disk available with 25 microwave applications. Long awaited by the above 30MHZ crowd, this book has quickly become one of our best sellers. Hams, technicians and professional engineers will find this manual to be extremely useful in understanding microwave technology. Twelve chapters include a brief history, safety, propagation, microwave devices, transmission media, design and fabrication techniques, system design, antennas and feedlines, EME operation, microwave measurements and how to use the computer to simplify microwave operation. © 1990 448 pages 1st edition.

AR-MEH Softbound \$19.95  
 FAR-FMEH (MS-DOS Program disk) \$9.95  
 AR-UHF Book and disk. Save \$2.00 \$27.90

#### REFLECTIONS- Transmission Lines and Antennas by Walt Maxwell, W2DU

Over the years, many myths and half truths have become "fact." Noted antenna expert Maxwell debunks them with clear, concise and accurate explanations. The first seven chapters are taken from his QST column "Another Look At Reflections." Seventeen additional chapters contain new and unpublished material covering matching networks, antennas and how to use Smith charts. Also available is a MS-DOS disk with programs taken from the book. © 1990 1st Edition 384 pages

AR-RTLA Hardbound \$19.95  
 FAR-RTLADOS (MS-DOS Disk) \$9.95  
 AR-RTLADOS Program and disk \$2 off \$27.90

#### DESIGN NOTEBOOK

by Doug DeMaw, W1FB

Written for the Amateur Radio builder. Projects can be put together using hand tools and easy-to-find parts. Building block approach to construction takes a simple idea and expands into a more useful piece of gear. Several interesting and useful projects. Great for the beginner. © 1990 194 page 1st edition

AR-DN Softbound \$9.95

#### The DXCC COMPANION

How To Work Your First 100 Countries

by Jim Kearman KR1S

Complete explanation of all the secrets to being a big gun and getting DXCC with as little pain as possible. How and when to operate, the tricks the big guys use to work rare DX and get a card in return. Great reading for the beginner. © 1990 1st edition 120 pages

AR-DXCC Softbound \$5.95

#### FREQUENCY MASTER FILE Vol. 1

Federal Assignments

by The Communications Research Council

Contains all the latest information on frequencies in use by the US Government. Over 200 pages of listings arranged by Government agency, location, call sign and other available information. © 1990 1st edition 215 pages

ATSI-FA1 Softbound \$24.95

#### 1991 AMATEUR RADIO CALENDAR

by John David, KB1T

The only way to stay up-to-date on what's going on in Amateur Radio is to have a copy of this calendar on your operation shack wall. Includes contests, hamfests, holidays, W1AW events plus much more. Great holiday gift for a friend or for yourself. Get your's now! © 1990

KB1T91 \$11.95

#### 40 YEARS OF HF MOBILING

by Don Johnson, W6AAQ

In addition to being a good source book for the HF mobiler, you get a fascinating history of the past 40 years of HF mobile operation. Fully covers what antennas to use, how to install radios, power supplies and antennas, tuners and a wealth of other information. Written in a friendly manner by a ham who has spent many years on the road with Amateur Radio. © 1989 3rd Edition 100 pages

AAQ-HFM Softbound \$14.95

#### BEVERAGE ANTENNA HANDBOOK by Victor Misk, W1WCR

Misk delves deep into the secrets of the single wire Beverage and SWA (Steerable Wave Antenna) with helpful hints and tips on how to maximize performance based upon wire size, height above ground, overall length and impedance matching. Transformer design information for both termination and freeline matching is completely revised. ©1987. 80 pages, 2nd Edition.

VM-BAH Softbound \$14.95

#### THE AMATEUR RADIO VERTICAL HANDBOOK by Captain Paul H. Lee, USN (ret.), N6PL

Based upon the author's years of work with a number of different vertical antenna designs, you'll get plenty of theory and design information along with a number of practical construction ideas. Included are designs for simple 1/4 and 5/8-wave antennas, as well as broadband and multi-element directional antennas. ©1984, 2nd edition.

CQ-VAH Softbound \$9.95

#### W1FB's ANTENNA NOTEBOOK by Doug DeMaw, W1FB

Antennas have been one of DeMaw's passions in Amateur Radio. He has worked with countless designs of all shapes and configurations. This fully illustrated book gives you how-to instructions on a number of different wire and vertical antennas. Also includes information on radial systems, tuners, balun and impedance transformers. ©1987 120 pages.

AR-AN Softbound \$7.95

#### LOW BAND DX'ING by John Devoldere ON4UN

Based upon years of practical on-the-air experience, learn the secrets of how ON4UN has been so successful on the low bands. Extensive coverage is given to transmit and receive antennas. Dipoles, inverted V's, slopers, phased arrays and Beverages. Also covered: propagation, transmitters, receivers, operating, software and an extensive Low Band bibliography. ©1987

AR-UN Softbound \$9.95

#### ARRL ANTENNA BOOK by Jerry Hall, K1TD, 11th Edition

The 11th edition of this antenna classic represents over two years of hard work by editor K1TD. It's doubled in size too - from over 300 over 800 pages big! 950 figures and charts cover just about every subject imaginable. Some of the highlights are: Chapters on Loop antennas, multi-band antennas, low frequency antennas, portable antennas, VHF and UHF systems, coupling the antenna to the transmitter and the antenna, plus p-t-e-n-t-y more. 11th edition. 999 pages. ©1988.

AR-AM Softbound \$14.95

#### ANTENNA IMPEDANCE MATCHING by ARRL

One of the most comprehensive books ever written on the use of Smith charts in solving impedance matching problems. 224 pages full of helpful information and solutions to tricky matching problems. ©1989.

AR-IMP Hardbound \$14.95

#### ANTENNA COMPENDIUM Vol 2

Includes MS-DOS program listings

Antennas are the #1 topic of interest among amateurs. ARRL annually receives far more articles than it can use in QST. So, they decided to publish them in THE ANTENNA COMPENDIUM. These never been published articles run the range from simple, easy-to-construct antennas to sophisticated designs. Six program listings included. You can also get the programs on a MS-DOS disk for an additional charge. ©1989, 1st edition 208 pages.

AR-AC2 Softbound Book Only \$11.95

FAR-AC2 (MS-DOS) Disk Only \$9.95

AR-FAC2 BUY 'EM BOTH SAVE \$3.95 Book & Disk \$15.90

#### 1990-91 ARRL REPEATER DIRECTORY

Bigger and better! Over 14,000 listings including 1400 digipeaters every Ham should have a copy of this book in their car or shack. Handy resource book has listings by frequency and location. Invaluable aid while traveling. ©1990.

AR-RD90 Softbound \$5.95

AR-2RD90 (Buy 2 & Save)



# SOFTWARE

# HAM RADIO MAGAZINE INVENTORY CLOSEOUT

This is it folks! Come January, we're going to have to start getting rid of old issues of Ham Radio Magazine. Order now to complete your collection. Here's what we have left in stock.

1968	March	1980	All Months
1969	Aug, Sept*, Nov	1981	All but January
1972	Jun, Aug, Sept*, Oct*	1982	All Months
1973	Feb, Mar, Jun, Jul, Sept*	1983	All but March
1974	Apr, May*, Jul*, Aug, Dec*	1984	All Months
1975	Feb, Mar, Apr, Jun, Jul, Aug, Oct, Nov, Dec*	1985	All Months. Sept*
1976	Jan, Oct	1986	All Months. May*
1977	Feb, Mar, May, Jun, Jul, Aug, Sept, Oct, Nov, Dec	1987	All Months. Oct*
1978	All Months	1988	All Months. Jan*, May*, Dec*
1979	All Months	1989	All but April
		1990	Jan through June

\* Less than 100 copies in stock

Prices  1 copy \$5.00  5 copies \$15.00  10 copies \$25.00  20 copies or more \$2.00 each issue

**RJ'S ELECTRONIC SECOND OP**  
 v Improved Version 3.0  
 Jim Rafferty, N6RJ (for MS-DOS computers)  
 RJ's world famous Electronic Second Op has been extensively re-written to meet the needs of today's active Radio Amateur. Must program for contesters, DX'ers and casual operators alike. Lighting entry and data retrieval gives you an unbelievable wealth of information in the blink of an eye. Now takes and stores data from ICA's CT Contest program so you do not have to manually enter test contacts. DXCC, prefix and oblast records are automatically updated and are available in an instant. Will not run on floppies -- you must have a hard drive. There's much more to this program than can be listed here. ©1990 MS-DOS computers. 5 1/4 and 3 1/2" disks available, please specify.  
 CB-RJ (MS-DOS Computers) **\$59.95**

**WA9GFR COMMUNICATIONS ENGINEERING**  
 Version 3.1 by Lynn Gerig, WA9GFR  
 Interesting program that will allow you to predict communications frequencies based upon your stations operational capabilities. Useful from 10 MHz to 3.5 GHz. Also includes helpful Smith chart program for various types of matching network. Provides impedance results in both polar and high resolution Smith chart graphics. Great value at a low price.  
 GFR-DOS (MS-DOS) **\$19.95**  
 GFR-C64 (Commodore C-64) **\$19.95**

**CROSSMITH Smith Chart Utility Program (MS-DOS)**  
 Wes Hayward, W7ZO1  
 CrossSmith is a working Smith chart that has been optimized for impedance matching applications. The user can modify all variables to meet specific matching goals. Includes a clear and concise tutorial. All levels of interest will find useful. Complete text explanations and graphs aid full comprehension of the material.  
 WH-MS (MS-DOS) **\$29.00**

**RF-CAD ELECTRONICS DESIGN PROGRAM**  
 Version 3.7 Includes Intermodulation and Distortion Program  
 Joe Reisert, W1JR and Gary Field, WA1GRC  
 IBM PC and compatible computers  
 This software package has been written by electronic engineers and contains nearly 40 tested and proven programs. Emphasis has been placed upon ease of use. Programs include: Filters, LC, active-HP, BP; Inductor design, toroid, solenoid, straight wire; Matching networks; Crystal oscillators; Microstrip; Transmission lines; Antennas; Yagi-Uda, helix, dish, horn, element scaling; Pi and T attenuators. Also included: Radio Path calculations; FM modulation analysis; Miscellaneous conversions; Geostationary satellite pointing; Direction tracking aids; Receiver noise figure calculations and Spurious receiver response prediction. Requires IBM-PC with at least one floppy disk and 128k of RAM. ©1985.  
 RF-CAD (MS-DOS) **\$39.95**

**COM BEVERAGES THROUGH OSCAR**  
 Now Available in MS-DOS Format  
 Electronics bibliography 1909 to 1988  
 380 references in 92 chapters!  
 The only complete reference guide to Amateur articles in the world! Revised and up-dated from the softbound edition, this microfiche and DOS data base reference lists 80 years worth of information from different sources that include QST/Gold (since 1945), the GB's magazine RADCOM/Gold (since 1979) and all issues of HAM RADIO, CQ, and 73. Includes 5,000 key-word index and author/callsign cross references. Unbelievable value. Worth much more than is being charged!  
 BTO-Microfiche **\$49.95**  
 BTO-MS-DOS **\$79.95**

**ON4UN PRACTICAL YAGI DESIGN (MS-DOS)**  
 John Devoldere, ON4UN  
 This comprehensive Yagi design program is based upon tested antennas, not theoretical un-proven models. Contains 100 different antennas, designed, tested and optimized by ON4UN. Also contains a number of classic designs by noted antenna experts PV, W6SAI and others. Includes mechanical design of elements of the rotating mast. Fully detailed "Read.me" file is designed to help the user get maximum results from the program. ©1989.  
 ON-YAGI (MS-DOS) 5 1/4" & 3 1/2" Disk Avail. **\$59.95**

# OTHER BOOKS

**TOMMY ROCKFORD BOOKS** by Walter Tompkins, K6ATX  
 These thrilling stories introduced a whole generation of Hams to the wonderful world of Amateur Radio. Great reading, and gift ideas for all levels of Amateur Radio Interest. Each story is full of action packed excitement.  
 AR-DV Death Valley QTH Softbound \$4.95  
 AR-SO SOS At Midnight Softbound \$4.95  
 AR-CQ CQ Ghost Ship Softbound \$4.95  
 AR-DX DX Brings Danger Softbound \$4.95  
 AR-GC Grand Canyon QSO Softbound \$4.95  
 AR-MO Murder by ORM Softbound \$4.95  
 AR-TR All 6 books, Reg. \$29.70 Save \$4.75 **\$24.95**

**PACKET USER'S NOTEBOOK**  
 by Buck Rogers, K4ABT  
 This new book has been put together by CQ's Packet editor and packet pioneer, Buck Rogers, K4ABT. Written with the beginner in mind, the Packet Notebook is full of handy tips, hints and suggestions on how to get the most out of your packet system. Includes a brief history, a how to get started section, standards, flow control and information on radio to TNC to computer interconnections for just about every radio. Good book to have on every packeteer's desk. ©1989 1st Edition, 132 pages.  
 CQ-PKT **Softbound \$9.95**

**1991 EQUIPMENT BUYER'S GUIDE**  
 Brand new and fully up-to-date. Complete listing of equipment available from the various equipment and accessory manufacturers. Includes radios and accessories plus helpful hints and tips and a complete listing of addresses and telephone numbers. ©1990  
 CQ-EOP91 **Softbound \$4.95**

**1990 ANTENNA BUYER'S GUIDE**  
 Looking for the latest in antennas? It's all here in the CQ Antenna Buyer's Guide. Crammed full of articles, product information and a who's who section listing all of the manufacturers and importers. Get yours now and start planning for Spring 1991 antenna projects. ©1990  
 CQ-ANT90 **Softbound \$4.95**



**BASEBALL CAPS**  
 Personalized with your name and callsign. Super gift idea for any occasion. Hats come in the following colors: Blue, Gold, Red and Kelly Green. Please include your name and callsign. (Maximum of 6 letters per line)  
 UFBC (Specify color, name and call) **\$7.95**

**ID BADGES**  
 No ham should be without an ID badge. Just the ticket for club meetings, hamfests and get-togethers. Wide choice of colors. Your name can be engraved either in script or standard type. Available in the following colors: (badge/lettering) white/red, woodgrain/white, blue/white, white/black, yellow/blue, red/white, green/white, metallic gold/black, metallic silver/black  
 UID (mark colors) **\$3.50**

# SPECIAL LOW PRICES

**DX-EDGE (MS-DOS, C-64) software and slide rule**  
 Super fast speed and dazzling graphics make this program a treat to use. The MS-DOS version also includes a close up (zoom) feature for detailed examination, a MUF-calculator and a great circle bearing routine. All call sign prefixes and country names are built into the data base for easy pinpointing of locations. Requires 2 drives, 348k memory, Hercules, CGA or EGA graphics and DOS 2.1 or later.  
 FXN-DOS (MS-DOS) **SAVE \$15.00 \$19.95**  
 FXN-C64 (C-64 computer) **SAVE \$25.00 \$9.95**  
 XN-DX (slide rule version) **\$22.95**

# ORDER INFORMATION

**Call (800) 457-7373 8AM-5PM EST**

**ORDERS ONLY**

**INFORMATION**  
 For More information about an order call  
**(603) 878-1441**

**SHIPPING AND HANDLING**  
 \$3.75 to US and Canadian addresses.  
 All other addresses FOB Greenville, NH USA plus \$3.75 handling. COD orders add an additional \$5.00. UPS Blue or Red cost plus \$3.75 handling.

24 hour FAX Line (603) 878-1951

**CQ'S HAM RADIO BOOKSTORE**  
 Your Amateur Radio Book Source

GREENVILLE, NH 03048



**Announcing:**

# The 35th Annual CQ World-Wide WPX Contest

**SSB: March 30–31, 1991**

**CW: May 25–26, 1991**

**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 or (b) Single Band (one entry per operator). Only one transmitted signal permitted at any time. 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). (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 boundaries 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. The letter/numeral combinations which form the first part of the amateur call will be considered the prefix. Examples: N8, W8, Y22, Y23, WD8, HG1, HG19, WB2, WB200, KC2, KC200, OE2, OE25, U3, GB75, ZS66, NG84, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country or call area of operation. In cases of portable operation, the portable designator would then become the prefix. Example: N8BJQ operating from Wake Is. would sign N8BJQ/KH9 or KH9/N8BJQ, and KH6XXX operating from Ohio would not sign /KH8 which is normally assigned to American Samoa, but could sign /W8, /N8, /K8, etc., or any other prefix authorized for use in the US 8th district. Portable designators without numbers will be assigned a zero (0) after the second letter of the designator to

form the prefix. Example: N8BJQ/PA would become PA0. All calls without numbers will be assigned a zero (0) after the first two letters to form the prefix. Example: XEFTJW would count as XE0, RAEM would count as RA0, etc. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

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

CARIB./C.A. - Auturo Gigante, Jr., HI8GB

EUROPE - Jim Hoffman, N5FA

\*JAPAN - The DX Family Foundation

SO. AMERICA - Ron Moorefield, W8ILC

ARABIAN GULF - Don Greenbaum,

WB2DND

WORLD QRPp - Dayton A.R.A.

##### **Single Operator, Single Band**

WORLD - John N. Reichert, N4RV

\*WORLD 21 MHz - Lee Wical, KH6BZF

EUROPE - Myron E. Crofoot, WB4VQO

U.S.A. 3.7 MHz - Lance Johnson Engineering

U.S.A. 14 MHz - Doug Zwiebel, KR2Q

U.S.A. 21 MHz - Bernie Welch, W8IMZ Memorial

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

NORTH AMERICA - James Dixon, NL7HI

(Burt Curwen, KL7IRT Memorial)

U.S.A. - Glenn Tracey, KC3EK

##### **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.)

##### **Single Operator, Single Band**

WORLD - Pedro Piza, Jr., NP4A

(Pedro Piza, Sr., KP4ES Memorial)

WORLD 3.5 MHz - Lance Johnson Eng.

U.S.A. - Kansas City DX Club

U.S.A. 28 MHz - Walt Smith, K1DWQ

(Bernie Welch, W8IMZ Memorial)

U.S.A. 21 MHz - Wayne Carroll, W4MPY

U.S.A. 14 MHz - Gene Walsh, N2AA

U.S.A. 7 MHz - Dennis Younker, NE6I

##### **Multi-Operator, Single Xmtr.**

WORLD - Ron Blake, N4KE

U.S.A. - Austin Regal, N4WW

##### **Multi-Operator, Multi-Xmtr.**

WORLD - Roger Burt, N4ZC

##### **Contest Expedition**

WORLD - Ed Roller, K4IA

•••

##### **Combined SSB/CW**

EUROPE - SINGLE OPERATOR, ALL

BAND - Les Nouvelles DX Group

##### **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.*

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 eligible for an award, a minimum of three logs must be received from a club.

**XIII. Log Instructions:** 1. All times must be in GMT. All breaks must be clearly marked. Single operator and multi-single logs must be submitted in chronological order. Multi-multi logs must be submitted chronologically by band.

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 alpha/numeric check list of claimed PREFIX multipliers must be submitted with your log.

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.

7. Contest logs may be submitted on disk. Logs submitted on disk must contain all required information (Time, Band, Call, RST & NR Sent, RST & NR Rcvd, Multiplier, and QSO Points). Files must be in ASCII format and in chronological order for single operator and multi-single entrants. Multi-multi entrants should submit logs chronologically by band. Other file formats (.bin, .res, .dbf, .wks) are acceptable. A sorted multiplier file is also required. Only MS-DOS compatible disks will be accepted (either 5¼ or 3½ inch). A written summary sheet must accompany the disk, showing all required scoring information, the category of competition, off times, and the normal signed declaration, as well as your name and address. The original log may be requested for cross-checking.

**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 post-marked no later than **May 10, 1991** for the SSB section and **July 10, 1991** 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., or via packet to the following: N8BJQ @W8BI.OH.U.S.A.NA.



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

# "The Best Prize Life has to Offer is the Chance to Work Hard, at Work Worth Doing"

*Teddy Roosevelt*

CIE, the world leader in home study electronics, provides the quality training and hands on experience you'll need to exceed in these exciting career opportunities in electronics.



Data Communications



Avionics



Computer Assisted Manufacturing

Research and Development Technician • Medical Technician • Junior Engineer • Instructor • Instrumentation Technician • Field Service Engineer • Engineering Technician • Design Technician • Computer Technician • Automated Equipment Technician • Digital Technician • Automotive Technician • Audio Technician • Customer Engineer • Robotics Engineer • Industrial Maintenance Technician • Mobile Radio Technician • Marine Technician • Communications Technician • Transmitter Engineer • Broadcast Engineer...

If you want a job worth doing you'll need the education CIE has been providing their graduates (over 150,000 of them) for over half a century.

Getting started is easy! Just fill out the coupon below and mail it today for your free catalog about the facts on a career in Electronics.

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Age \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_



**CLEVELAND INSTITUTE OF ELECTRONICS**  
 1776 East 17th Street  
 Cleveland, Ohio 44114  
 (216) 781-9400

ACQ-18

# CQ SHOWCASE

## Palomar Engineers SCAF Filter

Palomar Engineers' audio filter Model PF-300 uses the switched-capacitor audio-filter technique to give excellent skirt selectivity, typically twice as sharp as the IF filters in transceivers, maker says. For AM and SSB reception it features a 16th-order low-pass filter with cutoff frequency variable from 3000 Hz



down to 300 Hz. There is also a 600 Hz high-pass filter to eliminate hum and rumble. For CW reception the PF-300 has a 16th-order bandpass filter with three bandwidths: 250 Hz, 100 Hz, and 45 Hz. The filter frequency is variable from 300 to 3000 Hz.

The filter connects between the speaker or headphone output of the receiver and a speaker. Audio output is up to 5 watts. The PF-300 is priced at \$99.95. For further information contact Palomar Engineers, P.O. Box 455, Escondido, CA 92033, or circle number 102 on the reader service card.

## Ashton ITC's SCORPIO

Ashton ITC has announced SCORPIO, which stands for Shortwave Computer Operated Radio Plus Input/Output. It combines intelligent scanning based on a flexible database search, with simultaneous automated digital signal decoding and data capture. SCORPIO can be interfaced with ICOM and Kenwood computer-ready receivers. In addition, RS-232 All Mode Terminal units such as those manufactured by AEA, Kantronics, MFJ, Tonno, and others may be interfaced to the program. SCORPIO allows the user to build databases (log files) which can include a received station's identification, location, frequency, mode, time of operation, agency or type of service, signal level, date heard, and any pertinent remarks. These databases may contain thousands of entries and may be sorted and searched by any category. An AutoLog function can even record "hits" to disks during a scan and convert the resultant file to a database.

LogScan not only allows the intelligent scan of an interfaced radio based on the user's search criteria, but also has several other options. The Duration (time to stay on each frequency) can be set from 3 seconds up. A UTC option when enabled will scan only those frequencies which according to their time entry are currently on the air as the scan progresses. The frequency range option allows setting upper and lower limits to the scan. A memory write option lets the user selectively load the radio's memories. The time off option automatically terminates the scan at a set

time. SCORPIO includes a comprehensive user's guide and a sample database containing 100 of the most popular HF utility and SW broadcast frequencies. The program sells for \$89.95 and is available directly from Ashton ITC, P.O. Box 830, Dandridge, TN 37725, or for more information, circle number 101 on the reader service card.

## Tripp Lite Line Conditioner

The Tripp Lite LC-2400 Line Conditioner provides voltage regulation and power line conditioning for operating computers and other sensitive electronic equipment. The LC-2400 provides up to 2400 watts of power from its six spike-protected AC output receptacles. Three isolated filter banks provide equipment protection. Isolation prevents equipment plugged into the unit from causing interference with each other. The LC-2400 comes in a compact cabinet and features input voltage monitoring lights, 20 amp circuit breaker, heavy-duty AC

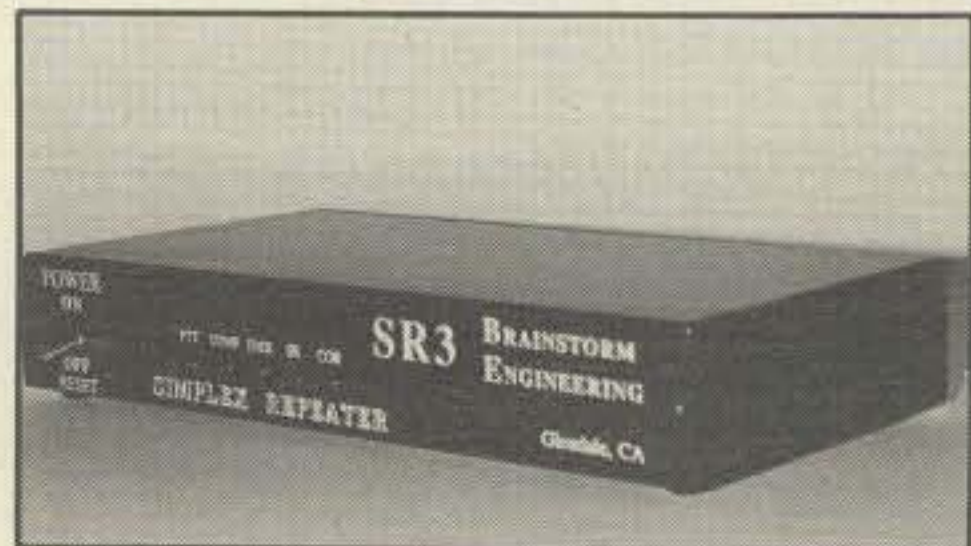


power cord, and two-year warranty. Complete spike, line noise, and RFI/EMI filtering is built-in, so external surge suppression is unnecessary.

The LC-2400 has a suggested retail price of \$399. For more information, contact Tripp Lite, 500 N. Orleans, Chicago, IL 60610-4188, or circle number 104 on the reader service card.

## Brainstorm Engineering Simplex Repeater

In simplex repeater mode the SR3 will automatically record and playback a message. When the SR3 detects a carrier it will begin to digitally record the audio being received by the radio to which you have connected it. When



the carrier drops, the SR3 stops recording and keys the radio (PTT) and transmits the audio it just recorded. This allows two or more mobiles to have a simplex conversation when they are

not in range of one another but in range of the simplex repeater site. When the SR3 is in voice mail mode, it can record and save a message for another station to retrieve at a later time when they come on the air. Retrieving a message can be accomplished by either entering DTMF command or pressing the PTT button. A message can be replayed as many times as desired. The SR3 can be connected to a repeater as a voice IDer. It has a built-in timer adjustable from approximately 10 seconds to 20 minutes. You can configure it to use its built-in timer, or use your repeater to force the ID. With the use of the SR3's built-in DTMF decoder, you can change your ID message from any mobile radio at any time.

Maximum message length is 64 seconds (with all 4 SRAM chips installed). The SR3 comes with 1 SRAM chip installed with 16 seconds of message time. Each additional chip will hold an additional 16 seconds of audio. The unit is being introduced at \$329 (includes PL decoder). For more information, contact Brainstorm Engineering, P.O. Box 415, Montrose, CA 91021-0415, or circle number 110 on the reader service card.

### MFJ-207 HF SWR Analyzer

MFJ's new MFJ-207 HF SWR Analyzer instantly gives you a complete picture of your antenna SWR over an entire band without a transmitter, SWR meter, or any other equipment. Plug your antenna into the coax connector, set your MFJ-207 HF SWR Analyzer to the frequency you want, and read your SWR. The bat-



tery-operated, handheld analyzer can be taken to an antenna and the SWR of the antenna measured directly. The distorting effects of the coax can be eliminated. SWR changes can be monitored as adjustments are made to your beam or vertical, and more.

The MFJ-207 is several instruments in one. It has a low-distortion RF generator that covers 10-160 meters, an SWR bridge that gives forward and reflected components, and a computing circuit that automatically computes the SWR and displays it on the meter. Everything is automatic. All you do is set the frequency and read the SWR. It has a frequency counter output so you can connect your frequency counter for precise digital readout. The MFJ-207 runs on a 9 volt battery (not included) or 110 VAC with optional MFJ-1312, \$12.95. It measures 7 1/2" x 2 1/2" x 2 1/4". It comes with

MFJ's one-year unconditional guarantee. For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 108 on the reader service card.

### GGTE Morse Tutor Advanced Edition

GGTE has introduced Morse Tutor, Advanced Edition, a software program that helps amateur radio operators obtain their license by teaching them the international Morse code. Morse Tutor, Advanced Edition also helps hams increase their speed. It is comprised of four separate modules: (1) A com-

plete and enhanced copy of the Morse Tutor program; (2) An automatic random QSO (conversation) generator that may be used by students, instructors, and volunteer examiners; (3) A unit allowing users to create QSOs, exams, or practice copy for characters difficult to master; and (4) A module enabling users to import a text file created with the program or with any word processor allowing users to save work as a text (unformatted ASCII) file. Morse Tutor, Advanced Edition requires 235K bytes of free memory and is compatible with the IBM PC Jr, PC, XT, AT, or PS/2, including Plasma and LCD lap-tops. Modules which include printing analyses and QSOs support laser and dot matrix printers. The Advanced Edi-

**rfe**

**RF ENTERPRISES**

TO ORDER: 1-800-233-2482

Service & Info: 218-765-3254 Fax: 218-765-3308

### ROHN TOWERS

#### SELF-SUPPORTING

(6 sq. ft. model)

BX64 64 ft. ....\$Call

(10 sq. ft. models)

HBX40 40 ft. ....\$Call

HBX48 48 ft. ....\$Call

HBX56 56 ft. ....\$Call

(18 sq. ft. models)

HDBX40 40 ft. ....\$Call

HDBX48 48 ft. ....\$Call

(Ratings based on 10 ft. boom.)

#### GUYED TOWERS

25G, 45G, 55G & accessories.

Call for current prices.

#### FOLD-OVER TOWERS

### ANTENNAS

#### TELEX/hy-gain

#### Crank-up towers: 37-70'

TH7DXS: 7-el. tribander  
TH5 Mk2: 5-el tribander  
Explorer-14: tribander  
Discoverer: 40 Meter beams  
205CA: 5-el, 20 M. beam  
204BAS: 4-el, 20 M. beam  
155BAS: 5-el, 15 M. beam  
105BAS: 5-el, 10 M. beam  
18HTS & 18ATV/WBS: verticals  
DX-88: **NEW!** HF vertical  
V2S: V3S: & V4S  
215-DX: 15 el. 144 MHz beam  
7031-DX: 31 el. 432 MHz beam  
64BS & 66BS: 6 Meter beams  
OSCAR Link Antennas

Complete inventory. Call!

### CUSHCRAFT

A3S Tribander  
A4S Tribander  
A3WS 3-el WARC beam  
R5 (10,12,15,17,20) **SPECIAL!**  
AP8 (80 - 10 Vertical)  
AV5 (80 - 10 Vertical)  
A50-5 5-el 6M. beam  
617-6B 6 Mtr "Boomer"  
ARX-2B, -220B, -450B, AR-270  
215WB 15-el wide band 2M  
32-19 19-el. 2M beam  
4218XL 18-el 2M Boomer  
424B 24 el. 432 MHz  
AOP-1 OSCAR pack

Call for prices on the entire line!

VISA Mastercard  
Telecheck

Prices subject to change without notice.  
Shipping additional except as noted. Returns  
subject to 20% restocking fee. No antenna or  
tower returns.

ICOM



TEN-TEC

YAESU

NYE-VIKING AMECO BENCHER HEIL SHURE KANTRONICS  
ALINCO MIRAGE RF CONCEPTS AMERITRON ALLIANCE  
ORION ALPHA DELTA DIAMOND KLM HUSTLER & MORE

### MFJ



949D TUNER

Complete inventory!

### HEATH

SB-1000 Linear Kit  
SA-2060 Tuner Kit HT's  
Packet Gear HW-9 QRP Rig  
Twin Band Mobile Xcvrs

Call us to order HEATH gear!

### AEA



PK-232 MBX

Morse, Baudot, ASCII, AMTOR,  
Packet, Facsimile, & Navtex  
ISOPOLES & ISOLOOPS

### ASTRON POWER SUPPLIES

RS-4A	RS-7A	RS-12A
RS-20A	RS-35A	RS-50A
RS-20M	RS-35M	RS-50M
VS-20M	VS-35M	VS-50M

CALL US FOR YOURS!

### WIRE & CABLE

#### BELDEN COAX: (Performance ... not problems)

9913 low loss; 50 ohm.	RG-8X (9258) 50 ohm; foam
RG-213/U (8267) 50 ohm. Mil-spec.	RG-11A/U (8261) 75 ohm.
RG-8/U (8237) 50 ohm.	RG-58A/U (8259) 50 ohm.
RG-8/U (8214) 50 ohm. Foam.	RG-59/U (8241) 75 ohm.
RG-214/U (8268) 50 ohm, double shield.	

Don't settle for less than the best. Call us for Belden.

#### COPPERWELD ANTENNA WIRE:

Solid: 12 ga.; Solid: 14 ga.; & Stranded 14 ga. Cut to your specs.

#### ROTOR CABLE:

Standard(6-22, 2-18) Heavy Duty(6-18,2-16)

We stock Amphenol Connectors and Andrew Heliax.  
Connectors Installed! Jumpers & custom cable assemblies.

Happy Holidays!

RF ENTERPRISES

HCR Box 43

Merrifield, MN 56465

tion supports either the standard or Farnsworth mode.

Other new features include importing from any subdirectory and converting text files to Morse code; on-screen analysis of drills and computer-generated QSOs; save to any subdirectory on disk and print drills and computer-generated QSOs; hundreds of color schemes to choose from; word and character speeds adjustable in tenths of a word per minute; and more. Suggested retail price for Morse Tutor, Advanced Edition is \$29.95. This includes free updates for a full year from the date of purchase. For more information, contact GGTE, P.O. Box 3405, Newport Beach, CA 92659, or circle number 105 on the reader service card.

### SW.I.F.T. ASP Version 3.0

ASP Version 3.0 (Amplifier Simulation Program) is the latest version of the program avail-

able from SW.I.F.T. Enterprises providing narrow-band, weak-signal transistor amplifier design not requiring in-depth technical knowledge. ASP provides a low-cost alternative for the designer in developing functional transistor amplifiers. User interface routines along with liberal use of help pop-up screens are used in guiding the user to the final design. Safeguards are imbedded in the program and will handle most unusual conditions or flag the user. Performance of devices can be viewed by the designer under user selectable source and load conditions. The program comes with automatic and user interactive design routines, performance data, matching circuits, auto "Q," and a NF optimizing utility. Design defaults are accessible to the user and can be changed. Maximum safe input source impedances are indicated for the device being used. A screen plotting utility is included to show

stability, gain, noise figure, and output VSWR. Matching circuit component values can be changed to "tweak" the circuit. Full design documentation can then be printed out. Color coded stability indicator has been added to the plotting routine and the NF optimizing utility. Updated documentation, device library, and theory files are included. Sterns' constant K design routines have been added to the program. New pop-up help screens provide additional information.

ASP Version 3.0 requires DOS 2.11 or later and requires EGA or higher. A Math Co-Processor is recommended. Price is \$75.00 plus \$2.50 shipping (US). For more information, contact SW.I.F.T. Enterprises, 955 Concord Lane, Hoffman Estates, IL 60195, or circle number 109 on the reader service card.

### ACE Communications 2000 Channel Receiver

ACE Communications has announced a scanning monitor which features 2000 channels, broad coverage, and high-speed scanning. Additionally, the unit has a built-in interface to a computer's RS232 port for programmed, unattended, control and frequency surveillance logging. The radio is designed for either tabletop or underdash use, has dimensions of 2 1/4 "H x 5 5/8 "W x 6 1/2 "D, and weighs 1 lb. 2 oz. Frequency coverage of the receiver



allows it to pull in distant shortwave broadcasts from all over the world in addition to being able to listen to super high frequency microwave broadcasts and everything in between. The design of the unit assures an extremely high level of image rejection, maker says. Sensitivity will typically be better than .35 uV @ 12 dB Sinad in narrow band FM from 10 MHz to 1.5 GHz. AM sensitivity in the 5 MHz to 1.0 GHz range is better than 1.2 uV for 10 dB S/N. Tuning increments are 5 kHz, 12.5 kHz, plus 25 kHz and are user selectable. A BFO for SSB/CW ability is included in the unit.

The receiver is capable of scanning 62 banks of 32 frequencies each for a total of 1984 scanned frequencies. An additional 16 memory locations are set aside for beginning and ending search limit frequency pairs. Bank 1 can be designated as a priority bank, thus giving higher priority to up to 32 different frequencies. The scan rate of 36 channels or search increments per second will automatically slow to compensate for tuning lags if adjacent frequencies are more than 30 MHz apart. A built-in RS232 interface device allows the radio to be controlled or programmed by any computer with a standard serial port. A suggested retail price of \$499 has been set for the unit. An optional software package is available to handle frequency databases and provide spectral analysis graphics. For more information, contact Ace Communications, Monitor Division, 10707 East 106th Street, Indianapolis, IN 46256, or circle number 106 on the reader service card.

## ELENCO & HITACHI PRODUCTS AT DISCOUNT PRICES

<b>NEW!</b> RSOs (Real-Time & Storage Oscilloscopes) From HITACHI <b>NEW!</b> The RSO - its the new solution View, Acquire, Test, Transfer and Document Your Waveform Data		<b>Compact Series Scopes</b>  Delayed Sweep Lightweight (13lbs) 2mV Sens 3 Yr Warranty Model V-1065 Shown	
<b>4-Channel, 100MS/s Model</b> 100MS/s (25MS/s on 4 channels simultaneously), 100MHz, 4kw x 1ch., 2kw x 2ch., 1kw x 4ch. VC-6145 \$4,695.00		This series provides many new functions such as CRT Readout, Cursor measurements (V-1085/1065/665), Frequency Ctr (V-1085), Swepttime Autoranging and Trigger Lock using a 6-inch CRT. You don't feel the compactness in terms of performance and operation.	
<b>Compact, Full Feature Models</b> 40MS/s, 100MHz, 4kw x 1ch., 2kw x 2ch. VC-6045 \$3,049.00 20MS/s, 50MHz, 2kw x 2ch. VC-6025 \$2,295.00		V-660 60MHz Dual Trace \$1,195 V-665 60MHz Dual Trace w/Cursor \$1,345 V-1060 100MHz Dual Trace \$1,425 V-1065 100MHz Dual Trace w/Cursor \$1,695 V-1085 100MHz Quad Trace w/Cursor \$2,045 V-1100A 100MHz Quad Trace w/Cursor \$2,295 V-1150 150MHz Quad Trace w/Cursor \$2,775	
<b>Low Cost/High Value Models</b> 20MS/s, 50MHz, 2kw x 2ch. VC-6024 \$2,049.00 20MS/s, 20MHz, 2kw x 2ch. VC-6023 \$1,749.00		<b>FREE DMM</b> with purchase of <b>ANY SCOPE</b> <b>SCOPE PROBES</b> P-1 65MHz, 1x, 10x \$19.95 P-2 100MHz, 1x, 10x \$23.95	
RSOs from Hitachi feature such functions as roll mode, averaging, save memory, smoothing, interpolation, pretriggering, cursor measurements, plotter interface, and RS-232C interface. With the comfort of analog and the power of digital.			

<b>WE NOW CARRY COMPLETE LINE OF FLUKE MULTIMETERS Models</b> 21F 83 23F 85 25F 87 27F 8050A 73 8060A 75 8062A 77F + More <b>CALL FOR SPECIAL PRICING</b>	<b>True RMS 4 1/2 Digit Multimeter M-7000</b> <b>\$135</b> .05% DC Accuracy .1% Resistance with Freq. Counter and deluxe case	<b>10 Function Multimeter CM-365</b> <b>\$65</b> AC + DC Voltage & Amps Resistance to 2000MΩ Diode, Logic, & Trans test Capacitance to 200uF	<b>Digital Capacitance Meter CM-1550</b> <b>\$58.95</b> 9 Ranges .1pF-20,000uF .5% basic accy Zero control with case	<b>Digital LCR Meter LC-1801</b> <b>\$125</b> Measures: Coils 1uH-200H Caps .1pF-200uF Res. .01-20M
<b>Function Generator Blox</b> <b>\$28.95</b> Provides sine, triangle, square wave from 1Hz to 1MHz AM or FM capability	<b>Triple Power Supply XP-620</b> <b>Assembled \$65          Kit \$45</b> 2 to 15V at 1A, -2 to -15V at 1A (or 4 to 30V at 1A) and 5V at 3A	<b>Wide Band Signal Generators SG-9000</b> <b>\$129</b> RF Freq 100K-450MHz AM Modulation of 1KHz Variable RF output SG-9500 w Digital Display and 150MHz built-in Counter \$249		
<b>Soldering Station Temperature Controlled SL-30</b> \$99 Digital display Temp range: 300F-900F Grounded tip Overheat protect	<b>Color Convergence Generator SG-200</b> <b>\$69.95</b> Finest in the industry 10 rock steady patterns	<b>10MHz Oscilloscope S-3000</b> <b>\$275</b> 10MHz DC or AC Triggered Sweep Calibrated Vert & Hor Reads Volts & Freq	<b>Temperature Probe M-110CF</b> <b>\$29.95</b> Semiconductor type Range -58F-302F Fits most digital multimeters	<b>Autoranging DMM M-5000</b> <b>\$45</b> 9 Functions Memory and Data hold 1/2 % basic acc 3 1/2 digit LCD
<b>AC Current Meter ST-1010</b> <b>\$69.95</b> 1000 Ampe Data & Peak hold 8 Functions Deluxe Case	<b>Decode Blox</b> <b>\$96.10 or \$96.20</b> <b>\$18.95</b> #9610 Resistor Blox 47 ohm to 1M & 100K pot #9620 Capacitor Blox 47pF to 10MFD	<b>Quad Power Supply XP-560</b> <b>\$59.95</b> 2-20V at 2A 12V at 1A 5V at 3A -5V at .5A Fully regulated and short circuit protected XP-575 without meters \$39.95		
<b>Digital Triple Power Supply XP-765</b> <b>\$249</b> 0-20V at 1A 0-20V at 1A 5V at 5A Fully regulated, Short circuit protected with 2 limit control, 3 separate supplies XP-860 with Analog Meters \$175	<b>GF-8016 Function Generator with Freq. Counter</b> <b>\$249</b> Sine, Square, Triangle Pulse, Ramp, 2 to 2MHz Freq Counter .1 - 10MHz GF-8016 without Freq. Meter \$179	<b>LEARN TO BUILD AND PROGRAM COMPUTERS WITH THIS KIT!</b> INCLUDES: All Parts, Assembly and Lesson Manual <b>Model MM-8000</b> <b>\$129.00</b> Starting from scratch you build a complete system. Our Micro-Master trainer teaches you to write into RAMs, ROMs and run a 8085 microprocessor, which uses similar machine language as IBM PC. You will write the initial instructions to tell the 8085 processor to get started and store these instructions in permanent memory in a 2816 EPROM. Teaches you all about input and output ports, computer timers. Build your own keyboard and learn how to scan keyboard and display. No previous computer knowledge required. Simple easy to understand instruction teaches you to write in machine language. <b>ROBOTICS KIT FOR ABOVE (MM-8010) \$71.95</b>		

**WE WILL NOT BE UNDERSOLD!** UPS Shipping: 48 States 5% (\$10 Max) IL Res., 7% Tax **C & S SALES INC.** 1245 Rosewood, Deerfield, IL 60015 (800) 292-7711 (708) 541-0710 **15 Day Money Back Guarantee** **2 Year Warranty** Prices subject to change **WRITE FOR FREE CATALOG**

CIRCLE 43 ON READER SERVICE CARD

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  
**WE SHIP WORLDWIDE!**



Ring in the New Year  
With the best of Barry's New Gear

## KENWOOD



TS440S/AT, R-5000, TS-940 S/AT, TM 241A/441A, TM-2570A/50A, TR-751A, Kenwood Service Repair, TM-731A, TS-711/811A, TH205AT, TH225A, TM-631A, TM-331A, TS140S, TS680S, RZ-1, TS-790A, TS950SD, TH-77A, TH27/47AT, TM-941A

AMPLIFIERS STOCKED:  
RF Concepts  
Mirage  
TE Systems

MARINE RADIOS  
ICOM M5, M56, M700TY, M800  
AVIATION PORTABLE ICOM A-20  
KING KX-99

Budwig ANT. Products  
FLUKE 77, 83, 85, 87 Multimeters

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.



DRSI

ONV Safety  
belts-in stock

YAESU

FT-767GX, FT-757GXII, FT-747GX,  
FRG-8800, FT-736R, FT-1000D,  
FT-4700RH, FT 212/712RH, FT-470

YAESU ICOM  
FT-23R IC2/3/4SAT  
FT411E-811-911 IC02AT/32AT  
FTC-1903/1123 IC2/4GAT/24AT  
FTH-2008/7008 IC-A20/U16

Landmobile HT's  
ICOM: U16, H16, V100, U400  
MAXON, MOTOROLA,  
YAESU: FTH 2008/7008  
UNIDEN, REGENCY, KING,  
MARINE ICOM: M5, M56, M700  
AVIATION ICOM: A20 H.T., TAD



IC-32AT



IC-H16/U16



MOTOROLA RADIUS  
COMMERCIAL RADIOS  
TH-77A



FT-470



ICOM

IC-R71A, 751A, 781, 229H, R-7000,  
IC-765, 275A/H, 3220A, 475A/H, 735,  
IC-901, IC725, IC-2400A/2500A



CES

Simplex Autopatch SDI-50 Will Patch FM  
Transceiver To Your Telephone. Great For  
Telephone Calls From mobile To Base. Simple  
To use. SDI-50, SS1-68.



Connect Systems (CSI)  
PRIVATE PATCH V, Duplex 8200,  
CS700

TUNERS STOCKED:  
NYE MBV-A 3 Kilowatt Tuner



MFJ-989C

Covercraft/Coaxseal Stocked

SHORTWAVE RECEIVERS  
STOCKED

JRC  
NRD-525,  
JST135

## Panasonic

Shortwave Radios/Marine

FREQUENCY  
COUNTERS:  
1MHz-1.3GHz

COMMERCIAL  
& HAM  
REPEATERS  
STOCKED.  
WRITE FOR  
QUOTES

Kantronics  
KAM, KPC II,  
KPC IV, Data Engine,  
DVR 2.2

MOTOROLA AUTHORIZED DEALER  
KACHINA COMMUNICATIONS DEALER

## AUTHORIZED SONY

DEALER

DIGITAL FREQUENCY COUNTERS  
OPTOELECTRONICS model 1300 H/A, 0-1300MHz  
2210 H, 0-2200 MHz, 2600H, UTC-3000

Long-range Wireless  
Telephone for export in stock

BENCHER PADDLES,  
BALUNS, LOW PASS FILTERS  
IN STOCK

MIRAGE AMPLIFIERS  
ASTRON POWER SUPPLIES  
Belden Wire & Cable, Int'l Wire  
OPTO KEYERS STOCKED

Radios for Business,  
Gov't, 2-way, etc.  
Stocked & serviced,  
call for great prices!

COMET ANTENNAS  
STOCKED

HEIL  
EQUIPMENT  
IN STOCK

Media Mentors—  
Amateur Radio Course



New TEN-TEC  
PARAGON, OMNI V

Hy-Gain Towers  
will be shipped  
direct to you  
FREE of  
shipping cost.

AMERITRON AUTHORIZED DEALER

Wanted: HF Radio Technician

VoCom/Mirage/Alinco  
Tokyo Hy-Power/TE SYSTEMS  
Amplifiers & 5/8λ HT Gain  
Antennas IN STOCK

G&G ELECTRONICS ART1,  
Air Disk, SWL, Morse Coach

Computer Interfaces  
Stocked: MFJ-1270B,  
MFJ-1274, MFJ-1224, AEA  
PK-88, MFJ-1278T, PK-232 MBX  
W/FAX, DRSI PRODUCTS

Professional  
Soldering  
Station  
48 Watts  
\$79

METRON  
KW HF Mobile  
Amplifier  
Stocked

AOR, AR-1000—wide  
range, hand held scanners

Alpha Delta  
Products  
Stocked



EIMAC  
3-500Z  
572B, 6JS6C  
12BY7A &  
6146B

AEA Isopoles  
(144, 220, 440  
MHz), IsoLoop.

BIRD  
Wattmeters &  
Elements  
In Stock



MAIL ALL ORDERS TO: BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012 (FOUR BLOCKS NORTH OF CANAL ST., BETWEEN SPRING AND BROOME 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)

IRT/LEX—"Spring St. Station". Subways: BMT-  
"Prince St. Station", IND—"F" Train-Bwy Station"

Bus: Broadway #6 to Spring St. Path-9th St./6th Ave.  
Station.

COMMERCIAL RADIOS  
STOCKED: ICOM, Motoro-  
la, MAXON, Standard,  
Yaesu. We serve municipi-  
palities, businesses, Civil  
Defense, etc. Portables,  
mobiles, bases, re-  
peaters...

ALL  
SALES  
FINAL

Technical help offered upon purchase

We Stock: AEA, ARRL, Ameco, Ameritron, Antenna Specialists, Astatic, Astron, B&K, B&W, Bencher, Bird, Butternut, CDE, CES, Cushcraft, Daiwa, Eimac, Henry, Heil, Hustler, Hy-Gain, Icom, KLM, Kantronics, Larsen, MFJ, J.W. Miller, Mirage, Nye, Palomar, RF Products, Saxton, Shure, Tempo, Ten-Tec, TUBES, Yaesu, Vibroplex, Duplexers, Repeaters, Scanners, Radio Publications, Uniden, Kenwood, Maxon, RFC.

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

FAX: 212-925-7001

## NEWS OF COMMUNICATION AROUND THE WORLD

### The Most Wanted Countries

**W**hat separates the DX men from the boys? What is the biggest obstacle to overcome to reach the DXCC Honor Roll? DXpeditions to which countries cause the most excitement? The answer to all these questions is the Most Wanted Countries.

Every year *The DX Bulletin* surveys its 9000 readers worldwide and compiles an accurate, up-to-date list of the Most Wanted Countries. The 1990 Most Wanted Countries survey results are printed in the December 1990 issue of *The DX Magazine* and summarized here. In Table I are the Top 25, with 1990 rank, country name, prefix, percent of respondents "needing" the country, and the rank of the country in the 1989 Most Wanted Countries survey.

The DXers who responded to the survey had an average of 285 countries confirmed, so the survey results represent the needs of the serious DXers. Note that the percentage who need a given country falls off rapidly after the Top Five.

#### The Top Ten

The Top Ten Most Wanted Countries are familiar names to experienced DXers. **Albania** maintains its Most Wanted position another year. The Hungarian team that gave many DXers their first contacts with Vietnam 3W, Laos XW, and Kampuchea XU have held fruitful discussions with Albanian authorities about amateur radio, but they have not yet managed to put the Most Wanted Country on the air. However, the tight controls over outside contacts and travel in Albania have been relaxing over the past couple of years, and a ZA operation appears to be only a matter of time.

**Burma** also maintains its number two position in the 1990 survey. Again, HA5PP and HA5WE have both visited Burma and had productive meetings about amateur radio. As with Albania, however, the outcome of these meetings has fallen short of operating permission. Burma holds the distinction of being the DXCC country that has been off the amateur bands for the longest time. The last accredited operation from Burma was in 1965 by the notorious Don Miller.

1990 Rank	Country	Prefix	Percent Needing	1989 Rank
1	Albania	ZA	89	1
2	Burma	XZ	85	2
3	Afghanistan	YA	76	5
4	Yemen	4W	71	6
5	South Sandwich Islands	VP8	68	11
6	PDR of Yemen	7O	63	4
7	Bangladesh	S2	62	7
8	Ethiopia	ET	57	13
9	Malpelo Island	HK0	57	18
10	Peter Island	3Y	56	14
11	Agalega & St. Brandon Is	3B6	55	17
12	Bhutan	A5	55	9
13	Mount Athos	SV/A	54	22
14	Tromelin	FR/T	54	12
15	Libya	5A	49	25
16	Glorioso Island	FR/G	48	28
17	Andaman	VU7	48	29
18	San Felix	CE0	47	31
19	Spratly Island	1S	47	10
20	Heard Island	VK0	46	33
21	Laccadive Island	VU7	46	26
22	Malagasy Republic	5R	46	32
23	South Georgia Island	VP8	45	21
24	Kampuchea	XU	44	15
25	Tunisia	3V	43	35

Table I—The top 25 of the 1990 Most Wanted Countries survey conducted by The DX Bulletin. The survey results represent the needs of serious DXers.

Moving up to the number three slot is **Afghanistan** YA. Afghanistan has not been on the air (legitimately) since 1973. The two **Yemens** 7O and 4W take fourth and sixth positions. The 7O1AA and 7O8AA operations took place after the survey was conducted. Besides, these countries will most likely be deleted from the DXCC country list soon. Hanging on to the number seven position is **Bangladesh** S2. Again, the S2VT and S21U operations occurred too late in the year to be reflected in the survey results. Look for both the new Yemen 7O and Bangladesh to drop out of the Top Ten in the 1991 survey.

New to the Top Ten this year are **South Sandwich** VP8, **Ethiopia** ET, **Malpelo** HK0, and **Peter I Island** 3Y. All moved up from the Second Ten last year. Scheduled major DXpeditions to both South Sandwich and Malpelo in late 1990 will drop these countries well out of the Top Ten, if they were successful.

Gone from the 1989 Top Ten are **Bouvet** 3Y, **Laos** XW, and **Bhutan** A5. The **3Y5X** Bouvet operation knocked the country out of a tie for second Most Want-

ed all the way down to 46th position. The percentage of respondees "needing" Bouvet dropped from 82% to 34%. Laos also dropped far down the list, from eighth position and 67% needing it, down to 62nd position with 29% needing it. Bhutan dropped just a fraction, from 9th to 12th place. Percentage needing Bhutan dropped to 55% from 66%. Obvious-



Hiroo, JA2EZD, stopped by the XU8DX shack late last year to meet operator Sokun. Kampuchea ranked 24th on the Most Wanted Countries survey in 1990.



## The WPX Program

### Mixed

1472 ..... KB3WN 1473 ..... JH7IEJ

### SSB

2193 ..... GM0GMI 2199 ..... LU7HJM  
 2194 ..... EA3GBU 2200 ..... IK8IPD  
 2195 ..... TI2SAH 2201 ..... KB5GEO  
 2196 ..... JH6WMJ 2202 ..... K4JHT  
 2197 ..... XE1CI 2203 ..... N4THE  
 2198 ..... JA3WFR

### CW

2652 ..... WA0DFF 2654 ..... JH0BLI  
 2653 ..... CT7DRB 2655 ..... JA0BSL

### Endorsements

Mixed: 450 EA7TV, 500 EA7TV, 550 EA7TV, 600 VE3OMM, EA7TV, 650 VE7TV, K5IC, 700 EA7TV, K5IC, 750 EA7TV, K5IC, 800 EA7TV, K5IC, 850 EA7TV, K5IC, JE1DXC, 900 EA7TV, JE1DXC, K5IC, UA3FT, 950 EA7TV, JE1DXC, UA3FT, 1000 EA7TV, JE1DXC, UA3FT, 1050 JE1DXC, IK2FCZ, UA3FT, 1100 JE1DXC, IK2FCZ, UA3FT, 1150 IK2FCZ, UA3FT, 1200 UA3FT, 1250 UA3FT, 1300 UA3FT, 1350 UA3FT, 1400 UA3FT, 1450 UA3FT, 1500 UA3FT, 1550 UA3FT, 1600 UA3FT, 1650 KS3F, UA3FT, 1700 UA3FT, 1750 UA3FT, 1800 N4UH, UA3FT, 1850 UA3FT, 1900 UA3FT, 1950 KF2O, UA3FT, 2000 KF2O, W2FXA, I1POR, UA3FT, 2050 KF2O, I1POR, UA3FT, 2100 I8RFD, I1POR, UA3FT, 2150 I1POR, UA3FT, 2200 I1POR, UA3FT, 2250 I1POR, UA3FT, 2300 I1POR, UA3FT, 2350 I1POR, UA3FT, 2400 UA3FT, 2450 N2AC, UA3FT.

SSB: 350 DL8AAV, EA7TV, EA3GVU, JA6WMJ, XE1CI, IK8IPD, 400 EA7TV, TI2SAH, JA6WMJ, XE1CI, 450 EA7TV, TI2SAH, JA6WMJ, XE1CI, 500 EA7TV, TI2SAH, JH6WMJ, XE1CI, N6SFV, DF7YN, 550 EA7TV, TI2SAH, JH6WMJ, XE1CI, 600 EA7TV, JH6WMJ, XE1CI, WD8EOL, K8YVI, 650 EA7TV, XE1CI, KB8DAE, 700 EA7TV, XE1CI, 750 EA7TV, XE1CI, JH6WMJ, 800 EA7TV, XE1CI, IV3VCG, 850 EA7TV, XE1CI, KA0ZFX, IK8BMW, 900 EA7TV, XE1CI, IK8BMW, 950 EA7TV, XE1CI, IK8BMW, 1000 EA7TV, XE1CI, IK8BMW, 1050 IT9JKY, 1600 K5RPC, 1650 K5RPC, 1700 KF2O, K5RPC, I1POR, 1750 KF2O, I1POR, 1800 I8RFD, I1POR, 1850 I1POR, 1900 I1POR, 1950 I1POR, 2100 ZP5JCY, 2150 ZP5JCY, 2200 ZP5JCY, 2250 ZP5JCY, 2300 ZP5JCY, 2350 ZP5JCY, 3150 ZL3NS.

CW: 350 WA0DFF, JA0BSL, 400 JA0BSL, 450 JA0BSL, 500 IK8DDY, JA0BSL, JF6TUU, 550

VE3OMM, IK8DDY, YU2HF, I2KKL, JA0BSL 600 YU4BR, YU2HF, LA3GI, I2KKL, JA0BSL 650 YU4BR, I1POR, YU2HF, JA4BSL 700 YU4BR, I1POR, YU2HF, JA0BSL 750 JA3ARM, YU2HF, 800 YU4BR, YU2HF, 850 YU2HF, 950 IK3GER, 1100 I8RFD, 1150 SP6FER, 1200 SP6FER, 1250 KF2O, W8IQ, SP6FER, 1300 KF2O, W8IQ, SP6FER, 1300 KF2O, W8IQ, G4SSH, 1350 KF2O, OK2PO, W8IQ, 1400 OK2PO, 1450 OK2PO, 1500 OK2PO, 1650 IT9VDQ.

10 Meters: EA7TV, IK2FCZ  
 15 Meters: EA7TV, YU1PJ, JH6WMJ, JF6TUU  
 20 Meters: EA7TV, IK2AEQ, YU1PJ, WM0G  
 40 Meters: EA7TV  
 80 Meters: EA7TV

Asia: EA7TV, JH0BLI, LU7HJM, JH6WMJ  
 Africa: KF2O, EA7TV, JR4NUN  
 No. Amer.: EA7TV, IK2AEQ, NG9L, LU7HJM  
 So. Amer.: EA7TV, IT9JKY, LU7HJM  
 Europe: NG9L, WM0G, JH6WMJ, LU7HJM, EA7TV  
 Oceania: KF2O, EA7TV, N6SFV, JH6WMJ

**Award of Excellence Plaque Holders:** W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, W8BYTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2\*\*, AB9O, FM5WD, I2DMK, W4BOY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, H18LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB00/G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YLW4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC.

**Award of Excellence Plaque Holders with 160 Meter Endorsement:** VK9NS, DE0DXM, VE7IG, K9BG, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2\*\*, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BOY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YLW4, I4EAT, WB4RUA, VE7WJ, N4NX.

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.



DAN KB0—KIRBY KA0ZTS—LOUIS KA0IPN  
 RON N0KMR—DENISE YL—MALINE XYL—MIKE S00N

1-800-426-2891

# YAESU



FT-767 GX Gen. Cvg Xcvr	299.00	Call \$
FT-757 GX II Gen. Cvg Xcvr	299.00	Call \$
FT-7000 15m-150m AM	299.00	Call \$
FT-212RH 1.25m HT	199.00	Call \$
FT-712RH 70cm HT	199.00	Call \$
FT-290R All Mod. 2m HT	199.00	Call \$
FT-23 R/TT Mini HT	99.00	Call \$
FT-736R, All Mod. 2m HT	199.00	Call \$
FT-470 2m HT	199.00	Call \$
FT-747 70cm HT	199.00	Call \$
FRG 8800 HT Rcvr	199.95	Call \$
FRG 9600 UHF Rcvr	199.95	Call \$
FT 690 R/H	99.00	Call \$
FT 790 R/H	99.00	Call \$
FT 4700 Dual Band Mobile	199.00	Call \$
FT 411 2 Meter HT	96.00	Call \$
FT 811 440 HT	110.00	Call \$

# ICOM



IC-781 New Deluxe HF Rig	6149.00	Call \$
IC-765 Gen. Cvg Xcvr	3149.95	Call \$
IC-735 Gen. Cvg Xcvr	1149.00	Call \$
IC-751A Gen. Cvg Xcvr	1149.00	Call \$
IC-R7000 25-130cm	299.00	Call \$
IC-R71A 100 kHz Rcvr	99.00	Call \$
IC-228A/H FM Mobile	449.95	Call \$
IC-28A/H FM Mobile	449.95	Call \$
IC-2GA 2m HT	199.00	Call \$
IC-900 2m HT	199.00	Call \$
IC-3S AT 220 MHz	199.00	Call \$
IC-2S AT 2M	199.00	Call \$
IC-4S AT	199.00	Call \$
IC-48A FM Mobile	599.00	Call \$
IC-4GAT New	449.95	Call \$
IC-38A 25w Fm Xcvr	489.00	Call \$
IC-32AT 2m/70cm HT	629.95	Call \$

NOW

# Cushcraft CORPORATION

Alinco  
 Astron  
 Butternut  
 ARRL  
 Kantronics  
 Sony  
 Bencher  
 Larsen  
 Hustler  
 Lakeview  
 AEA  
 MFJ  
 Cushcraft  
 Vibroplex

Plus more ... Thanks for your support.

NOW CANADA

1-800-426-2891  
 METRO: (612) 786-4475  
 2663 County Rd. I  
 Mounds View, MN 55112

Super Minnesota Watts 1-800-279-1503

CIRCLE 134 ON READER SERVICE CARD

ly, the A51JS DXpedition by Jim Smith did little to satisfy the DX demand for this rare country.

## The Next Fifteen

Many of the countries that make up the Next Fifteen Most Wanted were in similar positions in the 1989 survey, as they didn't see any operations over the past year. Countries remaining in the Next Fifteen include **Agalega 3B6**, **Mount Athos SV/A**, **Tromelin FR/T**, **Libya 5A**, **Spratly 1S**, **South Georgia VP8**, and **Kampuchea XU**. The proposed VP8SGI DXpedition, Romeo's 1S0XV Spratly DXpeditions, FR5ZU's occasional Tromelin trips, and the XU8CW/DX QSL cards should help move those countries down the list in the next survey.

Moving up into the Next Fifteen from positions slightly below are **Glorioso FR/G**, **Andamans VU4**, **San Felix CE0**, **Heard Island VK0**, **Laccadives VU7**, and

**Tunisia 3V**. Of these, only Glorioso has much chance of moving down the list next year.

Dropping out of the Next Fifteen, based on valid operations during the past year, are **Abu Ail A1**, **Pagalulu Island 3C0**, **South Sudan ST0**, **United Arab Emirates A6**, and **Marion Island ZS8MI**.

## Regional Variations

The Most Wanted Countries survey is heavily biased toward US DXers, as more than 90% of those responding were in the States. However, the results from European and Asian (mostly Japanese) DXers were compiled separately. Their results show some important regional variations in the Most Wanted Countries.

As a glance at a globe will quickly show, European DXers find the central Pacific to be the most difficult part of the world to work. Conversely, they have an easier time than most other DXers with

## ATV CONVERTERS • HF LINEAR AMPLIFIERS

DISCOVER THE WORLD OF FAST SCAN TELEVISION



### AMATEUR TELEVISION CONVERTERS

ATV2 420-450 \$44.95 Kit  
 ATV3 420-450 (GaAs-FET) \$49.95 Kit  
 ATV4 902-928 (GaAs-FET) \$59.95 Kit

### AUDIO SQUELCH CONTROL for ATV

SIL \$39.95 Kit

### 2 METER VHF AMPLIFIERS

35 Watt Model 335A \$79.95 Kit  
 75 Watt Model 875A \$119.95 Kit  
 Available in kit or wired/tested

### HF AMPLIFIERS per MOTOROLA BULLETINS

Complete Parts List for HF Amplifiers Described in the MOTOROLA Bulletins.

AN758 300W \$160.70	EB63 140W \$88.65
AN762 140W \$93.25	EB27A 300W \$139.20
AN779L 20W \$83.79	EB104 600W \$448.15
AN779H 20W \$93.19	AR305 300W \$383.52
AR313 300W \$403.00	

### NEW!! 1K WATT 2-50 MHz Amplifier

### POWER SPLITTERS and COMBINERS

600 Watt PEP 2-Port	\$69.95
1000 Watt PEP 2-Port	\$79.95
1200 Watt PEP 4-Port	\$89.95

### 100 WATT 420-450 MHz PUSH-PULL LINEAR AMPLIFIER - 5SB-FM-ATV

KEB67-PK (Kit)	\$159.95
KEB67-PCB (PC Board)	\$18.00
KEB67-I (Manual)	\$5.00

For detailed information and prices, call or write for our free catalog.

### UNIVERSAL DIGITAL FREQUENCY READOUT

YK-1 (Wired/tested) \$149.95

### HEAT SINK MATERIAL

Model 99 Heat Sink (6.5x12x1.6) \$22.00  
 CHS-6 Copper Spreader (6x6x1/4) \$18.00

We also stock Hard-to-Find parts

### CHIP CAPS—Kemet/ATC

METALCLAD MICA CAPS—Unelco/Semco

RF POWER TRANSISTORS

MINI-CIRCUIT MIXERS

SBL-1 (1-500MHz) \$6.50

SBL-1X (10-1000MHz) \$7.95

### ARCO TRIMMER CAPACITORS

VK200-20/4B RF Choke \$1.20

56-590-65-3B Ferrite Bead \$ .20

Broadband HF Transformers

Add \$3.50 for shipping and handling.

We ship worldwide.



**CCI Communication Concepts Inc.**

508 Millstone Drive • Xenia, Ohio 45385 • (513) 426-8600  
 FAX (513) 429-3811



WE SHIP WORLDWIDE

CIRCLE 38 ON READER SERVICE CARD

## "The Epitome of Excellence"



### Elevate the status of your repeater with the RC-850 Repeater Controller.

Ever heard a really great repeater? One that sounds superb? Is fun to use? And benefits its users through its wealth of interactive features? Chances are, it's controlled by an ACC RC-850 Repeater Controller. Because more discriminating repeater owners choose ACC controllers for their systems than any other. And the 850 leads the industry in performance.

The '850 is extensively programmable, using interactive Touch-Tone entry and voice response, or a computer terminal. All *remotely!* From access codes to its operating schedule, nearly everything can be easily changed.

The patch supports local and radio-linked phone lines. A three-tiered system offers flexibility in call routing, assignment of privileges and control. The 250 autodial slots support even the largest groups.

The Touch-Tone activated mailbox lets users leave messages for each other. The *system* will leave you messages if you miss a reverse patch or alarm. Paging support includes all popular tone formats so users can always be available without having to listen.

Multi-band linking extends your repeater's range, ties your repeater to others for emergency and public service activities, and lets you benefit from the elevation of your repeater site for working all bands. Individual user codes offer secure access to selected functions to bar unauthorized use.

The top-of-the-line '850 distinguishes itself as a stellar performer on hundreds of repeaters. And it can do the same for you. Learn more about how to enrich your repeater system by contacting us directly.

**ACC**

advanced computer controls, inc.

2356 Walsh Avenue, Santa Clara, CA 95051 (408) 727-3330

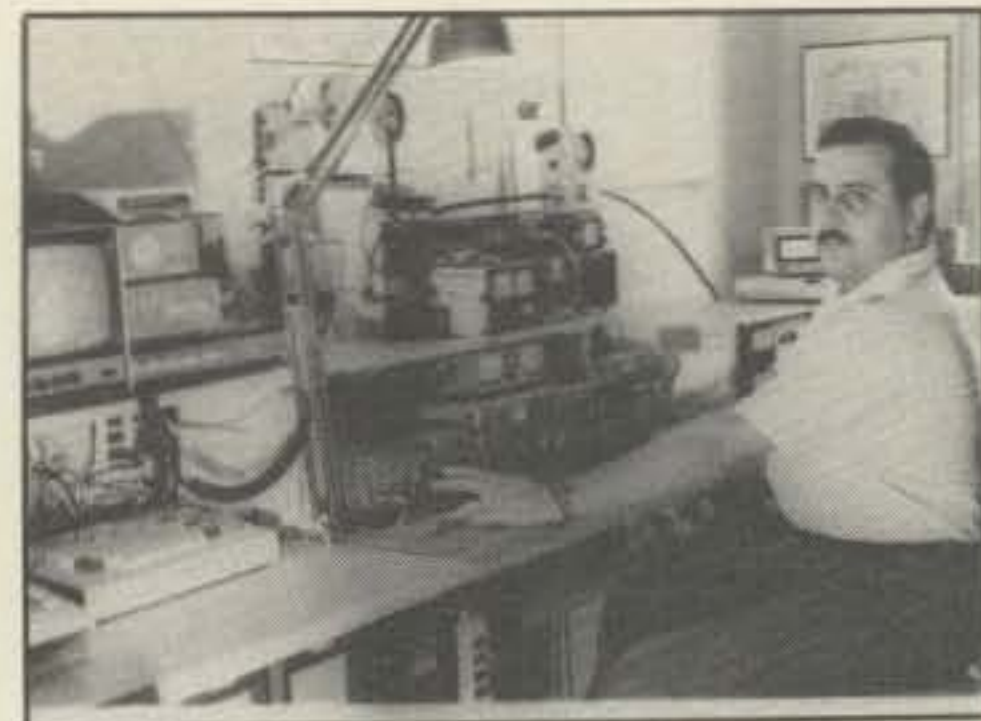
CIRCLE 50 ON READER SERVICE CARD



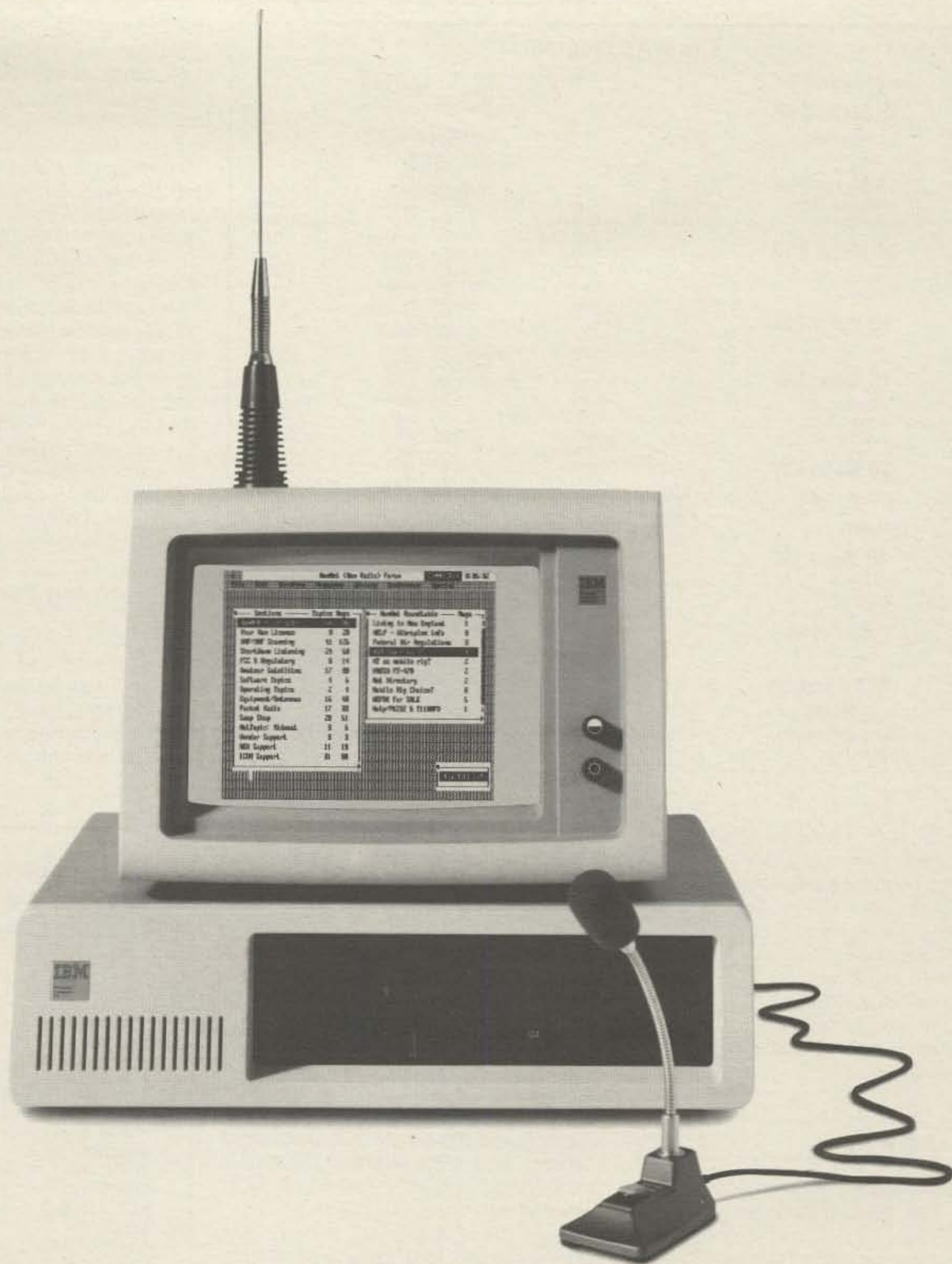
Members of the Moscow City Radio Club UZ3AWA in their shack. (Thanks to Richard Abrams for the photo.)

the African and Middle Eastern countries. Among those countries that European DXers need much more than US DXers are Kure Island KH7, Midway Island KH4, Rotuma 3D2, Palmyra Island KH5, Belau KC6, Willis Island VK9, Central Kiribati T31, Minami Torishima JD1, and Clipperton Island FO0. Most of the other countries European DXers crave are other Pacific Islands. Compared to the rest of the world, however, Europeans have little need for Mount Athos SV/A, Libya 5A, Uganda 5X, Qatar A7, Tunisia 3V, Iran EP, Syria YK, and Monaco 3A. Europeans also did better with the 3Y5X Bouvet DXpedition than DXers in other parts of the world, perhaps due to the mostly European makeup of the 3Y5X team.

The Japanese have the most trouble working Africa. The short path from Japan to most of Africa passes over the North Pole and across QRM-filled Europe. The countries that Asian DXers need more than US amateurs include Burkino Faso XT, Rwanda 9X, Niger 5U, Western Sahara S0, Equatorial Guinea 3C, Sudan ST, and Benin TY. As might be expected, the Japanese DXers have



Paolo Zaffi, 14EWH, earned 5-Band Worked All Zones #283 using 4-element monobanders on 10-20 meters, a vertical on 40 meters, and 4 phased verticals on 80. Zones 1 and 31 on 75 meters were the tough ones. He still lacks Hawaii, Wyoming, and Nevada on 75 meters for 5-Band Worked All States.



# Where Hams Talk Turkey.

Who would have guessed? One of the best ways for you to talk to other ham radio enthusiasts turns out to be through your computer.

On HamNet, CompuServe's ham radio forum, you can make new friends, exchange ideas, or solve problems, all from your computer keyboard. Plus, you can take advantage of a wide range of resources, including data libraries, bulletin boards, and conference areas where you can communicate with over 14,000 other ham radio forum members and equipment manufacturers.

Just give us a call, and ask for Representative 48. We'll send you a free introductory membership to CompuServe, including a \$15 usage credit. And tell you everything you need to know about a station where the reception is especially good.

**CompuServe®**  
800 848-8199

## The WAZ Program

### Single Band WAZ

#### 10 Meter SSB

365 ..... 4X6DK 366 ..... JG1DUN  
367 ..... K8ZR

#### 15 Meter SSB

358 ..... WP4U 360 ..... K5AOL  
359 ..... JH4WEE 361 ..... JA8EKU

#### 20 Meter SSB

821 ..... UT4UX 823 ..... WA6YOO  
822 ..... ZL2BLC

#### 10 Meter CW

94 ..... JH1FSF 95 ..... W3TVB

#### 15 Meter CW

189 ..... NN6W 192 ..... W1MK  
190 ..... JR1NXQ 193 ..... JA6VU  
191 ..... NZ7X

#### 20 Meter CW

380 ..... JH8CMZ 383 ..... AG9S  
381 ..... W7HS 384 ..... JA6VU  
382 ..... UA6YHR

#### 40 Meter CW

127 ..... KZ3H 129 ..... HB9BMU  
128 ..... WB4MAI

#### All Phone

596 ..... WA1G

#### RTTY Awards Mixed

53 ..... W6/G0AZT 55 ..... N2HOS  
54 ..... WB4UBD

### 20 Meter RTTY

32 ..... UZ9CWA

### All Band WAZ SSB

3635 ..... SM3AKX 3643 ..... IK8IPD  
3636 ..... WA1G 3644 ..... N2HOS  
3637 ..... DJ7EE 3645 ..... I1GVX  
3638 ..... IT9JPK 3646 ..... N1EUO  
3639 ..... IT9SVJ 3647 ..... IT9JKY  
3640 ..... IK4MFP 3648 ..... IC8SDL  
3641 ..... N7GVV 3649 ..... IK1EGC  
3642 ..... G3UMV

### CW/Phone

6866 ..... HB9BQB (CW) 6877 ..... N5MIV  
6867 ..... PA3DGN 6878 ..... CT3CU  
6868 ..... JR1REZ (CW) 6879 ..... I5CFY (CW)  
6869 ..... I2EAY 6880 ..... KD8WX (CW)  
6870 ..... OK1HCD (CW) 6881 ..... W8AXI  
6871 ..... JF2BNG 6882 ..... VE4ROY  
6872 ..... DJ4CF (CW) 6883 ..... IK4HLR  
6873 ..... DL6DBF 6884 ..... N2BAP  
6874 ..... DJ7UO 6885 ..... IK3GER (CW)  
6875 ..... DK7SS (CW) 6886 ..... KM5R (CW)  
6876 ..... WB3LHD

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

for DXpeditions. The Most Wanted Countries survey provides definitive information about which countries are really needed, and which DXpeditions will probably get the manufacturers the most publicity for their donations. Also, the major DXpedition funding foundations, such as the Northern California DX Foundation, use the Most Wanted Countries survey to decide which DXpeditions to assist. One of the first questions asked of potential DXpeditioners is "Is it in the Top Fifty?" Finally, DXpeditioners often base their travel plans on the results of this survey. On more than one occasion a DXpeditioner has changed his intended destination, when the survey shows another country is More Wanted.

What will the 1991 Most Wanted Countries survey show? Check back in a year and find out. Meanwhile, keep an ear out for DXpeditions to some of the Most Wanted Countries in 1991.

## The Coming Year

This should be another banner year for DXers, the third such in a row. Sunspot Cycle 22 has peaked, but solar activity should remain high enough in 1991 to keep the high bands open. Look for good daytime openings on 10 and 12 meters,

worked most of the Asian and Western Pacific Most Wanted Countries. They have little need for Kampuchea XU, Bhutan A5, Spratly 1S, Laccadives VU7, Christmas Island VK9, Auckland-Campbell ZL9, Bangladesh S2, Laos XW, Andamans VU4, Maldives 8Q, and Cocos-Keeling VK9. Interestingly, M-V Island 4J is also among those countries the Japanese DXers have worked more than stateside DXers.

## How and Why

The DX Bulletin's Most Wanted Countries survey has been conducted since the mid-1970s. The exact methods have evolved over the years, from hand tabulation and analysis to today's Scantron forms and data-base management processing. The basic format remains the same, however. Every spring The DX Bulletin readers are canvassed informally for additions to the 100 countries that the survey can economically consider. These recommendations are used to select the countries that appear on the Scantron survey form. In June these forms, along with instructions and return envelopes, are mailed to The DX Bulletin's 9000 readers.

Within days the Fulton, California post office is swamped by thousands of returned forms. On some summer days the volume of survey mail exceeds that of all

the other mail at Zip Code 95439. (The Fulton postmistress now schedules her annual vacation during June to avoid dealing with the heavy mail volume.)

Over the next few weeks The DX Bulletin's staff opens the thousands of returned surveys and compiles some of the additional statistics included with the survey. These include the Next 50 Most Wanted Countries, confirmed band-country totals, and more. Also, the staff has to re-do about 10% of the Scantron forms, as many DXers don't seem to be able to follow the simple instructions for marking their Most Wanted Countries. Soon The DX Bulletin's small office is crowded with boxes of surveys.

Once the majority of surveys are opened and unfolded, they are sent to Everett Jackson, WA8CZS, who spends many evenings carefully feeding the Scantron forms into the counter to produce the raw results. These results are then run through The DX Bulletin's 33 MHz 386 computer for analysis. (The complete survey results are available for \$2.00 postpaid from The DX Magazine P.O. Box 50, Fulton, CA 95439.)

Why go to this much effort (and several thousands of dollars in expense) to ask DXers what countries they need? A surprising amount of effort, equipment, and expense hangs off these results. The major amateur radio equipment manufacturers receive hundreds of requests each year for donations or loans of equipment

## 5 Band WAZ

As of September 30, 1990, 291 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

UZ2FWA	SV1JA
EA6NB	N5CB
I2JQ	K9FD

The top contenders for 5 Band WAZ are:

N4WW, 199	UA4RZ, 199
UQ1GXX, 199	KB8DB, 199
W7OM, 199	NA0Y, 198
SP9PT, 199	K7UR, 198
K6YRA, 199	I8IGS, 198
K5UC, 199	VE7DX, 198
LA4HW, 199	W0PGI, 198
PY7ZZ, 199	VE7AHA, 198
DL9WW, 199	SM6AHS, 198
K0CS, 199	K1ST, 198
KB0G, 199	ZS6BCR, 198
ZS6BCR, 199	VE6OU/6, 198
HA8XX, 199	WB9Z, 198

681 Stations have attained the 150 zone level as of September 30, 1990.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

## 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 324. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is \$1.00.

### CW

W9DWQ	324	K3UA	318	IT9ZGY	311	KZ4V	302	N5FW	294	AG9S	283
K2FL	324	N6AR	317	W7CNL	311	YU2TW	301	IT9TQH	294	JH1VRO	282
K2TQC	324	W0SR	317	K2OWE	311	I3OBO	301	W6YQ	294	W3BBL	282
N4JF	324	W6PT	316	WD9IIC	311	W0JLC	301	IT9VDQ	294	I2QMU	281
K4CEB	324	K4XO	316	K8PYD	310	N7RO	301	N5DX	291	K7ZR	280
DL1PM	323	N4PN	315	WB4RUA	310	DL6QW	300	KB0G	291	I5XIM	280
K9MM	323	DL7AA	315	W6SN	310	NN4Q	300	IT9QDS	290	W2LZX	280
K6JG	323	W1NG	315	AA6AA	309	I8WY	300	N4AH	290	KB9XG	280
W2FXA	323	N4KG	315	K9IW	309	F3TH	300	W1WLW	289	W9NUF	280
ON4QX	322	N2KW	315	W9RY	308	WA4IUM	300	W4BV	289	KB8DB	280
YU1HA	322	DL8CM	314	W0HZ	308	W6DN	299	K1VHS	289	HB9AFI	279
SM6CST	321	EA2IA	314	W4OEL	307	K3FN	298	G2GM	289	KA2DIV	279
N6AV	321	N6CW	313	KQ9W	307	DJ7CX	297	K2JF	289	KA3R	278
N4MM	321	WA2HZR	313	SM6CTQ	306	K8LJG	297	K8NA	288	DL1QT	277
OK1MP	321	K6EC	312	K4CX	305	WA4DAN	297	G2FFO	287	K9DDO	277
SM3EVR	320	W0IZ	312	W2UE	305	WA8YTM	297	W9SC	287	KU0S	277
K6LEB	319	W9WAQ	312	WA4JTI	305	K9TI	297	VE7DX	287	YV5ANT	277
K1MEM	319	K9BWQ	312	W1WAI	305	WD9IIX	296	G3KMQ	287	K2JLA	277
DL3RK	319	DJ1XP	311	AB4H	304	KD8V	296	K4JLD	287	NS7Z	276
W4BQY	318	W6ID	311	N8MC	304	NY5L	295	DJ2PJ	286	K4SE	275
K9AB	318	K9QVB	311	WA8DXA	302						

### SSB

K2FL	324	G4CHP	319	IT9TGO	313	KA9ABC	307	K1VHS	300	W9SC	287
W6EUF	324	WA4ECA	319	K0GT	313	WA2MID	307	I8IGS	300	PA0XPQ	287
VE1YX	324	KR9O	319	W2FGY	313	WB4PUD	307	PY4OY	300	N8BJQ	286
F9RM	324	W9JT	318	G3VOF	313	WB6OKK	307	ZL1BOQ	300	N3ARK	286
N4JF	324	OE3WVB	318	WB3DNA	313	XE1MDX	307	K8YVI	300	N9CPW	286
VE3MR	324	W8ILC	318	KQ9W	313	WB5TED	307	WA0TKJ	299	K9MNT	286
DJ9ZB	324	N6AR	318	I8KCI	313	N4KE	306	I6PLN	299	IK7DBB	286
4Z4DX	324	KM2P	318	WA4IUM	313	KB5FU	306	KA8T	299	KB5RF	285
W4EEE	324	K9AB	318	KB3OQ	313	KE3A	306	KB2FC	299	KF5AR	285
W9DWQ	324	VE7WJ	318	KE4HX	313	K3LUE	306	DJ7CX	299	IK8BMW	285
W4DPS	324	WA4DAN	318	F2MO	312	CX4HS	306	K9SM	298	G4SZD	285
W0YDB	324	YV5GWO	318	W0SD	312	KA3HXO	306	JH4PRU	298	VE2GHZ	285
EA4DO	324	N2KW	318	K9RF	312	W5LLU	306	EA9IE	298	NZ7D	285
DL9OH	324	W4UW	318	K9HDZ	312	WA6DTG	306	XE1HI	298	KC7EM	284
VE3XN	324	W7FP	318	LA7JO	312	K9TI	306	KF5DX	298	KR9F	284
W3AZD	324	K4CX	318	LU3YL	312	KZ8Y	305	K5DUT	298	WB3HAZ	283
YV1KZ	324	YV1AJ	318	N6OC	312	K8VAV	305	T12JP	298	VE3MV	283
OK1MP	324	DJ1XP	317	NA5W	312	EA1QF	305	N4KEL/M	298	ZP5JCY	283
VE3GMT	324	KD8VM	317	W8ILC/QRPp	312	K4RIG	305	HP1JC	297	I8DVJ	283
ZL1AGO	324	N4WF	317	I2MQP	312	K8ZZU	305	YU7KV	297	YB3CEV	283
ZL3NS	324	K4PQV	317	NN4Q	312	I4WZK	305	XE1OW	297	K3NEE	283
K6WR	323	W9OKL	317	KS0Z	312	K4JLD	305	WD9GQV	297	W3SOH	283
YU1HA	323	NY5L	317	IK2GNW	312	KD8V	304	F6BFI	297	WA9BXB	283
I0ZV	323	KR9O	317	KA6V	312	KC8YM	304	WB3GPR	296	AE2B	282
EA2IA	323	I8LEL	317	AA6BB	312	W6MFC	304	KB3KV	296	A19R	282
I8YRK	323	KC8EU	317	SM6CST	312	K4LR	304	I0SGF	296	TG9EP	282
VE2WY	323	WA4JTI	317	W4SSU	311	KB0SY	304	K8NWD	296	VE3NUP	282
W9OKL	323	K9HQM	317	K6EC	311	WE2L	304	KB0G	296	N1ALR	282
K9BWQ	323	W6SN	317	K8NA	311	KA9TNZ	304	EA4KK	296	EA8TE	282
K6JG	323	AG9S	317	NJ0C	311	WA2FKF	304	W0IYR	295	PY2DBU	281
W9SS	323	I8ACB	316	I8XTX	311	WA8YTM	303	KK0C	295	NP4CC	281
K6YRA	323	K8PYD	316	KB4HU	311	XE1KS	303	G3XTT	295	NX0I	281
N7RO	323	K4XO	316	G4ADD	311	W2LZX	303	VE3XO	295	G4FAM	280
ON5KL	323	N4KG	316	NJ0C	311	KB0U	303	K13L	295	W9VA	280
YU1AB	323	A18S	316	I8XTX	311	W0ULU	303	I7UNX	295	WB8TLI	280
K9MM	323	W0SR	316	KB4HU	311	W4BQY	303	WD0BNC	294	W8URM	280
T12HP	323	WB1DQC	316	G4ADD	311	XE1XM	303	I5BDE	294	W5XO	280
K8LJG	322	VK4LC	316	WD8PUG	311	K7EHI	303	WB3CQN	294	K5AOL	280
N4MM	322	T12CC	316	XE1OX	311	K1MEM	302	KB8O	294	KB5DN	279
W2SUA	322	W2CC	316	IK8BQE	311	N5FG	302	VE5FX	294	EA6DE	279
OA4OS	322	9H4G	316	I2EOW	311	I3OBO	302	IT9VDQ	294	JH8NYK	279
I0AMU	322	K2JLA	316	DK2BL	310	K9UAA	302	KB7VD	294	KX5V	279
I8ALB	322	WA4WTG	319	AA6AA	310	KP4EQF	302	WD9IIC	294	WN5K	279
CT1FL	322	W6NLG	316	AB9O	310	N5FW	302	K4SE	293	K4BYK	278
I8AA	321	K3UA	316	KU9I	310	VE2PJ	302	KC8JH	293	VE3IUE	278
OZ3SK	321	XE1AE	315	N6AHV	310	IK8GCS	302	A15I	293	DF6EX	278
VE3MRS	321	I8KDB	315	KB9OC	310	K0HQW	302	W9NUF	293	KG9N	278
K5OVC	321	K9LKA	315	K1MIZ	310	KB1JU	302	KD5ZM	293	I8WYD	278
DL6KG	321	OH5KL	315	I2QMU	310	VE3DLR	302	VE6PW	293	CE7ZK	278
KB8DB	321	OZ8BZ	315	IV3YRN	310	N6CGB	302	T12LA	293	KA9I	278
SV1ADG	321	YV5DFI	315	I5EFO	310	WA3HUP	301	WA4LOF	292	WB0UFL	277
WD8MGQ	321	W9RY	315	I1POR	310	VE3FJE	301	AC0A	292	W4PTT	277
I4LCK	320	I4EAT	315	G4GED	310	WB4NDX	301	VE3FEA	292	WD0DMN	277
KS2I	320	NJ2C	315	IK8CNT	310	YU2TW	301	VP9CP	292	HK6BER	277
PY1APS	320	W4UNP	315	KP4P	310	N4CRU	301	W8LKG	292	NC9T	277
W3GG	320	K8CSG	315	WA9RCQ	310	KZ0C	301	SV1JG	292	I8IYW	277
I4ZSQ	320	KU9Z	315	N4PN	309	N8BKF	301	KE7UL	292	XE1DU	277
W2FXA	320	W6BCQ	315	WD9IIX	309	WT4T	301	VE3IPR	291	N0AMI	276
W4NKI	320	I2LLD	314	K9QVB	309	K22HK	301	W4JFE	291	N7ASL	276
YS1GMV	320	W1NG	314	WB6PSY	309	K7LAY	301	DU9RG	291	WA4OPW	276
N6AHU	320	W1LQQ	314	VK4VC	308	KB9KD	301	XE1CI	291	KC2RS	276
W7OM	320	SM4CTT	314	YV5AIP	308	KC2FC	301	K1HDO	291	NO4J	276
IT9ZGY	320	WB4UBD	314	N6AV	308	KB2MY	301	VE3CKP	290	KC4MJ	276
K1UO	320	K9IW	314	A18M	308	IN3ANE	301	I4UFH	290	KA5YCM	276
K2TQC	320	K2JF	314	NS7Z	308	KF7SH	301	W9TA	289	K14FW	276
KZ2P	320	KE4VU	314	K8CMO	308	VE4AT	300	JA5PUL	289	WB1EAZ	275
VE7DX	320	EA4LH	313	K4MQG	308	SV8CS	300	A19U	289	NX4Y	275
ZS6LW	319	W8PCA	313	KZ4V	308	I2ZGC	300	YV2EJU	289	VE7BSM	275
W0SFU	319	N2SS	313	I0MBX	307	NW5K	300	I4CSP	289	W0FF	275
OZ5EV	319	OE2EGL	313	KV2S	307	WB6GFJ	300	OK1AWZ	288	I8INW	275
IT9XGY	319	ZL1BIL	313	VK3JF	307	JH1VRO	300	EA3KW	287	WA5SUE	275
W6DN	319	WZ4I	313	VE4SK	307	IT9TQH	300	AB9E	287		

# REVOLUTIONARY

is the only word to describe this:



The NIR-10 is a Noise/QRM Reducer for SSB VOICE! It is the only device available that can reduce noise and remove heterodynes occurring in the presence of speech. What makes this possible? Real-Time Digital Signal Processing (DSP) using a 40 MHz DSP chip!

**•The NIR-10 is a DSP audio processor that connects to the audio output of your receiver or transceiver and includes a built-in Speaker Amplifier.**

**•Automatically Enhances Voice Reception by Reducing or Eliminating:**  
**Heterodynes & Tune-Ups**  
**White Noise**  
**Ignition Noise**  
**Power Line Noise**  
**RTTY Interference**  
**"Woodpecker"**

**•Includes a Bandpass Filter Mode to Enhance CW and RTTY. Forms a Variable Center Frequency Digital Filter with Selectable Bandwidth. Provides performance that analog filters can't match!**

**•Work More Stations: Allows Reception of Otherwise Unreadable Signals!**

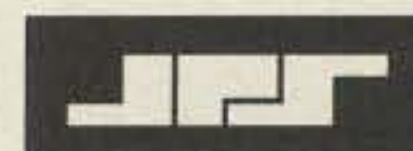
**•Reduces Listener Fatigue.**

**•A Must for DXers, Contesters, and Field Day Ops.**

Order direct:  
 NIR-10: \$395; with 12V AC Adapter add \$12. We pay shipping.

Orders 1-800-533-3819  
 Tech 1-919-790-1048  
 FAX 1-919-790-1456

MC/Visa. Allow 3 wks for personal checks. Add \$3 for COD. NC residents add 5% sales tax.



**JPS Communications, Inc.**

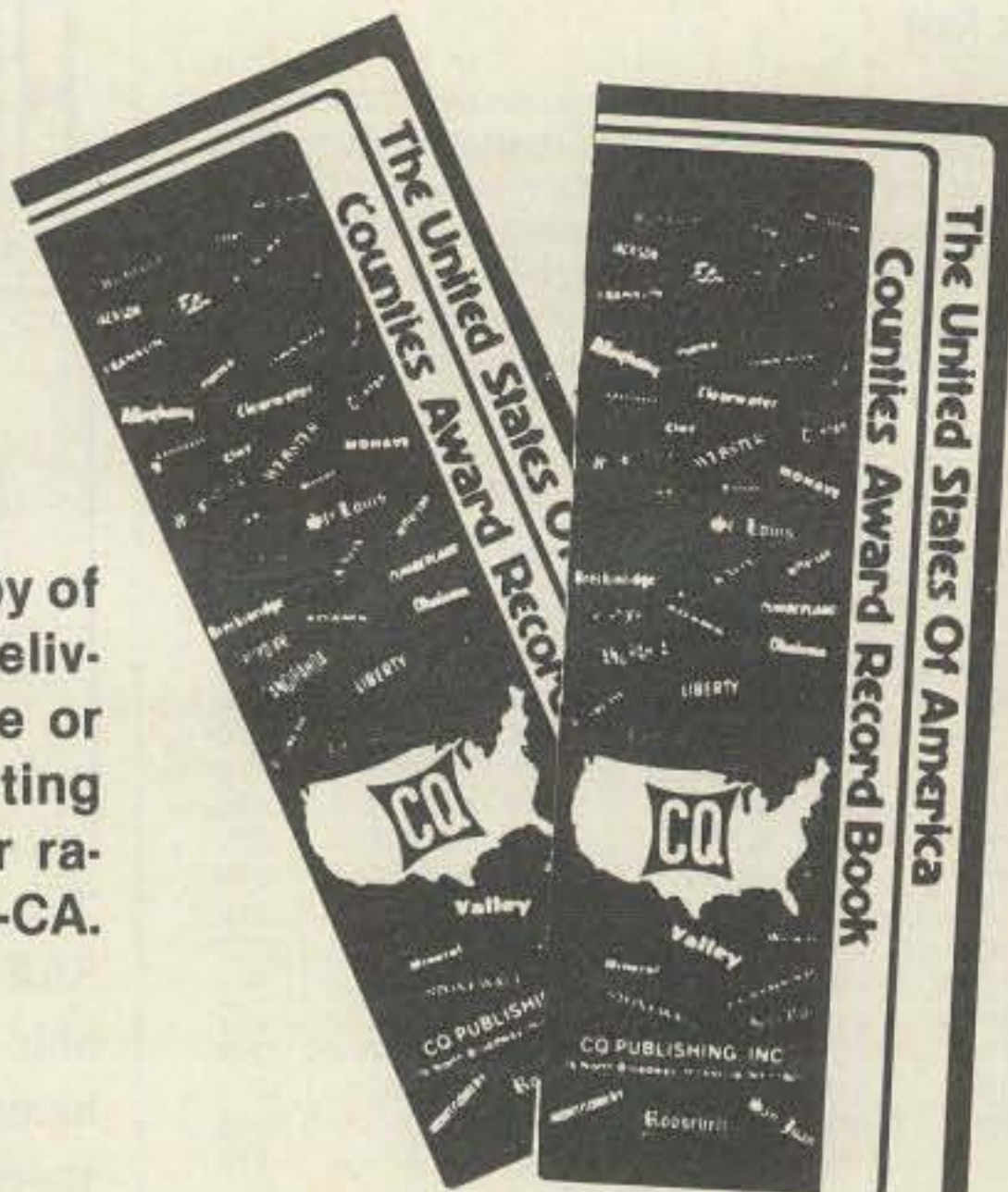
5516 Old Wake Forest Road  
 P.O. Box 97757 Raleigh, NC 27609

CIRCLE 115 ON READER SERVICE CARD

# \$1.25

That's all it takes to get a copy of the USA-CA Record Book delivered to your door. Order one or two today and start collecting counties for one of amateur radio's most prized awards, USA-CA.

CQ Magazine  
76 North Broadway  
Hicksville, New York 11801



## CQ DX Awards Program

### SSB

1806	HP6AYV	1810	IK8IPD
1807	K5ALU	1811	G3UMV
1808	YC2IAB	1812	XE1ZLW
1809	XE1RAE		

### CW

806	KP4P	807	YV5ANT
-----	------	-----	--------

### SSB Endorsements

320	VE3GMT/324	310	K8CSG/315
320	OK1MP/324	310	KU9Z/315
320	YV1KZ/324	310	KB3OQ/313
320	ON5KL/323	310	WA4IUM/313
320	YU1AB/323	310	KE4HX/313
320	K9MM/323	310	I2EOW/311
320	N4MM/322	310	KP4P/310
320	WD8MGQ/321	300	K4JLD/305
320	W0SR/321	300	K8YVI/300
320	SV1ADG/321	275	N4KEL/M/298
310	KR9O/319	275	WD9IC/294
310	K4CXY/318	275	KA9I/278
310	YV1AJ/318	200	HP6AYV/201
310	AG9S/317	3.5/7 MHz	K7EHI
310	K3UA/316		

### CW Endorsements

320	W2FXA/323	300	N8MC/304
320	N4MM/321	300	N7RO/301
320	OK1MP/321	300	WA4IUM/300
310	K3UA/318	275	K4JLD/287
310	W0SR/317	275	AG9S/283
310	W9WAQ/312	275	K2JLA/277
310	K2OWE/311	275	YV5ANT/277
310	WD9IC/311	200	N4KEL/M/210
310	W7CNL/311	200	G3DPX/203
300	W1WAI/305	Mobile	N4MM
300	K4CXY/305		

Total number of active countries is 324. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

### CABLE-TV BOXES

Descramblers • Converters

FREE CATALOG

TRANS-WORLD CABLE CO.  
12062 Southwest 117th Ct., Suite 126  
Miami, Florida 33186  
800-442-9333

## HAM LICENSE PREPARATION

### WRITTEN TEST STUDY GUIDES

All ham radio questions and answers with explanations. Choose Novice, Technician, General, Advanced or Extra Class.

\$5.95 Each + \$1.50 shipping.  
All five manuals: \$26.95 postpaid.

### HAM RADIO LICENSING MANUAL

All 1,931 questions, multiple choices and answers found in every ham license exam, Novice through Extra. (300 pages)

\$11.95 postpaid.

### WRITTEN TEST COMPUTER SOFTWARE

Take sample ham tests at your IBM compatible keyboard. Study all 1,931 questions by license class and subelement. Four 5 1/4" disks cover every amateur radio license class.

\$19.95 postpaid.

### MORSE CODE TEST PREPARATION

Set contains two 2-hr. cassette tapes

Code Teacher,	0-5 WPM	\$9.95
General Code,	3-15 WPM	\$9.95
Extra Code,	12-21 WPM	\$9.95

All Manuals, Code tapes, Software: \$69.95  
New Part 97 Ham Rules: \$ 2.95

THE W5YI GROUP  
P.O. Box #565101 - Dallas, TX 75356  
VISA/MasterCard  
(Toll free) 1-800-669-9594

## RFI KIT

Use ferrite beads to keep RF out of your TV, stereo, telephone, etc. Kit includes one dozen beads, one dozen toroids 1/2" to 1 1/4" diameter, three "split beads" and our helpful RFI tip sheet. Everything needed to fix most RFI problems. \$15 + \$4 S&H U.S. and Canada. 7 1/4% tax in CA.

Free catalog and RFI tip sheet on request.

## PALOMAR ENGINEERS

Box 455, Escondido, CA 92033  
Phone: (619) 747-3343

### ARIES - 1

Log, Control TU, Read Radio Data

### ARIES - 2

Log, Control TU, Read & Control Radio

### SCORPIO

Unparalleled SWL / Monitoring control

### BEARING

Up-to-date and User modifiable

Integrated Multi-Function Communications Software for IBM PCs

- ARIES-1 (Log, Control TU, Read Radio Data) \$64.95
- ARIES-2 (Log, Control TU, Read & Control Radio) \$89.95
- SCORPIO (Unparalleled SWL / Monitoring control) \$89.95
- BEARING (Up-to-date and User modifiable) \$29.95

> Includes Printed Manual > SCORPIO also includes "Top 100 HF Frequencies" database  
> Mouse and/or Function Key control of Terminal Units & most newer Radios  
> Search Log by any field including Remarks > Scan Radio based on a Log Search  
> Print DIGITAL signals to the screen or a file even while scanning > MUCH MORE!!

Call or Write for Complete Specifications

MasterCard Include Call Sign w/order - add \$5.00 S&H Visa

## ashton

PO Box 830 - Dandridge, TN 37725 - (615-397-0742)  
CompuServe # 72557, 3560

especially in the spring and fall. Fifteen and 17 meters will also be good DX bands for much of the year. The maximum usable frequency will often be well above 14 MHz during the day, but 20 meters will provide good DXing around local dawn and sunset and for a few hours in the evening. At times 20 meters will stay open all night. Thirty and 40 meters will open around local sunset and should be open to some part of the world most of the night. During the winter months these bands are good places to look for DX around local dawn. Low-band DXers will probably find the pickings slim again in 1991. Absorption will reduce signal-to-noise ratios, and QRN will make weak signals difficult to copy. However, if we are fortunate enough to get a few days in a row of very low geomagnetic activity (A indices of 10 or less), check out the lower bands.

One potential problem with propagation in 1991 is an increase in solar flares. Band-disrupting flares are more frequent on the declining side of the sunspot cycle. Keep an ear on WWV at 18 minutes after the hour (or WWVH at 45 minutes after the hour) for the latest solar news. The bands are often better the day after the

**GO WITH THE WORLD LEADER!**  
**The WB2OPA LogMaster**  
**HF Logging System**



**Now K1EA Compatible!**

- Unparalleled Log Statistics.
- Auto QSO Alert Indicator.
- Auto Beam Headings.
- Auto Country, Prefix, and Zone Selections.
- Print Log Sheets, QSL Cards, and QSL Labels.
- Dual Clock Calendar.
- User Configurable.
- Search and Sort on Call Sign, Date Prefix, Country, State, CQ Zone, ITU Zone, or User Defined Fields.
- IBM Compatible.
- AND MUCH, MUCH MORE!!!

Just \$59.95 (Plus \$2.00 P & H) Complete.  
 (New Jersey Residents Please Include Sales Tax)

**30 Day Money Back Guarantee**

**FREE DEMO DISK** (Include \$2.00 for P & H)  
 Send Call and Disk Size (5.25 or 3.5) to:

**Sensible Solutions**

P.O. Box 474  
 Middletown, New Jersey 07748  
 (201) 495-5066

"Professional Software For The Radio Amateur"

CIRCLE 77 ON READER SERVICE CARD

**ALL PURPOSE TERMINALS**



MANUFACTURED BY  
**RCA**

**\$75**

RCA's APT is a high quality, self-contained computer, a smart terminal, loaded with many features. Originally selling for about \$500, this terminal is a super value for anyone needing a computer to access bulletin boards, word process, operate a TNC on PACKET RADIO or simply free up a larger PC.

Our APT's are very clean units removed from service. Instruction manual, wall cube power supply and TV/APT selector switch included. Optional 6" Centronics printer cable—\$25. Optional DB-25 male/male Gender Changer—\$7.95. Add \$5 for UPS. New 9" green screen composite monitor, NICE! for only \$99.95 plus \$10 UPS. A perfect addition to the APT.

**SPECIAL: PACKET RADIO COMPLETE SYSTEM:**

Purchase our RCA APT today, along with a PK-232MBX Controller, a brand new 9" green screen monitor and a DB25 gender changer for \$485 and we will pay the shipping anywhere in the cont. U.S., an \$18 value (DX orders \$18 credit).

**AEA'S AT-300**  
**Antenna Tuner**



**Limited Time Offer - \$139**

- 300 Watts continuous power handling capability will handle most any rig.
- 3.5 - 30 MHz
- Low Pass Filter's two-coil design provides greater harmonic reduction, more power transfer and a wider range of impedance matches than most tuners on the market.
- Peak reading cross-needle meter shows forward power, reflected power and SWR.
- All steel, quality cabinet is 12.8" W x 15" D x 5.8" H. Weight is 8.14 pounds.
- Large cabinet provides more internal space for higher "Q" and greater efficiency.
- High and low power switch for versatile operation.
- 6 position "Antenna Selector" switches between 2 coax fed inputs, both tuned and bypassed, a dummy load position and balanced or wire antenna.
- Back lit meter is switchable from front. 12 volts must be supplied externally to jack on back.
- Still want to more facts? Then dig out your April 1990 CQ and read Lew McCoy's review!

With all of these features, the AT-300's regular Ham Net price of \$219 is a bargain. We sold out of DX Handies in record time, so don't miss out on this tuner special at \$139

U.S.: Please add \$5.50 per Tuner for UPS. We pay all U.S. shipping on 2 or more AT-300s. Catalog 6 included with your order (or sent upon completion) (\$3 a/c in cont. US or \$5 DX). 200 pages, over 10,000 electronic PARTS. Please add adequate shipping. 30¢ per lb. to 70 lbs. (1st - 3lbs add \$3 min). We accept Visa, MC, Amexco, checks, Cash On Delivery (UPS), add \$3.

1315 Jones St. • Omaha, NE 68102  
 402-346-4750 • fax: 402-346-2939

**Surplus Sales of Nebraska**

CIRCLE 57 ON READER SERVICE CARD

**NEW COLLINS PARTS**

We purchase Collins replacement parts from many of the same vendors used by Collins, made to original specs. You have the choice. Keep it original for optimum operation and resale.

Manuals: Brand New, Fresh and Crisp! KWM-2 & 3, 515-1, 325-1, 325-3A, 75A-4, 529, 755-28 & C, 755-1, 325-5, 522, 755-3 & 4, 325-1, 301-1, 522, 1885-1, 516F-3, 519, 3120-4 & 5, 522, 329-2, 75A-3, 595, 48-280 Operation Manual, 136A-1 (Hammer) - 520, 4315-1, 5165. Photo Copied: HF/KWM-380 Series - 599, PW-2, 51, HP-1, 516E-2, 530, 1881-2 & 3, K3R2, K3R4, 556-1, 575, 229-1, 7 & 3, 545, 512, 2 & 4, 550, 425-1, 75A-1, 3 & 4, KWS-1, 549, 2998-4 & 5, 399C-1, 515, 4718-1, 595, 7891-1, 5140.

Plastic Trim Rings: Large fit all S-Line and KWM-2, Small fit 516F-2, 3125-3, 4 & 5, 529a, w/5100 Front Feet Extensions: Aluminum, tapered, black anodized feet fit rig up. 58 w. w/5100  
 Paint: (12 oz. spray) Primer-Die Oxide, Collins Trim Ring #128 Gray, Cabinet #180, Front Panel #250, St. James Trim #270, KWM-380 Cabinet Earth Brown. (1/2 pt. can) KWM-380 Front Panel Cabinet. 517a, w/5100  
 Power Cards: 515-1 - 521.95; 755-5 - 515; 516F-2 power - 58.95; 516F-2 interconnect - 526.95  
 Crystals, operating frequencies: HC-6/U holders. 58 w. w/5100  
 Crystals, BFO, Calibrator: 456.350, 453.650 & 455.8 KHz - 535 w. 100 KHz - 540 w. 540 w. 540 w.  
 KWM-2A Plug-in Relays: 970-2439-010 (K90) or 970-2439-020 (K97) 549.95 w. 4/5100  
 KWM-2A Plug-in Relay Mod Kit: (assembled upon frame to plug-in relays. Incl. instructions, relays & etc. 5119  
 TR Relay for KWM-2/A, 325- & 301-1: Authentic KR-2565-1 P&B Relay 550 w. w/5100  
 Panel Meters: New Meters for most all Collins equipment. 585  
 Mechanical Filters: S-Line: 500 Hz CW (526-9494-00) 529 w. • 1500 Hz 8771/558 (526-9495-00) 525 w. 75A-4 & 4 KHz AM (526-9491-00) F-45 (5160) 539 w. • 500 Hz CW (526-9154-00) F-45 (5105) 539 w. Oak Switches for Collins: New LOW PRICES! KWM-2/A function Switch (239-1075-00) 550 • 755 Function Switch (239-0949-00) 535 • 10070-4 w/ all "AC" and switch for reuse of KWM-2 & 325- Function Switch. 512 w. 4/5100  
 Optional Crystal Deck Water for modification of 755-3 or KWM-2 when adding extended frequency coverage. (769-1177-00) 516  
 Potentiometers: KWM-2 & 325 Mix Gate (376-7404-00) 529 w. • 755- AT/RF Gain (276-2151-00) 539 w. 301-1: Power Switch - 519; Plate Choke, L1 (2/44µH) - 510; 100µF-450V Filter Caps - 4/5100  
 KWM-380 to HF-380 Conversion Kit: Includes A3 Filter, 060 ROM, instructions, and HF-380 Emblem. 535  
 MM-280 Mobile Mike - 53; AC-2830 Headset - 545; AC-2801 Rack Mount - 5145; AC-2828 Footswitch - 545; AC-3802 Speech Processor - 535; 140 Hz CW Filter - 519; 360 Hz CW Filter or 1.7 KHz ETTY/SSB Filter - 519; 6 KHz AM Filter - 59; Complete Knob Set - 59  
**COLLINS EQUIPMENT ON HAND:** 515-5, 513-3, 75A-4, 75A-1, 325V-1, 325-1, 325-3, 755-1, 755-2, 755-3, 755-3B, 755-3C, KWM-2, 301-1, 305-1.  
 Other COLLINS Parts On Hand: HF Transformers, Front Panels, Escutcheons, Knobs, Transformers.

<b>AEA'S LA-30 1200 WATT AMPLIFIER</b>	<b>SGC'S SG-230 SMARTUNER</b>
<ul style="list-style-type: none"> <li>• 1200 watts input in class AB<sub>1</sub> design.</li> <li>• 3-500Z triode for instant on operation.</li> <li>• 1.8 to 29.7 MHz (Hams) coverage.</li> <li>• 30 watts drive for full output.</li> <li>• Cross Needle Tuning Bar metering.</li> <li>• 14"W x 16-1/2"D x 7-1/2"H</li> </ul>	<ul style="list-style-type: none"> <li>• Microprocessor control</li> <li>• Weatherproof</li> <li>• 1.8 to 30 MHz frequency range</li> <li>• 10-150 watts input</li> <li>• Tunes 8'-80' antenna</li> <li>• 13.8vdc operation</li> </ul>
Regular Price \$1195	Regular Price \$565
now only \$895	now only \$469

**AEA products at new lower prices!**

<b>FSTV-430A</b>	Fast Scan Television Transceiver	\$399
<b>PK-232MBX</b>	All mode TNC	\$319
<b>PK-88</b>	Packet only TNC	\$119
<b>ISOloop</b>	14 - 30 MHz omni-directional Antenna	\$315
<b>MM-3</b>	Memory Keyer (Morse Machine)	\$179
<b>AVT</b>	Amiga Video Slow-Scan	\$279
<b>ET-1</b>	300 watt all band tuner	\$ 99
<b>DL-1500</b>	650MHz, 1500w Dummy Load	\$ 69
<b>LPF-30</b>	Low Pass Filter, 1500 watt	\$ 35
<b>HPF-1</b>	75/300Q High Pass Filter for TV/VCR	\$ 12
<b>144 MHz IsoPole</b>	Antenna for 2 Meters, omni-directional	\$ 55
<b>220 MHz IsoPole</b>	Antenna for 220, omni-directional	\$ 55
<b>440 MHz IsoPole</b>	Antenna for 416-465 MHz, omni-dir.	\$ 85
<b>AT-3000</b>	3000 watt antenna tuner	\$369

*Charlotte*  
**Hamfest and Computerfair**

**New Location**

**ARRL ROANOKE DIVISION CONVENTION**  
**March 9 & 10, 1991**

**Charlotte Merchandise Mart Charlotte, North Carolina**

- Over 170 Commercial Exhibit Booths
- All Major manufacturers represented
- Special Dealer Swap Area available with electricity
- Over 500 swap tables by preregistration only
- 104,00 square feet of space indoors
- Largest Hamfest in the Carolinas
- Convenient off-street parking for 3,500 cars

For more ticket or swapfest information, write to:

Charlotte Hamfest & Computerfair  
 PO Box 221136  
 Charlotte, NC 28222-1136



**Manufacturer & Dealer**

**Booth Information**

Robert Starling, N4GVF  
 7021 Holly Hill Road  
 Charlotte, NC 28227  
 (704) 568-7611

Swapfest & Preregistration  
 (704) 536-7373



Trevor Rogers, VK9TR, operating the Kenwood TS-130 into a Vee-beam antenna at the Willis Island shack.



This is Willis Island, which ranked 86th in the 1990 Most Wanted Countries survey.

flare, and much worse the second day after. VHF DXers should look for good openings when the HF bands are disrupted by the effects of solar flares.

In 1991 all DXers should resolve to avoid unnecessary interference, not act as "DX policemen," use good operating ethics, and use UTC date and time on all QSL cards. DX stations and fellow DXers around the world will appreciate the efforts.

### Focus on Willis Island VK9

Willis Island is an Australian island located at 16 degrees south, 149 degrees east. The island is all of 500 meters long and 140 meters wide and has a population of four, who operate the weather station on the island.

The accommodations on the island are comfortable for the operators, and include a satellite TV system, pool table, a well-stocked bar, and amateur radio. Three large generators provide the power to operate the station and to generate hydrogen gas from sea water to lift the daily weather balloons. Trevor Rogers, VK9TR, recently completed a one-year tour of duty on Willis and was very popular.

Trevor says his favorite activities on the island included checking out the island's large bird population, watching newly hatched turtles fight their way to the sea, and amateur radio. About the latter, Trevor says, "It provided an opportunity for three other people to tap into world conversations of which they were unaware, being carried out at all strange hours of the night. Many enjoyable hours were had by all, sitting back with Boobie Bird Bitter in hand, participating in the closet world of the Ham operator."

### January Notes and Events

Fran Thisse, W2BJI, intends to operate as **J37XC** from Grenada through the end of March. He operates both CW and SSB, and expects to be on the new bands (30, 17, and 12 meters) as well as the traditional bands. Since he will be on the island for some time, DXers can send their QSL cards to him c/o Otways Palmbeach House, Grand Anse, St. Georges, Grenada, Windward Islands.

Also hitting the DXpedition trail is Joe Adams, VE3CPU. Joe is aiming for the North Cook Islands for about a month, beginning around the end of January. Exact dates depend on the unpredictable transportation between the South and North Cook Islands. Look for Joe signing a ZK1X-callsign. Joe is a veteran of several other DXpeditions, beginning with a trip to The Last Resort on Montserrat. Other stops of his DXpedition career include Barbados, Turks and Caicos, Mellish Reef and Willis Island, and St. Vincent Island. QSL to VE3CPU.

Potential DXpeditioners might be interested in Doug Brabner, VE7NH's plans for this summer. Doug has a 30 foot sailboat that he intends to take to Wallis FW, Rotuma 3D, the Kiribatis T30-T33, North and South Cooks, Mellish Reef, Lord Howe Island VK9, Campbell Island ZL9, and other Pacific spots, depending on the winds and where he can get operating permission. Doug has space for one or two sailing companions, preferably CW operators, who are willing to share expenses and sailing duties for the trip. He's planning to leave Hawaii in June. Anyone interested in joining Doug should contact him at 1429 Williams Ave., North Vancouver, BC Canada V4L 4G1.

Looking for a different kind of help, the

members of the Natal DX Group of Brazil hope to return to St. Peter and St. Paul Rocks PY0 this June. They are looking for financial support to cover the high cost of the trip. Contributions should be sent by registered airmail to the Group via Pergentino Andrade PT7AA, Rua Osorio de Paiva 25, 60.720 Fortaleza, Ceara, Brasil.

### QSL Notes

Many DXers have inquired about the QSL route for **HJ0T**. The station was actually **5J0T**, and QSLs via Radivoje Lazarevic, YU1RL, Nisavska 8/A, 14000 Valjevo, Yugoslavia.

QSL to **OH2AQ/OJ0** Market Reef operation via Pekka Holstila, OH2BVF, Kruuntie 16 A, 02180 Espoo, Finland.

Ray Riker, NY2E, is now handling all cards, US and foreign, for **HS0B**, **HS0M**, **HS0SM**, and **HS0AC**. (WA4BCQ, who used to handle the US cards, had to resign.) Ray's new address is 433 Palo Alto Drive, Palm Springs, FL 33461.

Rudy Klos, DK7PE, made 6500 QSOs as **7Q7CW** in August. QSL via the bureau, or direct to Rudy at Kleine Untergasse 2, 6501 Nieder-Olm 5, Germany.

After **V31BB** passed away, Gordon Silverman, N3ADC, obtained the V31BB logs and QSL cards, and will answer requests for cards. Gordon's address is 77 Homestead Road, Levittown, PA 19058.

Pat Shinnors, **W7VIH**, wants fellow amateurs to know he is not a Silent Key. His wife, also named Pat, passed away, and the USPS returned some mail addressed to Pat marked "deceased." (The W7 QSL bureau disposed of his returned cards and cleaned out his file!)

Contacts with **JY9EL** from 1972-73 can be confirmed via WA6IET, 260 Mesa Road, Nipomo, CA 93441.



## QSL Managers

3A/ON4AHI to ON4AWL  
 3B8DB to NA5U  
 3C1EA to EA4CJA  
 3D2JH to KF7PG  
 4K8ADS to RW3AH  
 4K1B to UA1ADQ  
 4K2BCA to RA3YA  
 4K3BB to RB5CB  
 4K4/EK8AX to UA9OBA  
 4K4QQ to RA1QQ  
 4S7CF to 9V1JY  
 4U1UN to NA2K  
 5N30BFD to DJ9FH  
 5R8JD to F6FNU  
 5U7FF to F6FNU  
 5W1HM to JH4IFF  
 5Z4BI to W4FRU  
 5Z4DU to KE4DA  
 6W1QB to DK3NP  
 6W7FZ to DK6ZZ  
 7J1ADJ/JD1 to KB1BE  
 7J7AAU to K3EST  
 7P8EN/P to ZS5BK  
 7Q7RM to K6KII  
 7Q7XB to LA7XB  
 7X7KG to YASME  
 7Z1AB to WB2WOW  
 9H1EL to LA2TA  
 9H1FBS to N5APW  
 9H1XX to DL2GBT  
 9J2FR to I2ZZU  
 9L1US to WA8JOC  
 9M6HF to WE2K  
 A25AL to G4RUL  
 A35XK to WA6ZEF  
 A41JV to KJ4GK  
 BV2DA to DL7FT  
 B24RCC to BY4WNG  
 C02MA to CO2VG  
 CP8/DJ4SN to DJ4SN  
 CR1BI to CT1CJ  
 CW8W to CX4CR  
 DF8RR to DL8APU  
 ES1QD to UR2QD  
 EX7M to UL7MW  
 F2JD/CE7 to F6AJA  
 FK880 to F6HKA  
 FK8FU to NA5U  
 FM5WD to W3HMK  
 FO8IGS to F6EEM  
 FO4NR to F6ELE  
 FO5FO to F2BS  
 FT4XG to FD1AAS  
 FT5XA to F8ITD  
 FW8DD to FW8DD  
 FW8ET to FK8DD  
 FY5YE to W5JLU  
 G4WYG/ST2 to G4OHX  
 GX4GT to G3VQO  
 HB8/HB9NL to HB9NL  
 HD2IG to HC2AQ  
 HF8POL to KB6GWX  
 H18A to JA5DQH  
 HL30AP to HL5AP  
 HL9EP to K0VZR  
 HX8URA to FF6URA  
 HX10MN to F1HWB  
 ISDEX/OD5 to I5ZMH  
 IJ5ONU to I5KKW  
 J28NU to F6FNU  
 J39BS to WB2LCH  
 J5CVF to CT1DIZ  
 JI2KLU/JD1 to JE2LYG  
 JW8GB to WB4ZBI  
 K1RH/1J5 to K1RH  
 KC6CQ to VE3JDO  
 KC6CW to JA2NOG  
 KC6GV to LA2GV  
 KC6MM to VE3JDO  
 KE9A/DU3 to WB9YXY  
 KP2A to W3HMK  
 OJ8/OH2AQ to OH2BVF  
 OM7CQR to OK3CQR  
 OX3SG to LA5NM

OX3XR to OZ3PZ  
 P29CH to KE9ES  
 P29PL to VK9NS  
 PABGAM/ST2 to PA0GIN  
 RD70DC to UD6DC  
 RF6F/UA3TT to UA3TT  
 RH3E/UW4HX to UW4MX  
 RH9E/UA3TT to UA3TT  
 RT6U/RB5MF to RB5MF  
 RY5B to UB5BCJ  
 RY7B to UB5BAN  
 RY8B to RB5BA  
 RZ8F/UL7GM to UL7GM  
 S79NBD to JG1NBD  
 S79X to JA1ARF  
 ST2YD to F6AJA  
 ST4/WZ6C to W4FRU  
 SV8HS to DJ8MT  
 T20AA to N4FJL  
 T30BC to K7EHI  
 T32Z to N7YL  
 TA3F to DL5YCC  
 TE10E to T14SU  
 TI75S to T14SU  
 TK/HB9ASZ/P to HB9ASZ  
 TK9LAV to F6ATQ  
 TR8BY to FF6KGU  
 TR8GL to F6IXI  
 TU2PA to KE0LS  
 TU2QW to F2CW  
 TU90A to F6FNU  
 TZ6VV to N0BLD  
 UC700 to UC1OWA  
 UF6FDR to UF6FF  
 UH1E to RA3QK  
 UH1W/UA4CIC to RA4CG  
 UH8YP to UA9AB  
 UM3Q/UA90F to UA90F  
 UZ3YWB/UI2U to RA3YF  
 V47NXX to KB2XR  
 V51NF to ZS3N  
 V63AN to JA2NOG  
 V63JC to KC6JC  
 V73BL to WB4CSK  
 VP2EC to N5AU  
 VP2EXX to KC8JH  
 VP2V/W9VNE to W9VNE  
 VP5P to WN5A  
 VP5V to WN5A  
 VP88XX to W9ARV  
 VQ9CQ to KA6V  
 VQ9SS to KA6V  
 VS6CM to W0JLC  
 VS6CT to KA6V  
 XF1C to WB6JMS  
 XM1MQ to VE1BTT  
 XM2DWH to VE2DWH  
 XU8DX to JA1NUT  
 YB8ARC to KA6V  
 YC4GDZ to YB4FNN  
 YJ8AMH to KF7PG  
 YJ8AB to KC4MJ  
 YJ8RN to N9DRU  
 YL3G to RQ2GG  
 YN/SM80IG to SM8KCR  
 YT90T to YU4FRS  
 YU90AA to YU2AA  
 ZC4HMS to G4SSH  
 ZD8CUE to G4ZVJ  
 ZK1XK to WA6ZEF  
 ZK3KM to JR3OIB  
 ZL8AIC to HB9AAA  
 ZM7AMO to ZL1AMO  
 ZS8MI to ZS5AEN  
 ZS9A to ZL1IS  
 ZX8CW to PT7AA  
 ZX8DX to PS7AB  
 8R1BQ to Box 121, Georgetown, Guyana  
 VQ9TB to Tom Benton, POB 55, FPO San Francisco 96685  
 ZK1TW to Box 129, Rarotonga, Cook Islands

YV2A, YV3A, YV5A, YV6A, YV7A, YV8A, YV9A, and YV0DX. Jose also says that 4M5ANT, YX5A, YW5A, and YY5A are his contest calls, and may also be confirmed via the same address.

SM8KCR has a new address: P.O. Box 1441, S-183, 14 Taby, Sweden. Robin handles cards for LU2BC, SM0OIG/LU, SM0OIG/YN, HT3A, H73A, H71A, 7S8AAA, SK0MT, and SK0UX.

Doug Donley, KG4DD, who handles the QSL bureau for Guantanamo Bay, says the Norfolk address will be closed in January. QSL via the new address: Box 692, FPO New York, NY 09593-0055.

**Soviet QSL Information.** Mike Sochinski, RA3YG, will QSL for the Kolguyev Island operation in June, which operated with the calls 4K3PA, 4K3PWB, 4K3/UA3YCA, and 4K3/RA3YG. He asks for

direct QSLs only, one card per SASE. US dollars are now legal in the USSR.

Some direct USSR addresses from WB2YIP are as follows:

UA9JH to Box 2545, Tyumen 625053  
 UK2SN to Box 74, Mogilev 212002  
 UA6EED to Box 12, Cherkessky 357100  
 RH8AA to Box 7, Cheleken 745030  
 UF6CX to Kosta, Box 6, Tbilisi 380002  
 UB5PAN to Box 3, Kovel 264410  
 UA9AO to Mike Tsavev, Box 124, Troitsk 457100  
 UL8LWF to Box 8, Kustanang City 458000  
 UD70GF to Box 169, Baku, Azerbaijan  
 UA4AQO to Box 2960, Volgograd 400121  
 UB5KCV to Box 1, Zdobunov 265640  
 RB5ZC to Box 411, Nikolaev 327003  
 UB4ZWK to Box 411, Nikolaev 327003  
 73, Chod, VP2ML

# PETER DAHL CO

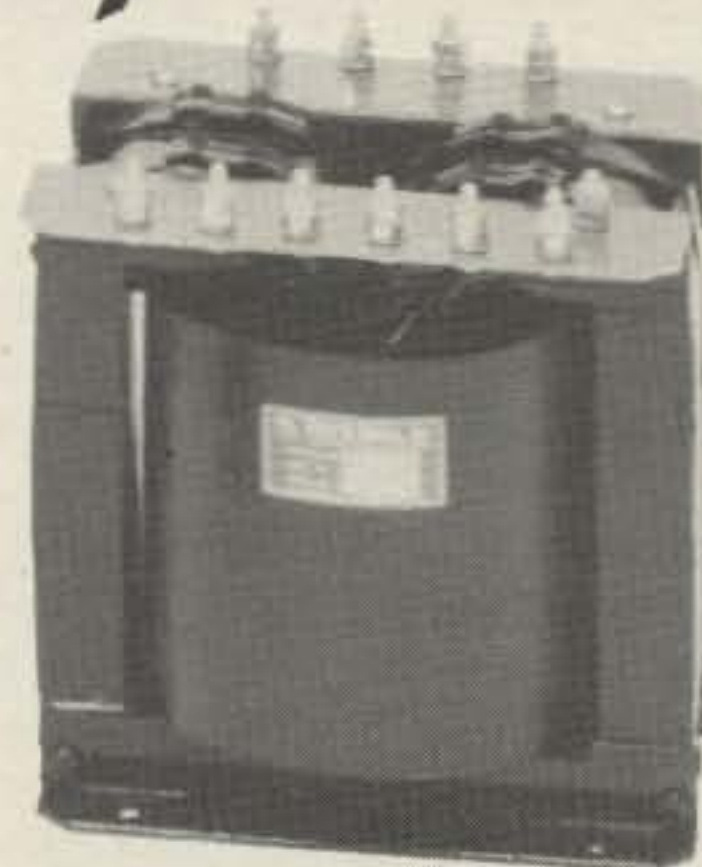
## Heavy Duty Components

### FOR THE SERIOUS HAM

Hipersil Plate & Filament Transformers  
 High Voltage Rectifiers, DC Filter  
 Chokes & Capacitors, Vacuum  
 Variables, Roller Inductors, RF Plate &  
 Filament Chokes.

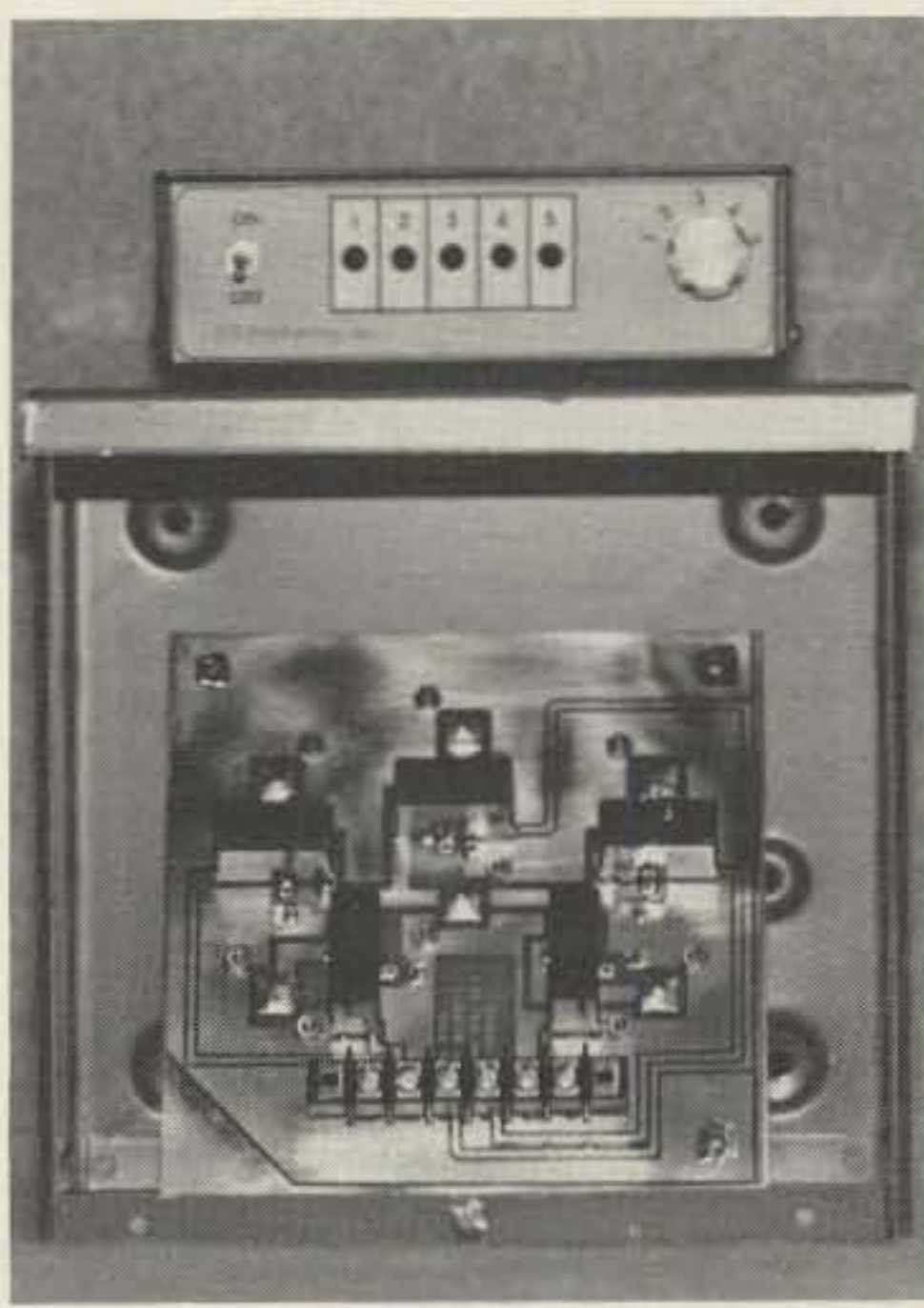


Write today for  
 a complete  
 free listing.



5869 Waycross Avenue El Paso, Texas 79924  
 (915) 751-2300 Telex: 76-3861 PWDCO Fax: (915) 751-0768

CIRCLE 40 ON READER SERVICE CARD



### The DX Engineering Remote Coax Switch - Why is it better?

- Selects up to 5 antennas or combinations.
- True RF switching relays.
- True 5 KW+ power rating.
- Enclosed relays prevent contamination.
- Metallic NEMA 3R rainproof outdoor enclosure protects connections.
- Usable through 440 MHz.
- Unused antennas may be grounded.
- Only \$149, shipping prepaid.

IF YOU'RE INTERESTED IN ANTENNAS - We've got a big NEW catalog covering our yagis, remote switchboxes, phasing and stacking boxes and lots more, write or call for our free catalog. Check out our new 17 meter yagle and hear what you've been missing! 17DX4-LB, 4 el., 32' boom \$375; 17DX4, 4 el., 20' boom \$309.

**DX Engineering, Inc.**  
 618 Spaulding Avenue,  
 Brownsville OR 97327 (503) 466-3138

CIRCLE 53 ON READER SERVICE CARD

The *Callbook* address for OE7MCJ, QSL manager for 9Q5PL, is incorrect. The street number should be 13.

Jose Castejon, YV4ANT, reports that the following stations may be confirmed via the Venezuela DX Club, Box 75458, Caracas 1070-A, Venezuela: **YV1A**,

## NEWS/VIEWS OF ON-THE-AIR COMPETITION

### How To Improve Your Contest Score

Let's be honest with ourselves and admit that nothing improves a contest score more than good old-fashioned experience and improved station hardware. Despite that reality, there is still hope for all of us who want to improve. Many of the ways we can enhance our results have nothing to do with the size of our antennas or the number of years we have been contesting. Hopefully, you will gain something from the suggestions I've thought of this month.

The idea for this month's column was born from a new concept that was implemented by a group in the Yankee Clipper Contest Club last year. We dubbed it "Contest University." The intent was to share ideas on a weeknight evening about contesting fundamentals, including operating and preparation techniques that have been used by some of the club's successful contesters. Entrance requirements into the university were simple: A contester's transcript detailing past contest scores (the lower the better) and a desire to improve! In most cases we waived the transcript requisite, but 30 contesters did arrive that evening with a desire to brainstorm about one of the great questions of contesting: How can I get better at this stuff?

I have divided my thoughts into several categories which include physical considerations, operating, food/drink, station design, preparation, and other. I'm sure there are additional classifications. As you read on consider your own little tricks. At the risk of letting a few secrets out, your insight may help your fellow contester, and I'll be happy to provide the vehicle to pass it along.

**Physical.** There are few specialties in amateur radio more physically grueling than slugging it out for 48 hours in a major DX contest. Successful contesters don't take physical preparation lightly and consider this aspect to be almost as important as the station itself. For example:

- Try and get a good nap on Friday afternoon.
- Try operating while standing for short stretches.
- Don't be afraid to take short breaks; try going for a 5 minute walk to clear your head.

2 Baldwin Street, Windham, NH 03087

#### Calendar of Events

Dec. 30	CARF Winter Day Contest
De.31 -Jan.1	ARRL Straight Key Night
Jan. 5-6	ARRL RTTY Roundup
Jan. 12-13	N.A. CW QSO Party
Jan. 19-20	N.A. SSB QSO Party
Jan. 19-20	Hungarian DX Contest
Jan. 19-20	North Dakota QSO Party
Jan. 19-20	Michigan QRP CW Contest
Jan. 19-21	ARRL VHF Sweepstakes
<b>Jan. 25-27</b>	<b>CQ WW 160M CW Contest</b>
Jan. 26-27	YL-ISSB CW Contest
Jan. 26-27	UBA SSB Contest
Jn.26 -Feb.3	ARRL Novice Roundup
Feb. 2-3	YL-ISSB CW QSO Party
Feb. 2-4	New Hampshire QSO Party
Feb. 3	North American CW Sprint
Feb. 9-10	QCWA CW Party
Feb. 10	North American SSB Sprint
Feb. 11-15	School Club Roundup
Feb. 16-17	ARRL DX CW Contest
Feb. 23-24	UBA CW Contest
<b>Feb. 22-24</b>	<b>CQ WW 160M SSB Contest</b>
Mar. 2-3	ARRL DX SSB Contest
Mar. 8-10	Japan Int'l CW DX Contest
Mar. 9-10	QCWA SSB Party
Mar. 9-10	YL-ISSB SSB QSO Party
<b>Mar. 30-31</b>	<b>CQ WW WPX SSB Contest</b>

- Wear loose/comfortable clothes; dress enough to stay warm *not* hot.
- Change into fresh clothes periodically.
- Open windows from time to time.
- Take one or more showers during the weekend.

**Operating.** While there is some merit to the concept that operating ability is partly natural, the truth is that the majority of good operators have learned their skills through experience. Operating ability is more than being able to copy the information you are being asked to receive. It's also a function of aggressiveness and operating with common sense. For example:

- Don't listen/worry about your competition.
- Transmit the minimum amount of data necessary to complete the QSO. Don't be a chatty contester!
- Use that RIT—especially on CW.
- Dig for weak signals; sometimes it's just QSB.
- Split your operating into different parts of the band; don't get stuck in one area for the entire contest.

- Special frequencies: Slightly up from nets, way up into bands.

• Don't get stuck trying to run guys when you can't; the search and pounce method can produce good rates.

• Track your QSO/MULT ratios. This can be a guide in determining the time you should spend calling in pileups.

• Use propagation tools to find openings for you (The DX Edge, computer S/W, etc.).

- Pass your brains out!
- Be aggressive when operating.
- Don't be caught "DXing" when you should be running guys.

• Never miss easy multipliers; always be aware of what you have and what you need.

• Always operate on the highest band open to Europe in the AM.

• Use your VFO memories to store sked frequencies, pileups, etc.

• Operate where others aren't from time to time.

• Don't be afraid to start moving needed multipliers to other bands in the beginning of the contest.

**Food/Drink.** The choice of food and drink during a contest is largely one of personal choice. The advantage comes from developing a plan. In most cases:

- Avoid a big meal right before the contest starts.
- Coffee, NO-DOZ, Coca Cola—choose your weapon.
- Consider your meal plan for the weekend; focus on high-energy foods.
- No booze!
- Drink lots of fluids during the contest.

• Consider food choices that are quick to prepare. Crock-pot dishes (e.g., stew, soups) are good choices as are microwave dinners.

**Station Design.** The old aphorism is that the internal layout of your station plays an incredible role in reducing Sunday afternoon fatigue. Why compromise the advantage of phased verticals by labeling them poorly? You should not have to hop into your car to get to your antenna switch. And there are others:

- Label everything in your shack (e.g., antenna switches, remote switches, keyer memories, etc.).
- Label your amplifier (and exciter if required) settings per band.
- Review your station setup; every-

# GREAT RADIO AND ANTENNA BUYS

## KENWOOD



**TS-950SD**  
Digital, 150W, Dual RX and Much More! Also Available w/out Digital. A Top Performer ..... Call

**TS-940SAT**  
General Coverage HF Xcvr, 120W, A Great Performer ..... Call



**TS-440SAT**  
General Coverage HF Xcvr, 110W, Available w/out The Autotuner. A Good Performer ..... Call

**TS-140S / TS-680S**  
General Coverage HF Xcvr, 100W. TS-680S Has 6m! Both are Economical .... Call For Your Price!

**VHF / UHF MOBILES & HT'S**  
TM-731 2m/440 Mobile ..... Call  
TM-631 2m/220 Mobile ..... Call  
TM-701 2m/440 Mobile ..... Call  
TM-241 2m 45W Mobile .... Call  
TR-751 2m All Mode ..... Call  
TH-26 2m Small HT ..... Call  
TH-27 2m Tiny HT ..... Call  
TH-77 2m/440 Tiny HT .. Call  
TH-225 2m 5W HT ..... Call  
Please Call For Special Prices

## AMERITRON

AL-1500 1500W HF Linear Amp  
AL-1200 1500W HF Linear Amp  
AL-82 1500W HF Linear Amp  
AL-80 1000W HF Linear Amp  
AL-811 600W Linear Amplifier  
Please Call For Special Prices



AP8 ..... 8 Band Vertical  
ARX2B ..... 2m Vertical  
AR270 ..... 2m/440 Vertical  
A3S .... 3 Element Triband Beam  
A4S .... 4 Element Triband Beam  
D40 ..... 40m Rotatable Dipole  
R5 .... 5 Band No Radial Vertical  
215WB ..... 15 El. 2m Beam  
230WB ..... 30 El. 2m Beam  
40-2CD ..... 2 El. 40m Beam  
Call For Your Low Sale Prices.

## COAX

RG-213/U - Military Specification, 95% Shielded, Non-contaminating Jacket, Poly. Dielect. .... \$ .39/Ft.  
RG-8X - 95% Shielded, Mini RG-8, Foam Dielectric ..... \$ .25/Ft.  
9086 - International Wire's Equivalent to 9913, 100% Double Shielded, Air Dielectric, Solid Center Conductor ..... \$ .49/Ft.

**FREE SHIPPING ON ALL RADIOS**

## YAESU



**FT-1000D**  
Digital, 200W, Dual RX, Deluxe and Standard Models Are Available ..... Call For Your Price!

### MORE YAESU RADIOS

FT-767GX HF Xcvr ..... Call  
FT-767GXII HF Xcvr ..... Call  
FT-747GX HF Xcvr ..... Call  
FT-736 V/UHF Xcvr .. Call  
FT-470R V/UHF HT .... Call  
FT-411E 2m HT ..... Call  
Please Call For Special Prices!

Paragon HF Xcvr ..... 1899.95  
Omni-V HF Xcvr ..... 1899.95  
Titan HF Linear ..... 2749.95  
Hercules HF Linear ..... 1099.95  
Other Ten-Tec Items In Stock!

## ASTRON

12V POWER SUPPLIES

MODEL	AMPS	ICS	PRICE
RS4A	3	4	49.00
RS7A	5	7	59.00
RS12A	9	12	79.00
RS20A	16	20	99.00
RS20M	16	20	119.00
RS35A	27	35	159.00
RS35M	27	35	179.00

Units with "M" Suffix Are Equipped with Amp & Volt Meters.

## AEA

AT-300 300W Tuner ..... 99.95  
LA-30 1000W Linear .... 795.95  
MM-3 Memory Keyer .... 179.95  
PK-232 All Mode TNC .... 329.95  
Call For AEA Items Not Listed

## BUTTERNUT

HF-2V 80/40 Vertical .... 149.95  
HF-5B Triband Beam .... 259.95  
HF-6V 80-10 Vertical .... 159.95  
**Accessories:**  
A1712 17/12m Add On .... 39.95  
RMKII Roof Mount Kit .... 59.95  
STRII Radial Kit ..... 59.95  
TBR160 160m Kit ..... 59.95  
30MRK 30m Add On Kit .. 39.95  
**Free Shipping On All Butternut Antennas, As Well As Any Accessory Ordered Together!!!**

## RF CONCEPTS

MODEL	IN	OUT	PRICE
2-23	2	30	119.95
2-217	2	170	279.95
2-317	30	170	239.95
2-417	45	170	239.95

These Amplifiers Are For 2m, Other Models In Stock Too!

## SAFETY BELTS

Sizes: M, L, X-L ..... 79.95



## ICOM

IC-781 HF Xcvr ..... Call  
IC-765 HF Xcvr ..... Call  
IC-751A HF Xcvr ..... Call  
IC-735 HF Xcvr ..... Call  
IC-726 HF Xcvr (w/6m) .. Call  
IC-725 HF Xcvr ..... Call  
IC-970 All Mode Base .... Call  
IC-2400 2m/440 Mobile .... Call  
IC-229A 2m 25W Mobile .. Call  
IC-229H 2m 45W Mobile .. Call  
IC-32AT 2m/440 5W HT .... Call  
IC-24AT 2m/440 Tiny HT .. Call  
IC-2GAT 2m 7W HT ..... Call  
IC-2SAT 2m Tiny HT ..... Call

## ALINCO

DR-590T 2m/440 Mobile .. Call  
DR-570T 2m/440 Mobile .. Call  
DR-510T 2m/440 Mobile .. Call  
DR-112T 2m 45W Mobile .. Call  
DJ-120T 2m Tiny HT ..... Call  
DJ-160T 2m Small HT .... Call  
DJ-560T 2m/440 HT ..... Call  
Please Call For Special Prices

## MFJ ALWAYS IN STOCK

989C/986C Tuners ..... 299/259  
949D/948 Tuners ..... 139/119  
941D/945C Tuners ..... 99/89  
901B/910 Tuners ..... 59/19  
1278/1270B TNCs ..... 249/129  
202/204 Noise Bridges .. 59/79  
407/401B Keyers ..... 69/49  
422/486 Keyers ..... 119/179

## TELEX / HYGAIN

CRANKUP SALE

All Models Shipped Prepaid, And Feature All Steel, Galvanized Construction. Totally Self Supporting Design. Complete With Rotor Plate And Wench. Call For Price.

MODEL	HT.	LOAD
HG37SS	37'	9 Sq.'
HG52SS	52'	9 Sq.'
HG54HD	54'	16 Sq.'
HG70HD	70'	16 Sq.'

DX-88 8 Band Vertical .. Call  
EX-14 Triband Beam .... Call  
TH5MK2 5 El. Triband .... Call  
TH7DX 7 El. Triband .... Call  
V2S 2m Vertical ..... Call  
18HT 80-10 Vertical .... Call  
64BS 4 El 6m Beam .... Call  
105BAS 5 El 10m Beam .. Call  
155BAS 5 El 15m Beam .. Call  
204BAS 4 El 20m Beam .. Call  
205BAS 5 El 20m Beam .. Call  
Call For Prices On All Hygain!

## ROTATORS

Telex CD45II ..... (8.5 Sq. Ft.)  
Telex HAMIV ..... (15 Sq. Ft.)  
Telex Tailtwister ..... (20 Sq. Ft.)  
Telex HDR300 ..... (25 Sq. Ft.)  
Yaesu G400RC ..... (Azimuth)  
Yaesu G500A ..... (Elevation)  
Yaesu G1000SDX ..... (Azimuth)  
Yaesu G5400 ..... (Az./El.)  
Please Call For Rotator Prices

## ROTATOR CABLE

Standard 8 Conductor Rotor Cable - (2-#18, 6-#22) .... \$ .25/Ft.  
Heavy Duty 8 Conductor Rotor Cable - (2-#16, 6-#18) ..... \$ .45/Ft.



All U.S. Tower Crankups And Masts Are Constructed of Hot Dipped Galvanized Steel To Resist Rust And Corrosion, And Are Of The Highest Quality Available. All Tower Models Are Totally Self-Supporting - No Guy Wires Needed! Coax Arms, Thrust Bearings, Masts, Motor Drives, Optional Bases, And Other Accessories Are All Ready For Quick Shipment. Towers Are Shipped Freight Collect From Visalia, California. California Residents Please Add 6% Sales Tax. These Towers Are Our Best Selling Crankups! Please Call!

MODEL	MIN. HT.	MAX. HT.	WINDLOAD	PRICE
MA-40	22 FT.	40 FT.	10 SQ. FT.	629
MA-550	22 FT.	55 FT.	10 SQ. FT.	999
MA-770	23 FT.	71 FT.	10 SQ. FT.	2249
MA-850	24 FT.	85 FT.	10 SQ. FT.	3489
TX-438	22 FT.	38 FT.	15 SQ. FT.	919
TX-455	21 FT.	55 FT.	15 SQ. FT.	1385
TX-472	23 FT.	72 FT.	15 SQ. FT.	2279
TX-489	24 FT.	89 FT.	15 SQ. FT.	3959
HDX-538	22 FT.	38 FT.	30 SQ. FT.	1179
HDX-555	22 FT.	55 FT.	30 SQ. FT.	2079
HDX-572	23 FT.	72 FT.	30 SQ. FT.	3559
HDX-589M	24 FT.	89 FT.	30 SQ. FT.	7119

## ROHN TOWERS

GUYED TOWER PACKAGES      SELF SUPPORTING TOWERS

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

MODEL	HEIGHT	PRICE
HBX40	40 FT.	449.00
HBX48	48 FT.	589.00
HBX56	56 FT.	699.00
HDBX40	40 FT.	569.00
HDBX48	48 FT.	689.00

These Towers Are Shipped Complete With Rotor Plate. Shipped Freight Collect From Plano, TX. **IN STOCK NOW!**

## FOLDOVER TOWERS

MODEL	HEIGHT	LOAD
FK2548	48 FT.	15 Sq.'
FK2558	58 FT.	13 Sq.'
FK2568	68 FT.	11 Sq.'
FK4544	44 FT.	34 Sq.'
FK4554	54 FT.	29 Sq.'
FK4564	64 FT.	28 Sq.'

25G Double Guy Kit .... \$ 299.00  
45G Double Guy Kit ..... 319.00

HBX Towers Are Rated At 10 Sq. Ft.; HDBX Towers Are Rated At 18 Sq. Ft. (At 70MPH). All Are Shipped Prepaid To You And Include Top Plate, Rotor Plate, And Base Stubbs. Ready For Quick Delivery!

## STACKED SECTIONS

20G Light Duty 12" ..... 54.50  
25G Med. Duty 12" ..... 65.50  
45G Heavy Duty 18" .. 153.50  
55G Extra Heavy 18" .. 197.50  
EF2545Ginpole 25/45/55 .. 295.00  
EFBX Ginpole HBX ..... 350.00  
P12 1/2" Poly Rope ..... 19/Ft.  
N12 1/2" Nylon Rope .. 39/Ft.  
Call For Prices On Rohn Accessories, Most Items Are In Stock.

## PHILLYSTRAN

HPTG2100I (2100#) ..... \$ .39/Ft.  
HPTG4000I (4000#) ..... .64/Ft.  
HPTG6700 (6700#) ..... .84/Ft.  
2100 END KIT ..... 5.00  
4000 END KIT ..... 6.00  
6700 END KIT ..... 7.00  
Phillystran Guy Cable Is Non-conducting. No More Insulators. End Kits Terminate The Cable With Hand Tools. .. Call

## GALVANIZED MASTS

WALL	5'	8'	10'	12'	20'
.12	29	39	49	59	89
.18	49	75	89	109	149
.25	n/a	n/a	129	n/a	249

Our High Carbon Steel Mast Measure 2" O.D. Mast Up To 8 Feet Are Shipped UPS, Others Are Shipped By Collect Freight.

## GUY WIRE AND HARDWARE

3/16 EHS Guywire (3990#) .... 15  
1/4 EHS Guywire (6650#) ..... 18  
3/16CCM Cable Clamp ..... 45  
1/4CCM Cable Clamp ..... 55  
1/4TH Thimble ..... 45  
3/8EE Turnbuckle ..... 6.95  
3/8EJ Turnbuckle ..... 7.95  
1/2X9EE Turnbuckle ..... 9.95  
1/2X9EJ Turnbuckle ..... 10.95  
1/2X12EE Turnbuckle ..... 12.95  
1/2X12EJ Turnbuckle ..... 13.95  
3/16 Preformed Guy Grips .... 2.49  
1/4 Preformed Guy Grips ..... 2.99  
GAS604 Screw Anchor ..... 19.95  
500D Guy Insulator ..... 2.79  
502 Guy Insulator ..... 4.49  
5/8X8' Copper Gnd. Rod .... 12.95

## ANDREW HELIAX®

LDF4-50 - 1/2 Copper \$ 2.29/Ft.  
LDF5-50 - 7/8 Copper .... 5.69/Ft.  
Connectors: 1/2" \$ 29 .... 7/8" \$ 74

ORDER TOLL FREE 1 - (800) 272 - 3467

LOCAL AND TECHNICAL INFORMATION PHONE: 1 - (214) 422 - 7306

FAX: 1 - (214) 881 - 0776

HOURS: 9AM - 5PM  
SAT. 9AM - 1PM

# TEXAS TOWERS

C.O.D.  
MC / VISA

A Division of Texas RF Distributors, Inc., 1108 Summit Ave. Suite #4, Plano, TX 75074

## 3rd Edition Over 150 Modifications



Number 3

\$19.95

### Radio / Tech Modifications



Modifications for:

Alinco  
ICOM  
Kenwood  
Yaesu  
CB's  
Scanners  
Others

- Extended Frequency Coverage.
- Cross Band Repeater Mods.
- Detailed Drawings Included.
- Sold in Radio stores Everywhere.

**\$19.95**

Add \$3 Shipping  
Visa, MC, Amer X.

*artsci*

P.O. Box 1848  
Burbank, CA 91507  
(818) 843-4080

CIRCLE 67 ON READER SERVICE CARD

## VHF UHF OSCAR GOES (the easy way)

### TRANSVERTERS

6 Meter 2M IF \$365.00

### RECEIVE CONVERTERS

6 Meter 10 M IF \$ 80.00  
2 Meter 10 M IF 80.00  
2 M (HP) 10 M IF 99.00  
220 MHz 10 M IF 99.00  
435 MHz 10 M IF 115.00  
1691 MHz 137.5 MHz 330.00

### GaAs FET PRE-AMPS

6 Meter T/R Switch \$ 80.00  
2 Meter T/R Switch 80.00  
220 MHz T/R Switch 85.00  
137 MHz (weather sat) 80.00  
1691 MHz (weather sat) 250.00

### ANTENNAS

137 MHz 2XY-137-C \$ 85.00  
137 MHz 5XY-137-C 115.00  
435 MHz 70-MBM28 60.00  
70-MBM48 110.00  
70-MBM88 150.00  
900 MHz DY20-900 95.00  
1268 MHz 1268-LY 70.00  
1296 MHz 1296-LY 70.00  
1691 MHz 1691-LY 75.00

Prices Subject to Change Without Prior Notice

ALL ANTENNAS INCLUDE 50 ohms Balun  
Send 75¢ (3 stamps) for detailed specs on all  
VHF & UHF Products



**si**

Spectrum International, Inc.  
Post Office Box 1084Q  
Concord, MA 01742 USA  
(508) 263-2145

CIRCLE 31 ON READER SERVICE CARD

### Country

W	OH	VE	HC
VK	XE	JA	ZL
I	FM	G	LA
GJ	HA	DL	KG6
F	KH6	OE	KL7
EA	VS6	PY	CE
ON	CT1	OZ	EI
HB9	KP4	SM	TF
PA			

Table I- Countries using K1EA CT Software.

thing should be positioned for maximum comfort and reduced back strain.

- Use a comfortable operating chair (not *too* comfortable).
- Ensure good lighting.
- Evaluate your headphones; they can ruin the advantage of a good receiver.
- Use computer logging programs!
- Try setting up a second radio for spotting/listening.
- Use a boom microphone.
- Clean up your shack for psychological advantages.
- Try using voice keyers.

**Preparation.** Being properly prepared for a contest is the single most important contributor to improving your contest score. Successful marathon runners don't just show up for their races. Rather, they prepare for months and years. A contest is not unlike a marathon. Even though everyone isn't a winner, successful participants excel based on their mental and physical preparation. The improving contesteer can:

- Prepare so that all you need to do on Friday is sit down and operate.
- Understand propagation before and during the contest.
- Work the bands vigorously during the week before the contest to understand who's on and their game plans.
- Have a plan for spare equipment (including PCs) if something fails during the contest.
- Plan the contest as if you were attempting to run the Boston Marathon.
- Use two alarm clocks set 5 minutes

Call Area	Number of Users
W1	129
W2	99
W3	63
W4	128
W5	103
W6	123
W7	61
W8	64
W9	87
W0	64
DX	161

Table II- Registered CT users by USA call area.

apart as a backup during rest periods.

- Use alarms that are battery powered to avoid power disruptions.
- Have a good understanding of last year's efforts, especially where you made good band decisions.

• Have a good supply of yellow stickies for note taking.

• Set goals for yourself and try to exceed them. Not everyone wins!

• Excel at band changing in your station.

• Know the rules inside and out (e.g., ten-minute rule, multiplier credits, etc.).

• Practice various operating scenarios with your radio (setting up a "quick" split on 40 meters, doing an A=B with your VFOs to tell a guy the frequency is busy, etc.).

**Other.** There are countless other thoughts about improved contest scoring which include:

• Tape record your operation and listen for mistakes and areas of improvement the next time.

• Operate in small contests during the year to develop your skills.

• Try to find a friend to operate with/ bounce ideas off from time to time.

• Try to identify and fix potential TVI/RFI problems *before* the contest. Have a plan established to deal with possible problems (e.g., pre-made power cords with toroids).

• Answer your bureau QSLs. DX stations *really do* remember.

## Our 1991 Contest Resolutions

Fellow contesters, that time of year has again come upon us. In addition to our never-ending attempts to initiate exercise programs, spend more time with our families, improve our work ethic, and commit ourselves to more disciplined financial budgeting, there is the issue of being a better contesteer in 1991. Here's a fun list for you to consider:

• I will always sign my entire callsign in every contest.

• I will never intentionally take someone else's frequency.

• I will never log a QSO unless I am absolutely sure of the exchange and callsign.

• I will religiously repeat the entire callsign of the station I am working during each QSO.

• I will always verify the callsign of the station I am working from a DX spot on packet before logging him.

• My logs will always be submitted in a clear format before the mailing deadline.

• I will plan this year's antenna projects during the winter and begin construction on the first warm spring weekend.

• My entire station will be ready for the fall operating season 30 days before the start of the CQ WW SSB contest.

- I will always solder the ground on my PL-259 connections.
- I promise to answer all of my incoming bureau QSL cards.
- I will be sure to respond to the next CQ Contest Calendar survey.
- I will periodically check to see if someone else wants to operate when participating at a multi-op.
- I will always act as if I were using my callsign when operating from someone else's station in the next contest.

## K1EA CT Update

Needless to say, the impact of K1EA's CT contest logging program has revolutionized contest operating. I've compiled some data about Ken's users as of November 1990 which I thought you might find interesting.

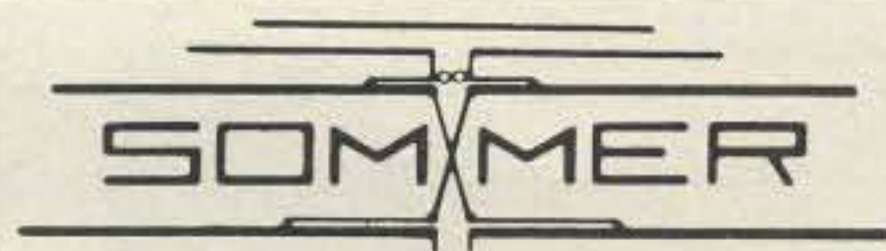
Ken now has 1082 registered users of CT. These users are located in 48 states (what about the contesters in Montana and North Dakota?) and 33 DXCC countries. Tables I and II provide more details about the demographics. It's anyone's guess how many other copies are being used. I think the question of computers being a required element of a contest station has at last been answered!

## What Have You Done Lately?

This month I am initiating a new feature that will run periodically based on your input. The question I'm asking is, What have you done lately? Over the years I've been amazed at the personal accomplishments and interests of contesters. Their tales have ranged from professional achievements to success in other hobbies and endeavors. Please don't be modest. If you have recently achieved a goal or did something that others would be interested in, please send it along.

This month I will begin with a rather unlikely story. Jay Roman, KB0Q, is the proud father of perhaps one of the youngest contest operators I have run across. His son, John, KB0H, at the young age of 8 began his contesting career this past January. John has found contest operating to be fun although somewhat intimidating. In addition to operating in the 1990 Novice Roundup, he has followed the lead of his dad and operated in several RTTY contests. Much to my personal liking, John has been especially attracted to CW and throughout his short ham career has shown impressive initiative, including studying on his own for the majority of his license requirements.

I have to admit that times have changed for many Novices, and having Dad as a ham certainly doesn't hurt. Together, Jay and John use a combination of Collins gear and a TS940 along with an IBM XT and HAL PCI-2000 for RTTY. The outside includes a 4-element KLM monobander



## TRAPLESS BEAMS

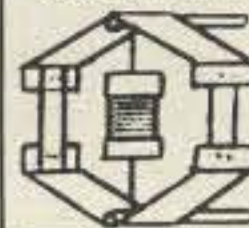
**SOMMER-ANTENNAS**  
P.O. Box 847  
Cowpens, SC 29330  
(803) 463-9514

**THE ISOTRON**  
COMPACT ANTENNAS FROM 160-10 METERS

NO TUNERS!  
NO RADIALS!  
NO RESISTORS!  
NO COMPROMISE!

FOUR EXCELLENT REVIEWS JUST  
DON'T HAPPEN BY CHANCE  
CALL US FOR A FREE CATALOGUE.

\*See review in Oct. 73, 1984 \*Sept. 73, 1985 March 73, 1986  
CO, Dec. 1988



**BILAL COMPANY**  
137 Manchester Drive  
Florissant, Colorado 80816  
(719) 687-0650



CIRCLE 87 ON READER SERVICE CARD

# COLORADO COMM CENTER



**800-227-7373**



M/C, VISA, DISCOVER, COD

Same Day Shipping Nationwide

**YAESU**

**FT-212RH**  
45 WATT 2 METER MOBILE

- 18 Memories
- Receive 140-174 MHz

**KENWOOD**

**TS-440S**  
COMPACT HF PERFORMANCE

- General Coverage Receiver
- Covers All Amateur Bands
- USB, LSB, CW, AM, FM, AFSK

**ICOM IC-725**

**HF ALL BAND TRANSCEIVER**

- Compact and Lightweight
- Receive .03 to 30 MHz
- Transmit 180-10 Meters
- SSB, CW, AM, Optional FM
- 100 Watts Output

**YAESU**

**FT-470**  
DUAL BAND

- 2 Meter/70cm
- Multi Scanning
- 2.3 to 5 Watt Output

**FT-411**  
"MAXI" 2 METER HT

- 49 Memories
- Built-in PL Encode/Decode
- Up To 5 Watt Output

**KENWOOD**

**TM-731A**  
144/450 FM DUAL BANDER

- Extended Receive Range
- 30 Memory Channels
- 50 Watts/2M, 35 Watts/70cm
- TM-631A, 2 Meter/220 MHz

**ICOM**

**IC-24AT**  
2 METER/440 MHZ HT

- Super Compact and Lightweight
- Crossband Full Duplex
- Up To 5 Watts Output

**IC-2SAT**  
COMPACT 2 METER FM, HT

- 48 Memories
- Built-In NiCd Batteries
- Multi Scan Functions

**AEA** PK-232 MBX

**WORLD'S LEADING MULTI-MODE DATA CONTROLLER**

**PK-88 FEATURE LOADED PACKET CONTROLLER**

**KENWOOD**

**TH-27A**  
SUPER COMPACT 2 METER HT

- Receive 118-165 MHz
- Up to 5 Watts Output
- CTCSS Encode/Decode Built-in
- Multi Function Scanning

**ALINCO**

**DR-112T**  
2 METER MOBILE

- 45 Watts Output
- Full Feature, User Friendly
- Backlit LCD Display

**MFJ** ANTENNA TUNERS & ACCESSORIES

**MFJ 1270B, 1274, 1278**

**525 E. 70th Unit 1W • Denver, CO 80229**  
**303-288-7373 Mon. - Fri. 9-5 MT Sat. 9-2**

1-800-666-0908

NEW!

**Twin Band  
HW-24-T**  
RX: 130 to 174.995 MHz  
350 to 469.995 + MHz  
TX: VHF + UHF  
Amateur Bands

- Dual Receive/Cross Band Repeater Mode + more
- The Ultimate Dual Band Handy!



SALE  
PRICED!



**Heath**

- SB-1000 Linear Amplifier Kit
- Mini + Micro HT's
- Packet Gear • Amateur Kits
- Twin Band Repeater/Mobile

Low Discount Prices—Full Line of Accessories

**LENTINI COMMUNICATIONS**

21 Garfield St., Newington, CT 06111

New equipment pricing + orders 1-800-666-0908 out of state.

Tech questions, used gear, info 203-666-6227

—We carry most major brands—



Hours: Mon.-Fri. 10-6 Sat. 10-4

We Ship UPS, CODs Welcome

CIRCLE 60 ON READER SERVICE CARD

**Six Function DTMF Controller**



**Auto-Kall  
AK-4**

- Outputs: 2 or 3 latched, 1 or 2 momentary, 1 timed and 1 manually reset group-call latched for remote alarm
- Different codes for turning outputs on/off NOT toggle on/off like most others! • Wrong number reset
- 4-digit access code - can use \* up # down
- Multiple group-call response • On-board 1-amp relay

- AK-4K (board/kit) ..... \$69.95
- AK-4W (wired/tested board) ..... \$89.95
- AK-4C (Complete unit in metal enclosure with in/out jacks, built-in speaker, etc.) ..... \$139.95

Plus \$3.00 shipping & handling

**MoTron Electronics**

310 Garfield St. • Suite 4

Eugene, OR 97402

Call Toll Free 1-800-338-9058 or (503) 687-2118

FAX (503) 687-2492



CIRCLE 94 ON READER SERVICE CARD

**MININEC \$35**

**MNjr 1.5** offers fast, powerful, inexpensive antenna analysis. MNjr models antennas in free space or over ground, uses 3-times faster FSS analysis, has automatic frequency sweep, simple definition of feeds and loads, and displays & prints standard ARRL polar plots. MNjr has everything you need for most antennas. 8087 and extra-fast no-8087 versions both included. MNjr 1.5, \$35. Full credit towards MN 3.5.

**MN 3.5** is the fastest, most powerful, and most advanced MININEC program available. MN 3.5 displays 3-D views of antenna geometry & phasor wire currents, does sophisticated polar & rectangular plots of H, V, RCirc, LCirc, MaxLin, MinLin, & Max polarization components, uses up to 254 pulses for complex antennas, calculates near-fields for TVI & RF-hazard analysis, computes far-fields for repeater coverage, does current feed for phased arrays, has automatic frequency sweep, and simple definition of feeds & loads. 8087 or extra-fast no-8087 version. MN 3.5, \$85. 500-pulse option, \$25.

MN & MNjr are up to 10 times faster than standard MININEC implementations. Comprehensive antenna design library, easy-to-use full-screen editor, and extensive documentation included. Add 6.25% CA, \$5 overseas. U.S. check, cash, or money order. For IBM PC, 3.5" or 5.25" disk.

Brian Beezley, K6STI, 507-1/2 Taylor, Vista, CA 92084

**WE BUY HAM GEAR • TOP PRICE**

SINGLE PIECE OR  
ENTIRE ESTATES

45 YEARS IN AMATEUR RADIO

IF YOU'RE LOOKING TO SELL OR BUY • SEND \$3 FOR CATALOG AND WHOLESALE LIST

ASSOCIATED RADIO • 913-381-5900

8012 CONSER BOX 4326

OVERLAND PARK, KANSAS 66204

**NEW**



**Ham Companion™**

BRINSON MICROWARE CORPORATION™  
1044 Downing #107 • Denver, CO 80218

- Over 5,000 Locations including:
  - + Every Country & it's Capital
  - + US State Capitals, Counties & County Seats
  - + US Military Bases Worldwide
  - + A Quick Reference for your most used locations.
  - + And you can add your own.
- Local Date & Time for all locations.
- Sunrise/Sunset Time & Grayline Bearings for any location in the World.
- Distance in Statute/Nautical Miles & Kilometers between any 2 locations.
- Short & Long Bearing to & from each location.
- World Maps with:
  - + Current Grayline.
  - + Great Circle Path between any two locations.
  - + Zoom Feature.
- MUF/FOT/LUF Graph - Printable.

Only \$79.95  
\$5 Shipping/Handling  
CO & OK Res. +Tax

1-800-874-0771

CIRCLE 81 ON READER SERVICE CARD

for 10 meters along with several other antennas.

John is proud of his first amateur QSO with a KL7 followed quickly by a JA. It took three QSOs for him to log his first state-side station! Currently John is trying for WAS and is gradually improving his code speed.

John is now 9 years old and is about halfway through the 4th grade. If you run into him on RTTY or during a contest, take a few extra seconds to say hello and encourage him along. Contesting needs more kids like KB0FTH!

**Closing Comments**

January and February are traditionally the busiest months on the contest calendar. I hope you have a chance to catch some of the action!

At the risk of stating the obvious, 1990 was a momentous year for amateur radio and the world around us. I trust you had a great holiday season and wish everyone a successful New Year in 1991!

As always, the deadline for the April 1991 Contest Calendar is February 1st.

73, John, K1AR

**U.B.A. SWL Competition**

January 1 to December 31, 1991

The U.B.A. (Belgium Amateur Radio Union) is again sponsoring this year-long competition for the benefit of SWLs.

There are five categories: Phone, CW, RTTY (AMTOR, ASCII, packet), and SSTV (FAX) for single operators. And all modes for clubs and multi-operators.

Use all 6 bands, 1.8–28 MHz.

Each station heard counts 1 point on each band. Each country heard is a multiplier (counted once only). Final score is total of different stations heard on all bands times the country multiplier.

To enter the competition you must report your progress to the Contest Manager on April 1 and September 1. Your final log must be submitted no later than January 20, 1992. There will be certificates and trophies to the winners in each category and area.

The U.B.A. suggests that you use their special log forms. Your requests for log forms and more detailed information should be directed to the Contest Manager. Include 3 IRCs if in Europe; 4 IRCs for all other areas (\$2 US).

Contest Manager: Marc Domen, (ONL 6945), P.O. Box 38, Borgerhout, B-2200, Belgium.

**ARRL RTTY Roundup**

1800Z Sat. to 2400Z Sun., Jan. 5–6

This is the third annual all-digital contest sponsored by the ARRL. Any station

IBM & Compatibles  
CGA, EGA or UGA





John Roman, KB0FTH, is a nine-year-old amateur who has joined the ranks of avid contesters.

may work any other station worldwide. You may operate more than one digital mode, but QSOs and multipliers are counted once only regardless of modes used.

Operation is limited to 24 hours out of the 30-hour contest period. Two rest periods must be taken in two separate blocks of time and clearly marked in the log.

**Modes:** Baudot, RTTY, ASCII, AMTOR, and packet.

**Bands:** 3.5–30 MHz on those frequencies recommended for digital operation (no 10, 18, or 24 MHz).

**Categories:** Single operator, multi-band, (1) less than 150 watts output, (2) 150 watts or more. And multi-operator, single transmitter, all band.

**Exchange:** Signal report and QTH. State for the U.S., province for Canada. DX will send a serial QSO number.

**Scoring:** One point per QSO. A station may be worked once per band for QSO credit.

**Multiplier:** Each US state (48), each VE province (12), and each DXCC country, counted only once, not once per band. (KH6 and KL7 are countries; VO1/VO2 counts as one VE province).

Entries with 200 or more contacts must submit a duplicate QSO check sheet.

**Awards:** Certificates to the top-single operator, both low and high power, and multi-operator scorers in each ARRL/CRRL section, and each DXCC country. Novice/Tech entrant with at least 50 QSOs will also receive a certificate.

Detailed information appeared in the November issue of QST. Contest forms are available from the ARRL for an SASE and two units of first-class mail and are recommended.

Postmark your entry by February 6th and send it to: ARRL RTTY Contest, 225 Main Street, Newington, CT 06111.

### North American QSO Party

CW: 1800Z Sat. to 0600Z Sun.,  
Jan. 12–13

SSB: 1800Z Sat. to 0600Z Sun.,  
Jan. 19–20

The object of this one is to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period. North American stations are defined by the rules of the CQ WW DX Contests with the addition of KH6.

**Classes:** Single operator and multi-operator two transmitters. Multi-operator stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Use of helpers or spotting nets by single operator entries is not permitted. Single operator entrants may only have one transmitted signal at a time. Output power is limited to 150 watts for eligible entries.

**Frequencies:** Suggested frequencies are 1815, 3535, 7035, 14035, 21035, and 28035 (20 kHz up from band edge for Novice) on CW, and 1865, 3850, 7225, 14250, 21300, and 28600 (28450 Novice) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters at 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z. You may work a station once per band.

**Exchange:** Operator name and station location (state, province, or country). Only one callsign may be utilized during the contest.

## GORDON WEST RADIO SCHOOL

### #04 21-DAY NOVICE . . . . . \$22.95



- 112-page textbook
- two stereo code learning tapes
- sample 5 wpm Novice code test
- over \$50 in radio manufacturers' discount coupons.

### #01 COMPLETE NOVICE . . . \$62.95

2 theory tapes, 2 textbooks, FCC Rule Book, 4 code tapes, code oscillator set, examiner test packet, and over \$50 in radio discount coupons.

### #02 NOVICE CODE COURSE \$32.95

6 cassette tapes make it easy to learn the code from scratch.

### #07A 2-WEEK TECH . . . . . \$22.95

This Technician course includes 2 theory tapes and 1 illustrated textbook.

### #05 COMPLETE GENERAL. . \$62.95

6 code tapes, 4 theory tapes, and 2 textbooks. Ideal for upgrade from Novice to General.

### #06 GEN. CODE COURSE . . \$32.95

This General course includes 6 tapes for speed building from 5 to 13 wpm.

### #08B COMPLETE ADVANCED \$62.95

This Advanced course includes 4 theory tapes, 1 textbook, and 6 code tapes (13 to 22 wpm).

### #09 ADV. THEORY COURSE \$32.95

4 tapes and 1 illustrated textbook

### #10 COMPLETE EXTRA. . . . \$62.95

4 theory tapes, 1 textbook, and 6 code tapes (13 to 22 wpm).

### #12 EXTRA THEORY COURSE \$32.95

4 theory tapes and 1 illustrated textbook for Extra class theory.

### #11 EXTRA CODE COURSE \$32.95

6 tapes for speed building from 13 to 22 wpm for the Extra code exam.

### #13 BRASS KEY & OSC. . . . \$25.95

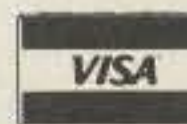
### #15 PLASTIC KEY & OSC. . . \$21.95

#### SINGLE CODE TAPES

\$10.95 each including shipping

- #19 5 wpm Novice QSO tests
- #20 5 wpm Random Code
- #21 5-7 wpm Speed Builder
- #22 7-10 wpm Speed Builder
- #23 10 wpm Plateau Breaker
- #24 10-12 wpm Speed Builder
- #25 12-15 wpm Calls & Numbers
- #26 13 wpm Random Code
- #27 13 wpm Test Preparation
- #28 13 wpm Car Code
- #29 13-15 wpm Speed Builder
- #30 15-17 wpm Speed Builder
- #31 17-19 wpm Speed Builder
- #32 20 wpm Random Code
- #33 20 wpm Test Preparation
- #34 20 wpm Car Code
- #43 3-15 wpm Code Review
- #40 12-21 wpm Code Review

Prices include shipping & handling  
IL residents add 6½%



### RADIO AMATEUR CALLBOOK INC.

925 Sherwood Dr., Lake Bluff, IL 60044  
Mon.-Fri. 8-4pm (708) 234-6600

CIRCLE 129 ON READER SERVICE CARD

**Scoring:** Multiply total valid contacts by the sum of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canada (NB—VE1, NS—VE1, PEI—VE1 or VY2, PQ—VE2, ON—VE3, MB—VE4, SK—VE5, AB—VE6, BC—VE7, NWT—VE8, YUK—VY1, NF—VO1, LAB—VO2), and other North American countries. (Do not count USA, Canada, KH6, or KL7 as countries.) Non-North American countries do not count as multipliers, but may be worked for QSO credit.

**Awards:** Trophies will be awarded on each mode for the high score in each of the following categories: Single operator CW and Multi-operator CW. Combined

score trophies will also be awarded. Certificates of merit will be awarded to the highest scoring entrant (200 QSOs minimum) from each state, Province, and North American country. T-shirts will be awarded to each member of winning teams.

NAQP logs must be postmarked 30 days after the contest and sent to John Golomb, KZ2S, 107 Bailey Corner Road, Wall, NJ 07719. Valid entries consist of: (1) a summary sheet showing the number of contacts and multipliers by band, total contacts, multipliers, and score, team name (if any), power output, name, call-sign, and address of the operator station

callsign and station location; (2) a complete, legible log of all contacts (including dupes marked as such) with indication of multipliers claimed; (3) a separate check sheet for each band; and (4) a list of all claimed multipliers worked on each band. Logs may be submitted on disk in the form of files generated by K8CC's NA program or MS-DOS ASCII files consisting of all information in (1)-(4) above if generated from a program other than NA. All entries should include a written, signed statement of "Fair and Ethical Operation."

Team competition is limited to a maximum of 5 operators per team. Groups having more than 5 members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated should the operator be a guest (e.g., N4RJ op by KM9P) must be registered with KZ2S. Team registration information may be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

For each unmarked duplicate QSO, you lose that contact plus an additional three contacts; for each QSO for which you are not in the other station's log, you lose that QSO plus an additional one contact; and for each QSO for which the log data is incorrectly copied in any respect, you lose that contact. Entries with score reductions greater than 5% will be disqualified at the discretion of the Contest Review Committee.

### North Dakota QSO Party

0000-0800Z & 1600-2400Z Sat., Jan. 19  
0800-1600Z Sun., Jan. 20

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), and QTH. County for ND stations; state, province, or country for others.

**Scoring:** Count 1 point for phone QSOs, 2 points for CW and RTTY.

**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—35 kHz up from band edges. Phone—1835, 3905, 7280, 14295, 21380, 28450. 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 final results.

Mail logs by February 28th to Mike Beaton, KD0A, 2301 18th Ave. S., Fargo, ND 58103.

# RENO RADIO



1-800-345-5686



BUTTERNUT — BENCHER — B & W — ASTRON — AMERITRON — ALINCO

**ICOM**



**IC-765**  
HF All Band Transceiver  
Call Now!



**IC-725**  
Compact Easy To Operate HF  
Call Now!



**IC-2400**  
Dual Band FM Transceiver  
Call Now!

**MFJ**



**MFJ-1278T Turbo**  
Multi-Mode Data  
Controller With New  
2400 Baud Packet  
Call For Details!  
Order Your Antenna  
Tuner, Switches, Keyers,  
And All Your MFJ  
Accessories

**YAESU**



**FT-1000**  
World Class HF  
Performance Rig  
Call Now!



**FT-747** **SALE!**  
Economical HF Fun  
Call Now!

**TEN-TEC**



**Paragon**  
Superior USA Made  
HF Winner  
Call Now!

**DIAMOND ANTENNA**

**Dual Band Base/ Repeater Antennas**  
X-500A 2 Meter/70 cm  
200 Watts, 205 in. Length  
X-200A 2 Meter/70 cm  
200 Watts, 88 in. Length  
Call Today For Details  
On Antennas, Duplexers  
And Power Meters

**YAESU**



**FT-767GX** **Special Holiday Savings**  
World's First  
HF/VHF/UHF Base Station  
Call Now!



**FT-736** **Special Holiday Savings**  
Work Satellites, Moonbounce  
Meteor Scatter  
2 m, 70 cm w/optional 50,  
220 MHz and 1.2 GHz  
Call Now!

**FT-470** **Special Holiday Savings**

Dual-Band  
Performance Perfected  
2 meter and 70 cm with  
42 Memories, Dual VFO's Each  
Band and More  
Call Now!

**Special Holiday Savings**

**FT-411**

Maximum Singleband  
HT Performance  
2 Meter, Extended Receive  
and All The "Goodies"  
Call Now!

12 Glen Carran Circle • Sparks, NV 89431

(702) 331-7373

Why Lose Money In Vegas, Try Reno!

CUSHCRAFT — DIAMOND — HUSTLER — ICOM — KENWOOD — LARSEN — MFJ — YAESU



## HA DX Contest

2200Z Sat. to 2200Z Sun., Jan. 19-20

Sponsored by the Hungarian Radioamateur Society, this is one of several very popular Eastern European contests. The contest is CW only and stations may be only worked once per band.

**Exchange:** RST plus serial number (599001). HA stations will also send a two-letter code corresponding to their county. The possible codes are: BA, BE, BP, BN, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA.

**Scoring:** Count 6 points per HA QSO and 3 points for non-HA QSOs on other continents. Final score is total QSO points times sum of HA counties worked per band.

Entries are due 6 weeks after the contest and should be sent to: Hungarian Radioamateur Society, Box 86, Budapest H-1581, Hungary.

## Michigan QRP CW Contest

1200Z Sat. to 2359Z Sun., Jan. 19-20

This is the 11th 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 250 milliwatts. (B) 1 milliwatt to 250 milliwatts. (C) 1 watt to 5 watts. (D) Over 5 watts.

The same station can be worked on each band for QSO and multiplier credit.

**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 1.25 if power used is 100% battery, and 1.5 for natural power.

**Final Score:** Total QSO points  $\times$  states, provinces, and countries worked per band  $\times$  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.

Logs must be received no later than Feb. 16th by L.T. Switzer, N8CQA, 654 Georgia, Marysville, MI 48040. Include a large SASE for a copy of the results or for sample forms.

## ARRL VHF Sweepstakes

1900Z Sat. to 0400Z Mon., Jan 19-21

This is the 44th 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 M Contest

CW: Jan. 25-27 SSB: Feb. 22-24  
2200Z Friday to 1600Z Sunday

Complete rules were published in the December issue. The following is a brief rundown.

**Exchange:** RS(T) and QTH. State for the U.S., areas for Canada, prefix for DX, country abbreviation for those with unusual prefixes.

Stations operating in a state different from that indicated by the call are required to sign portable.

**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 boundaries are the standards.)

**Awards:** Certificates to the top-scoring stations in each U.S. state, Canadian area, and DX country. And an assortment of 11 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.

Mailing deadline for logs is February 28th 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.

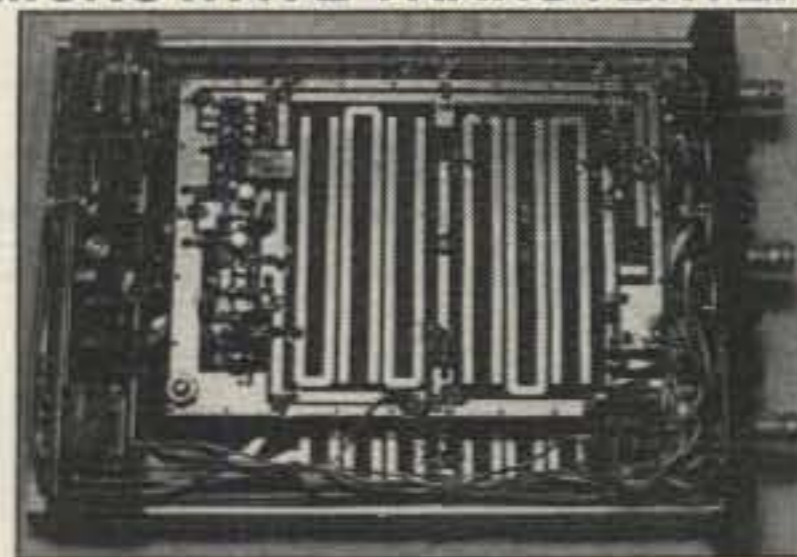
## U.B.A. CW/SSB Contest

Phone: 1300Z Sat. to 1300Z Sun.  
Jan. 26-27

CW: 1300Z Sat. to 1300Z Sun.  
Feb. 23-24

This one is sponsored by the Belgium Amateur Radio Union (U.B.A.) and is any station working any other worldwide. Numerous operating awards are available

## MICROWAVE TRANSVERTERS



SHF 1240 Complete Transverter

**SHF SYSTEMS** No tune linear transverters and transverter kits for 902, 1269, 1296, 2304, 2400, 3456 MHz. All use 2m i.f.g13.8V. Kits include mixer and L.O. P.C. boards, xtal and all components. Built units include I.F./D.C. switchboard, connectors and compact low profile housing. Other frequency options in amateur band available.

SHF 900K	902-906 MHz	50mW	Kit \$129	Built \$250
SHF 1240K	1296-1300 MHz	10mW	Kit \$139	Built \$240
SHF 1269K	1268-1272 Oscar Mode L	10mW	Kit \$130	Built \$240
SHF 2304K	2304-2308 MHz	10mW	Kit \$195	Built \$320
SHF 2401K	2400 MHz Mode S rcv Conv		Kit \$150	Built \$250
SHF 3456L	3456-3460 MHz	10mW	Kit \$195	Built \$320
SHF LOK	540-580 MHz L.O.	50mW	Kit \$ 64	

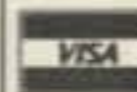
CALL OR WRITE FOR COMPLETE CATALOG

### DOWN EAST MICROWAVE

Bill Olson, W3HQT

Box 2310, RR1 Troy, ME 04987

(207) 948-3741



CIRCLE 114 ON READER SERVICE CARD

# BATTERIES

Nickel-Cadmium, Alkaline, Lithium, Sealed Lead Acid For Radios, Computers, Etc. And All Portable Equipment

**YOU NEED BATTERIES?  
WE'VE GOT BATTERIES!**

CALL US FOR FREE CATALOG



## E.H.YOST & CO.

7344 TETIVA RD.  
SAUK CITY, WI 53583  
(608) 643-3194  
FAX 608-643-4439

CIRCLE 58 ON READER SERVICE CARD

SMILE... YOU'RE NOT ON TV...

CALL 1-800-KILL-TV!

TO ORDER

**RFI FILTERS THAT REALLY WORK**

BX-2S Screws On to tv/vcr input

Now used by FCC during investigations



TP-12

KW-1

BX-2P

The World Famous BX cable-TV filter... \$24.95

TP-12 Effective standard telephone filter. 18.95

KW-1 Pure AC output line filter... 42.95

30 DAY RETURN—FOR—REFUND GUARANTEE

Replace Unfilterable Electronic Telephones With Our NEW TP-XL Filtered Touch-Tone Telephone \$42.95. TP-XL + 12 For Full Quieting With Linear Amp \$59.95.

800 number for orders only...

For engineering help, (512) 656-3635

Tom Coffee, W4PSC (R & D Eng.)

**TCE LABORATORIES**

5818 Sun Ridge

San Antonio, Texas 78247

DEALER INQUIRIES ARE NOW INVITED

CIRCLE 70 ON READER SERVICE CARD

and contest QSOs may be credited towards these awards.

**Classes:** 5 categories exist—Single Operator, All Band/Single Band, Multi-Operator/Single Transmitter, QRP 10 watts, and SWL.

**Frequencies:** CW—3500-3560, 7000-7035, 14000-14060, 21000-21060, 28000-28060 kHz. SSB—3600-3650, 3700-3800, 7040-7100, 14125-14300, 21200-21400, 28500-28800 kHz.

**Exchange:** RS(T) and consecutive serial number. Belgian stations also give their province abbreviation.

**Multipliers:** All Belgian Provinces, prefixes: ON4-9, DA1-2, and European countries.

**Scoring:** QSOs with ON, DA1-2 count 10 points. European QSOs count 3 points. All others are 1 point. Final score is total QSO points times total multipliers.

**Awards:** There are several awards available, including trophies and certificates to the high scorers in each operating class.

Send your final results no later than 30 days after each contest mode to: UBAHF Contest Committee, Galicia Jan, ON6JG, Oude Gendarmeriestraat 62, B-3100 Heist Op Den Berg, Belgium.

## ARRL Novice Roundup

0001Z Sat. Jan. 26 to 2359Z Sun. Feb. 3

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 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 not only highly recommended, but is a *must*. A large SASE to ARRL Novice Roundup will get you a contest package with all the necessary forms. The December issue of *QST* had a detailed announcement with suggestions and operating details not covered here.

Postmark your entry no later than March 4th to: ARRL Novice Roundup, 225 Main Street, Newington, CT 06111.

## New Hampshire QSO Party

1900Z Sat. to 0700Z Sun., Feb. 2-3  
1400Z Sun. to 0200Z Mon., Feb. 3-4

This year's party is again sponsored by the NH Amateur Radio Association. It is New Hampshire stations working all others, including Novices. As with most QSO Parties, the same station may be worked once on each band mode.

**Exchange:** RS(T) and QTH. County for NH stations; state, province, or country for others.

**Scoring:** All stations credit 1 point/SSB QSO, 2 points/CW QSO, and 5 points/

Novice QSO. NH stations multiply QSO points by number of NH counties, states, provinces, and DXCC countries. Others simply use counties. Twenty (20) bonus points (maximum of 240) may be added to your final score for working NHARA members: WB1CAG, NY1Z, W1GUA, W1WQM, WB1HBB, WB1FZZ, NS1S, WK1P, NE1K, N1LT, K1BKE, and W1OC.

**Final Score:** Final score is calculated by multiplying QSO points times total multiplier and adding bonus points.

**Frequencies:** CW—1810, 3535, 7035, 14035, 21035, 28035; SSB—1875, 3935, 7235, 14280, 21380, 28380, 50115, 144205; Novice—3735, 7135, 21135, 28135.

**Awards:** Certificates will be awarded to the highest scorer in each NH county, state, VE province, and DXCC country. Logs must be received by March 18th, 1991. Be sure to include an SASE for final results. Send logs and comments to: Mount Moriah Repeater Society, c/o Bud Valcourt, NY1Z, 19 Teague Drive, Salem, NH 03079.

## YL ISSB QSO Party

CW: Feb. 2-3 SSB: Mar. 9-10  
0001Z Saturday to 2359Z Sunday

The party is open to all, but the emphasis is on membership participation. Rules and logging format are much too lengthy and complicated to list here. I strongly suggest you send a large SASE to KØETA for more details.

**Categories:** Single operator, DX-US Partners, and YL-OM Teams.

**Exchange:** Call, RS(T), QTH (state, province, territory, district 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. In addition, credit one multiplier for working both DX-W/K partners, each YL/OM team, US state, VE province, DXCC country, and each VK, ZL call area. Use multiplier of 2 for low power (less than 250 W).

**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: Fred Kujawa, KØETA, RR 4 Box 213-6, Stockton, MO 65785.



## The Complete DX Tracking System for the IBM PC Rated #1 in RSGB's Amateur Radio Software Reviews!

- Fast, easy automated data entry with dupe warning. Real-time logging is a breeze!
- Automatic determination of country, zone, and oblast. Pop-up menus for tricky calls.
- Complete DXCC country and Russian oblast lists included. You can edit, add new ones!
- Automated statistics and reports for all DXCC, WAZ, and oblast awards through 6M.
- Automated award application determines eligibility, prints completed forms! Just sign!
- Useful reports include Logbooks, QSLs Needed Lists, Countries Needed Lists, and more.
- Beam headings calculated from your QTH! Automatic QSL labels for needed QSOs!
- Import QSOs from the CT or NA contest program, or print contest QSL labels!
- Companion products available soon include a PacketCluster system with xcvr control!
- Quick, easy, professional. No copy protection. Customer support hotline! Demo available!

Send a check for \$44.95 or \$5.00 for a DXLOG Demonstrator disk and manual. DX add \$5.00 shipping. PA residents add 6% tax. Please include your callsign and disk size!

PAYL Software, PO Box 926, Levittown, PA 19058 U.S.A.  
(215) 945-4404

CIRCLE 68 ON READER SERVICE CARD

# OUR READERS SAY

## Too Much "Hamspeak"?

Editor, CQ:

"Everybody" knows what a Yagi is. We all understand what is meant by QRT, DX, QSO, RTTY, and packet. But what about the curious person who has heard about "ham" radio and decides to pick up one of our magazines at a newsstand? He or she might as well pick up a foreign newspaper. He or she will have as much difficulty with most of our publications as if it were written in Sanscrit.

Whether the use of jargon and abbreviations is an act of snobbishness on our part or just an unconscious, unintentional act on our part, most of what we say concerning ham radio goes over the heads of a lot of people. We hear or read "Hamspeak," and, like lemmings, we follow along and encourage others to use our jargon, too.

RTTY becomes an accepted term overnight, and we consequently expect everyone else to have seen it and understand. A lot of us may use "Hamspeak" because it is the "IN" thing to do.

But "Hamspeak" annoys and confuses people who would like to learn something about ham radio but are repulsed at every juncture by our incomprehensible and easily misunderstood language. Sure, they can learn the hard way, the way we learned. Pay their dues, earn their stripes, and someday be a ham, too. But for everyone who achieves hamdom this way, 100 or 1000 others listen to our jargon and run the other way.

So who needs them, right?

Let us ask ourselves: Do you have all the club members you want? Do you dealers have all the customers you need? Do you magazines have all the subscribers you want and need to stay in business? Chances are the answer to these questions is a resounding "no!"

Unless we clean up our act and go out of our way to help the beginner learn the ropes and give him or her a chance to learn from us without having to master "Hamspeak" first, we may someday soon be a very small society of ex-hams.

Phillip Isenberg, KB4CPB  
Winston-Salem, NC

## Space Shuttle Retransmissions

Editor, CQ:

In just about every shortwave/ham magazine there is usually a listing of the frequencies that will be used by WA3NAN, W5RRR, and W6VIO for retransmission of space shuttle audio. WA3NAN at the Goddard Space Center, Greenbelt, MD, broadcasts on a 24-hour basis. I would ask that all amateurs assume "the frequency IS in use." In a time when we are looking for ways to attract the younger set to ham radio, having a service such as is provided by these three clubs can be a real Godsend. Let's all try to give these frequencies plenty of "elbow room" (1 kHz just isn't enough). Often, new hams and SW listeners (potential hams) don't have sophisticated equipment to IF shift, vary bandwidth, and notch out somebody who wants to talk about the weather and his rig. If we all can pay a little attention, Space Shuttle Missions can be a fun time for all. I know two lit-

tle boys who really like to come into my shack to listen! By the way, thanks to all who did leave the frequency courteously after being told it was in use. Thank you and 73's to all.

John B. Tant, N4XAN  
Corpus Christi, TX

## It's Not Impossible

Editor, CQ:

Yesterday I received confirmation on my WPX CW award, number 2652. Since then I have come up with an additional 50 prefixes as an endorsement to this award. Since I'm not on the air that much I thought that this award would be impossible for me to get. Just too many different prefixes to collect. Now it is a reality! My thanks to Norm Koch, K6ZDL, for accepting my application for the WPX CW Award and I thank the CQ organization for their interest in amateur radio. They make being in amateur radio fun!

Carl H. Larson, WA0DFF  
Bedford, IA

## After 33 Years

Editor, CQ:

I read with great interest, as I always do, your "Zero Bias" editorial in the October 1990 issue of CQ, paying particular attention to one paragraph. You said "... you look fondly at a collection of really old QSL cards, ..." and "Now the old QSL card is like the old telegraph key—a thing of beauty for what it represented, not exactly for what it is."

My wife Rita and I began talking about how I've enjoyed my ham radio hobby all these years, and I pulled out some of my old QSLs—way back when I was a Novice in the fifties. One in particular caught my eye, as it had a picture of the operator on it. He was 13 years old, about the same age as me then, and his call was WN7GHM. I have a current *Callbook* in my library, so I looked his call up and found that he had upgraded to Extra and was obviously active. Here comes the fun part.

I photocopied his QSL both front and back (including the two cent stamp used to mail it), and sent him a newsy letter with the photocopy enclosed. I guess he and his wife almost had a heart attack when they got that letter reintroducing me to them. Since we are both on packet, we've been corresponding that way and plan to meet on HF again this weekend after over 33 years. We may get our wives involved in the QSO, and who know, we might even go up to Washington and have an eyeball with them.

Your article spoke about how some like contests and therefore they exist. Personally, I like the lima beans you mentioned and respect those who like contests, too. Isn't it nice that our hobby has so many facets allowing so many areas of pleasurable expression? Presently, I'm enjoying what is for me a new area of this multifaceted hobby. Tell your readers not to be surprised if they get a note from K6UVI with a copy of their QSL confirming a QSO a long time ago. I'm having as much fun as your testers, believe me!

Ernie Rader, K6UVI  
Springfield, OR



Tough.....  
resilient.....  
black neoprene

## Protect Your Investment with The Pouch

For Every Portable  
Every Battery

A sturdy web belt-loop sewn on the back extends over the top and is secured on the front with a velcro tab.

**5 Sizes**  
• **SUPER-SMALL** for IC-2Sat  
• **SHORT** for other Mini H.T.s  
• **SLIM** (7')-FT4II, IC-24at, etc.  
• **C**- Fits full-size handhelds  
• **LONG** (9')-TH75a & "Bricks"



**The Pouch** It's Washable!

1-800-72-Pouch (Dealer Information)

CIRCLE 45 ON READER SERVICE CARD

**WRIGHTAPES:** (Since 1976) Unconditionally guaranteed Morse Code Practice on 60 min. cassette tapes. Beginners 2-tape set 5 WPM \$7.90. Also 3, 4, 5, 6-8, 10, 9-11, 12-14, 14, 16-20, 22, 24-28 WPM. Specify Plain Language or Code Groups. Also plain lang only 30-35, 35-40, 45-60. FCC type tests: 5-6, 11-12, 11-17, 13-14, 20-24. Call signs: 12-15, 20-24. Nos.: 5-22, 13-18, 18-24. Check, M/C, Visa \$3.95 ea. PPD 1st class USA. Can. Printed texts add \$.50 per tape. **Call anytime.**

9.95  
WBBVAS

Instant Service

PH: 517-484-9794 WRIGHTAPES  
235 E. Jackson C-3 • Lansing, MI 48906

W80N

## THEY'LL THINK THEY'RE JUST HAVING FUN



## YOU'LL KNOW THEY'RE LEARNING

Carole Perry's (Dayton 1987 Ham of The Year) "Introduction To Amateur Radio" package allows children of all abilities to achieve success.

Ready-to-teach package contains: Teacher's Manual with 26 lesson plans, Code Practice Oscillator for Morse Code practice, Spacecode audiocassette which follows lesson plans. **\$99.95**

### ● FREE Video Tape Showing Classroom Use

- Any motivated teacher can teach the program.
- Ham Radio program is used as a motivational tool to teach skills in other subject areas.
- 24 hour Hotline is available for help and questions.
- High motivational activities, homeworks, fund raisers, quizzes, & reproducibles included.

New!  
Includes  
"Tune in the World  
with  
Amateur Radio"

**Media Mentors**  
inc.

P.O. Box 131645  
STATEN ISLAND,  
N.Y. 10313-0006  
718 983-1416

CIRCLE 85 ON READER SERVICE CARD

## ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



MODEL VS-50M

### 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, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

### PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC  $\pm$  0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

### SL SERIES



MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
SL-11A	•	•	7	11	2 3/4 x 7 1/8 x 9 1/4	11

### RS-L SERIES



MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-4L	3	4	3 1/2 x 6 1/8 x 7 1/4	6
RS-5L	4	5	3 1/2 x 6 1/8 x 7 1/4	7



### RM SERIES

MODEL RM-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
RM-60A	50	55	7 x 19 x 12 1/2	60

### RS-A SERIES



MODEL RS-7A

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-3A	•	•	2.5	3	3 x 4 3/4 x 5 3/4	4
RS-4A	•	•	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A	•	•	4	5	3 1/2 x 6 1/8 x 7 1/4	7
RS-7A	•	•	5	7	3 3/4 x 6 1/2 x 9	9
RS-7B	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10A	•	•	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	•	•	9	12	4 1/2 x 8 x 9	13
RS-12B	•	•	9	12	4 x 7 1/2 x 10 3/4	13
RS-20A	•	•	16	20	5 x 9 x 10 1/2	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 3/4 x 11	46

### RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-12M	9	12	4 1/2 x 8 x 9	13
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46

### VS-M AND VRM-M SERIES



MODEL VS-35M

MODEL	Continuous Duty (Amps)			ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt. (lbs.)
	@13.8VDC	@10VDC	@5VDC			
VS-12M	9	5	2	12	4 1/2 x 8 x 9	13
VS-20M	16	9	4	20	5 x 9 x 10 1/2	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 3/4 x 11	46

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load
- Variable rack mount power supplies

### RS-S SERIES



MODEL RS-12S

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-7S	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10S	•	•	7.5	10	4 x 7 1/2 x 10 3/4	12
RS-12S	•	•	9	12	4 1/2 x 8 x 9	13
RS-20S	•	•	16	20	5 x 9 x 10 1/2	18



Is Your Azden Not Operating Properly??  
Does It Turn Off When It Should Turn On??  
If You Have Any Problem With Your Azden Transceiver Send It To The Specialists At The Azden Service Center. Quick Turn Around!!

Hourly Rate: \$35.00  
Your Problem Is Our Solution.

Amateur - Wholesale - Electronics  
P.O. Box 224 • 1040 Industrial Drive  
Watkinsville, GA 30677  
Or Call (404) 769-8706

We Accept: VISA, Mastercard,  
Personal Checks And Send C.O.D.

## AZIMUTH WEATHER STAR

Reads Wind Speed (MPH/KPH) • Hi Gusts • Wind Direction • Rainfall  
Temperature (Present-Hi-Low) • Wind Chill • Scans All!



Only 2 Payments of \$94.98  
Call Now For Credit Card Buy Plan

PLUS FREE BONUS CALL TODAY!

Your SPECIAL FREE BONUS Order TODAY!  
Our Azimuth DualZone 24 Hr Station  
Clock Retail Value \$29.95

Plus S&H & Accessories on Payment 1

ACT NOW! SEND TODAY!

A Power-Packed Micro Weather Computer for Your Station... by DIGITAR

THOUSANDS IN SERVICE WORLD WIDE!

Protect your antenna & home. Our WX computer is loaded. All the facts at your finger tips. Model TWR3—HANDY & COMPACT 2 1/2" x 2 1/2" x 1 1/2" • LARGE, EASY TO READ LCD READOUT Shows Wind Direction (2/10 deg) • Wind Speed • Records Hi Gusts • Outside Temp (F/C) • Hi/Lo Temp Record • Wind Chill • Time/Date • Scans all! Operates on DC/AC (Nicads & AC Adaptor Optional) • Tracks Rainfall (Daily/Annual) w/ Self-Dumping Rain Collector (Optional).

SYSTEM COMES COMPLETE WITH WeatherStar Computer (TWR3), Anemometer & Wind Vane, 40 ft. cable & connectors, Outside Temp Sensor (25') & Mounting Hardware. Just \$189.96  
OPTIONS INCLUDE—Stainless Desk Stand (DSK22) \$9.95, Recharge NiCad Pack (BP3) \$7.95, Extension Cable (40 Ft) (EC40) \$14.95, AG Power Adaptor (PS12) \$9.95 • Shipping/Hdng Add \$7.50 TWR3 & \$1.95 per Option. Foreign orders—please ask for shipping costs.

## THE NEW AZIMUTH AWARDS QSL LIBRARY

New Handsome Custom Albums  
To Collect, Protect & Organize Your Hard-Earned QSL Cards...  
Plus Special Albums for DXCC, WAS/WAC, & WAZ Radio Awards

Organize your QSL cards by award! Easy browsing. Great protection. Albums of tough, dark blue vinyl with 20 crystal-clear pocket pages. Pages hold 6, 4"x6" cards. Add extra pages—250+ cards/album. Specify DXCC - WAZ - WAS/WAC - Standard QSL Album. Each just \$19.95 plus \$2.50 S&H. Extra 20 Page Packs (EP20) just \$12.95 (\$2.50 S&H). (Foreign S&H—PPost 2X S&H; AirPP 6.: S&H)

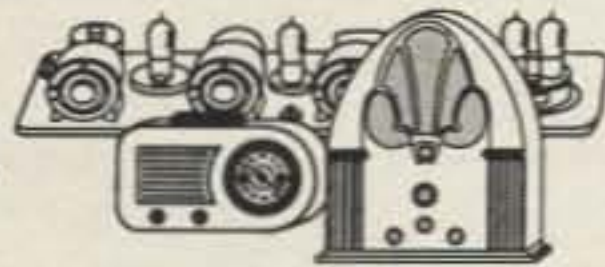
BUY 2 ALBUMS & GET 20 PAGES FREE!  
(SAVE \$12.95)



Special Introductory Offer  
Just \$19.95 Per Library

Made in USA

FREE SAMPLE COPY!



## ANTIQUE RADIO CLASSIFIED

Antique Radio's Largest-Circulation Monthly Magazine

Articles - Classifieds - Ads for Parts & Services  
Also: Early TV, Ham Equip., Books, Telegraph, 40's & 50's Radios & more...

Free 20-word ad each month. Don't miss out!  
Free Sample. 6-Month Trial - \$13.

1-Year: \$24 (\$36 by 1st Class). Foreign - Write.  
A.R.C., P.O. Box 802-C9, Carlisle, MA 01741



Price Breakthrough!  
\$99.95 Plus S&H  
Just Was \$119.95!

## AZIMUTH World RadioSphere™ First Ever!

A Crystal Clear Acrylic World Globe With All Zones & Radio Prefixes Shown By Country!  
Own the world of ham radio! Superb, 12" hand-blown clear acrylic world globe shows—DX radio prefixes (325+), 40 zones, lat & long, Intl Date Line, cities, countries & more. Beautiful—Gray land, clear oceans, red radio info & black nomenclature. Floats above your desk on stand. Mark your radio path around the world & wipe clean (pencil incl). Graphics sealed inside. Incredible American quality. A great gift!  
World RadioSphere (ARS1) Just \$99.95 (\$6.95 S&H). SAVE Order 2— Just \$189.90 (\$13.90 S&H)

Credit Card Orders Call Today Toll Free Nationwide 1-800-882-7388

(9AM to 6PM PST) FAX 707-573-1482 Other Info 707-577-8007 Satisfaction Guaranteed! 14-Days or Your Money-Back-If Not Delighted! Allow 2 to 6 Weeks Delivery • ACT NOW! CALL or SEND TODAY!

Check, Money-Order, VISA or MASTERCARD Accepted  
(Cal. Res add 6.75% sales tax)  
Azimuth Communications Corp. Dept. 9C  
3612 Alta Vista, Santa Rosa 95409 USA  
© MCMLXXX Foreign orders quoted.

Azimuth Products Available at Henry Radio, AES & All Ham Radio Outlets!  
CIRCLE 3 ON READER SERVICE CARD



## Factory Authorized Dealer

- YAESU
- ICOM
- TEN-TEC

CALL TOLL FREE 1-800-70K-HAMS  
1-800-765-4267



- BENCHER, INC.
- HUSTLER
- NCG/COMET
- Kantronics
- Astron
- DIAMOND ANTENNA
- HEIL

● MFJ

● International Wire and Cable

● AMERITRON®

- TELEX hy-gain
- Nye Viking
- Palomar
- CUSHCRAFT CORPORATION
- Larsen Antennas

FREE SHIPPING UPS SURFACE (except towers/antennas)



9500 Cedar Lake Ave., Suite 100  
Oklahoma City, Oklahoma 73114



Hours of Operation  
M - F 9-6  
Sat. 9-3

Local & Info (405) 478-2866 FAX (405) 478-4202

C.O.D.

## THE SCIENCE OF PREDICTING RADIO CONDITIONS

### 1990 In Review

**A**lthough sunspot Cycle 22 did not set a record, its peak was the third highest to be recorded. It now appears almost certain that Cycle 22 reached peak intensity with a smoothed sunspot number of 159 during July 1989. Except for Cycle 19, which peaked with a count of 201, and Cycle 21, which peaked at 165, the peak of Cycle 22 exceeded all other cycles recorded since the mid-eighteenth century.

Although Cycle 22 peaked during mid-1989, sunspot activity continued at a very high level during 1990. The year began with a smoothed sunspot number of 151 and is estimated to have dropped to approximately 130 at year's end. Accordingly, 1990 was an exceptionally good year for propagation conditions on the HF bands.

#### Forecast 1991

Cycle 22 is expected to continue to decline slowly during 1991. Starting with a smoothed sunspot number of approximately 130 in January, the cycle is expected to decline to a level of approximately 115 by the end of the year. This is still a relatively high level of sunspot activity, and good conditions are expected to continue on the HF bands through the New Year. We can expect a decline in 6 meter F-2 layer DX openings, a decline in 10 meter openings, and smaller windows for DX openings on 17, 15, 12, and 20 meters when compared to the past two years. For the most part, however, good propagation conditions are expected on all of the HF amateur bands and on the 6 meter band during 1991.

#### Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot data, reports a monthly mean sunspot number of 125 for September 1990. Daily values ranged between a high of 178 recorded on September 14 and a low of 77 reported on September 27. This results in a smoothed sunspot number of 152 centered on March 1990, a decline of one from the previous month. A smoothed sunspot number of approximately 130 is forecast for January 1991.

11307 Clara Street, Silver Spring, MD 20902

#### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for January 1991

Propagation Index .....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 6, 12, 15, 17, 21, 23	A	A	B	C
High Normal: 2, 7, 11, 16, 18, 22, 24-25, 29-30	A	B	C	C-D
Low Normal: 3, 8, 10, 14, 19, 28, 31	B	C	D	D-E
Below Normal: 1, 5, 9, 13, 20, 26	C	C-D	D-E	E
Disturbed: 4, 27	C-D	D	E	E

- Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.  
 B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.  
 C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.  
 D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.  
 E—No opening expected.  
 3 dB per S-Unit.

#### HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair-to-poor (C-D) on January 1st, good (B) on the 2nd, fair-to-good (B-C) on the 3rd, poor (D-E) on the 4th, fair-to-poor (C-D) on the 5th, etc.

A corresponding small decline was reported in the 10.7 cm solar flux. The Algonquin Radio Observatory, Ottawa, Canada, reported a monthly mean of 179 for September 1990. This results in a smoothed value of 199 centered on March 1990.

Table I is a listing of smoothed sunspot numbers observed to date for Cycle 22, and a forecast of activity expected through 1992. This is based on data provided by the Solar-Terrestrial Physics Division of the National Geophysical Data Center, Boulder, Colorado. The progress of Cycle 22 from its birth in September 1986 is shown graphically in fig. 1.

#### Flash Report for CQ WW DX Contest Phone Weekend

Thanks to initial observations made by

KH6BZF and others during the 1990 CQ WW DX Phone Contest weekend of October 27th and 28th, we have confirmation of the near excellent conditions that were predicted in this column. The ionosphere was stable on the 27th with a worldwide (planetary) geomagnetic A figure of 8. It was exceptionally stable on the 28th with a figure of 5. The sunspot count on the 27th was 122, rising to 132 on the 28th. Corresponding 10.7 cm solar flux levels were 164 on the 27th and 152 on the 29th. KH6BZF rated both days as Above Normal, with conditions slightly better on the 28th than on the 27th. These initial reports indicate that some new records may be established during the 1990 Phone Contest weekend.

#### January Conditions

It should be a toss-up between 10, 12, and 15 meters for DX propagation honors during the daylight hours. These bands should open to most areas of the world, often with very strong signals. Ten meters may have a slight edge before noon, with 12 and 15 meters being somewhat better after noon and becoming the optimum DX bands during the late afternoon hours. Short-skip openings, between distances of approximately 1200 and 2300 miles, should be excellent on 10 meters during most of the daylight hours. Excellent short-skip openings are also expected on 12, 15, and 17 meters from shortly after sunrise through the early evening hours for distances between 1000 and 2300 miles.

Excellent propagation conditions are expected on 20 meters for both DX and short-skip openings almost around the clock. DX conditions should peak during a window of an hour or two following sunrise, and again during the late afternoon and early evening hours. On many days the band should remain open well past midnight. Short-skip openings between approximately 1300 and 2300 miles should be possible from just after sunrise to as late as midnight. Shorter distance openings should also be possible from mid-morning to mid-afternoon.

The optimum band for DX conditions during the hours of darkness should be 40 meters. Openings to most areas of the world are forecast from shortly before sundown, through the hours of darkness,

Month	1986	1987	1988	1989	1990	1991	1992
January		18	58	142	151	128	113
February		20	65	145	153	127	110
March		22	71	150	152	125	108
April		24	78	154	150	124	105
May		26	84	157	148	124	102
June		28	94	158	146	123	99
July		31	104	159*	144	121	97
August		35	114	158	143	118	94
September	12	39	121	157	139	115	92
October	13	44	125	157	135	114	89
November	15	47	130	158	131	114	84
December	16	51	138	153	129	114	79

Table 1—Progress of sunspot Cycle 22 and predictions for 1990, 1991, and 1992. Predicted values are shown in italics. \*Denotes apparent peak of Cycle 22.

and until shortly after sunrise. Signal levels may be exceptionally strong at times. During the daylight hours short-skip conditions should be optimum for openings between approximately 100 and 600 miles. Skip will lengthen during the late afternoon, and by nightfall short-skip con-

ditions should be optimum for openings between 800 and 2300 miles.

Atmospheric noise levels are expected to be at seasonally minimum levels in the northern hemisphere during January. This should result in peak conditions on both the 80 and 160 meter bands. Expect some good openings to many parts of the world on 80 meters during the hours of darkness and the sunrise period. Short-skip openings, between distances of 50 and 250 miles, should be optimum on 80 meters during the daylight hours. During the later afternoon and early evening hours short-skip openings should increase to between 250 and 1500 miles, and by nightfall openings up to and beyond 2300 miles should be possible.

Expect some DX openings on the 160 meter band during the hours of darkness. Openings towards Europe and the east should peak at about midnight.

Openings towards the South Pacific and in a generally southerly direction should peak just prior to daybreak. Short-skip openings up to 1300 miles should be possible during the hours of darkness, and frequently the skip will extend out as far as 2300 miles. During the daylight hours intense solar absorption will severely limit openings, although some may be possible at times up to 150 miles or so.

### Short-Skip Charts

This month's column contains a Short-Skip Propagation Chart for use in the continental United States for distances between 50 and 2300 miles. Special prediction charts centered on Hawaii and Alaska are also included. The charts are valid through February 1991. See last month's column for detailed DX Propagation Charts for use during January.

### VHF Ionospheric Openings

Solar activity is still expected to be high enough during January to permit unusu-

## CQ Short-Skip Propagation Chart January & February 1991 Local Standard Time at Path Mid-Point (24-Hour Time System)

Band (Meters)	Distance From Transmitter (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	Nil	07-08 (0-1) 08-09 (0-2) 09-10 (0-3) 10-12 (0-4) 12-15 (0-3) 15-17 (0-2) 17-18 (0-1)	07-08 (1) 08-09 (2-3) 09-10 (3-4) 10-12 (4) 12-15 (3-4) 15-16 (2-4) 16-17 (2-4) 17-18 (1-2) 18-19 (0-2) 19-20 (0-1)
15	Nil	07-08 (0-1) 08-10 (0-2) 10-15 (0-3) 15-17 (0-2) 17-18 (0-1)	06-07 (0-1) 07-08 (1-3) 08-10 (2-4) 10-15 (3-4) 15-17 (2-4) 17-18 (1-3) 18-19 (0-2) 19-21 (0-1)	06-07 (1) 07-08 (3-2) 08-18 (4) 18-19 (2-3) 19-20 (1-3) 20-21 (1-2) 21-22 (0-1)
20	09-11 (1-2) 11-14 (1-3) 14-15 (1-2) 15-17 (0-1)	06-07 (0-2) 07-09 (0-3) 09-11 (2-4) 11-14 (3-4) 14-15 (2-4) 15-17 (1-4) 17-19 (0-3) 19-20 (0-2) 20-06 (0-1)	06-07 (2-3) 07-08 (3) 08-09 (3-4) 09-17 (4) 17-19 (3-4) 19-20 (2-4) 20-21 (1-4) 21-23 (1-3) 23-01 (1-2) 01-06 (1)	06-07 (3-2) 07-08 (3) 08-12 (4) 12-14 (4-3) 14-21 (4) 21-23 (3-4) 23-01 (2) 01-04 (1-2) 04-06 (1)
40	07-08 (0-2) 08-09 (1-3) 09-10 (2-4) 10-19 (4) 19-21 (2-3) 21-00 (1-2) 00-07 (0-1)	07-08 (2-3) 08-09 (3) 09-11 (4-3) 11-15 (4-2) 15-19 (4) 19-21 (3-4) 21-00 (2-4) 00-02 (1-3) 02-06 (1-2) 06-07 (1-3)	07-08 (3) 08-09 (3-2) 09-11 (3-1) 11-15 (2-1) 15-17 (4-2) 17-18 (4-3) 18-00 (4) 00-02 (3-4) 02-06 (2-3) 06-07 (3-4)	07-08 (3-1) 08-15 (1-0) 15-17 (2-1) 17-19 (3) 19-02 (4) 02-06 (3-4) 06-07 (4-3)
80	07-08 (2-4) 08-10 (4) 10-15 (4-3) 15-00 (4) 00-04 (3-4) 04-07 (2-3)	07-08 (4-3) 08-09 (4-2) 09-10 (4-1) 10-15 (3-1) 15-16 (4-1) 16-18 (4-2) 18-04 (4) 04-07 (3-4)	07-08 (3-1) 08-09 (2-0) 09-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-06 (4) 06-07 (4-3)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-04 (4) 04-06 (4-3) 06-07 (3-1)
160	09-17 (1-0) 17-19 (3-2) 19-06 (4) 06-08 (3) 08-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-2) 07-08 (3-1) 08-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-2) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (2-1) 07-08 (1-0)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2-1) 06-07 (1-0)

## HAWAII January & February 1991 Openings Given In Hawaiian Standard Time #

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	07-08 (1) 08-09 (2) 09-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (4) 09-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	12-14 (2) 14-17 (4) 17-21 (3) 21-00 (2) 00-06 (1) 06-08 (3) 08-09 (2) 09-12 (1)	17-18 (1) 18-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-20 (1)* 20-01 (2)* 01-03 (1)*
Central USA	07-08 (1) 08-09 (2) 09-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (4) 09-13 (3) 13-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	08-13 (2) 13-14 (3) 14-20 (4) 20-00 (3) 00-02 (2) 02-05 (1) 05-06 (2) 06-08 (3)	17-18 (1) 18-20 (2) 20-21 (3) 21-01 (4) 01-03 (3) 03-04 (2) 04-06 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-05 (1)*
Western USA	07-08 (1) 08-09 (2) 09-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	08-10 (4) 10-15 (3) 15-22 (4) 22-01 (3) 01-04 (2) 04-06 (1) 06-08 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*



# AUSTIN CUSTOM ANTENNA

## MODEL 500-C

AUSTIN, the leader in multi-band technology brings you state of the art low angle radiation performance in a compact design.

The Model 500-C is available in single or dual band configurations. Various combinations of frequencies are available from 100 MHz to 2 GHz, and a Soft Top model for HT's.

MOUNTS: LOW PROFILE, BNC, TNC, UHF POWER RATED 160 WATTS ICAS

\$29.95

"PATENT APPLIED FOR"  
!!A Better Idea From AUSTIN!!

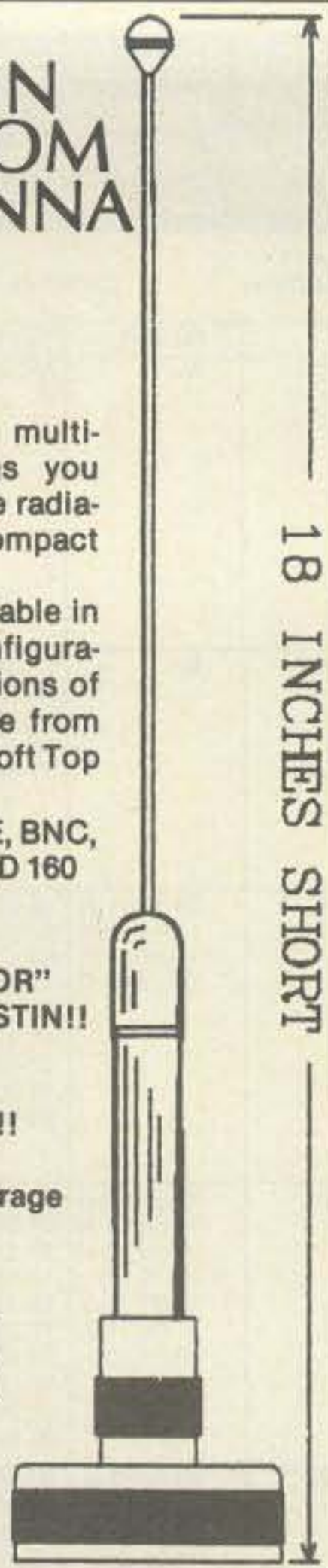
!!NEW!!  
!!NOW AVAILABLE!!  
"The Ferret"

Super Broadband Coverage  
25 to 1300 MHz



10 Main Street  
Gonic, NH 03839  
(603) 335-6339

CIRCLE 93 ON READER SERVICE CARD



18 INCHES SHORT

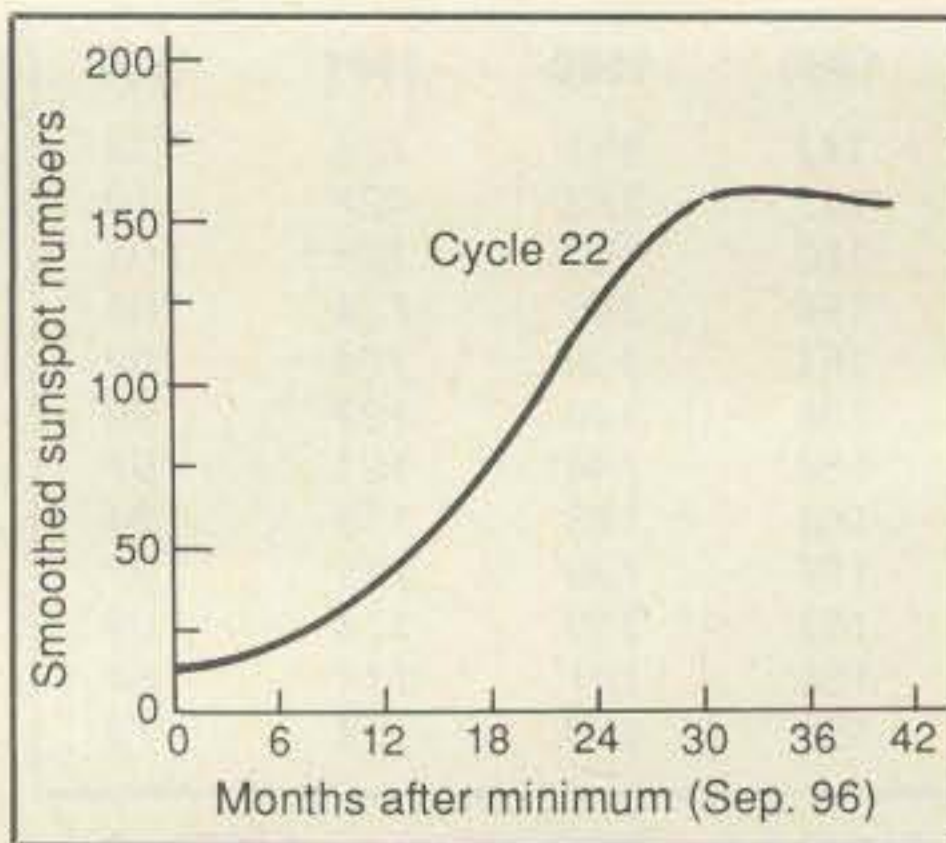


Fig. 1- Progress of sunspot cycle 22 since its birth during September 1986.

ally good DX openings on 6 meters to many areas of the world. Look for peak conditions towards Europe and Africa an hour or two before noon and towards the Caribbean area and Central and South America from an hour or two before, to about an hour or two after, noon. Expect 6 meter openings towards the Pacific, Australasia, and possibly the Far East during the later afternoon hours. Trans-continental openings should be possible beginning at about noon. Chances are best for 6 meter openings on those days expected to be High or Above Normal.

## ALASKA January & February 1991 Openings Given In GMT #

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	17-18 (1)	15-16 (1)	12-16 (1)	06-12 (1)
	18-20 (2)	16-17 (2)	16-18 (2)	07-11 (1)*
	20-22 (3)	17-21 (3)	18-21 (1)	
	22-00 (2)	21-23 (4)	21-23 (2)	
	00-01 (1)	23-00 (3)	23-02 (3)	
Central USA	17-18 (1)	15-16 (1)	12-16 (1)	06-08 (1)
	18-20 (2)	16-17 (2)	16-18 (2)	08-13 (2)
	20-00 (3)	17-20 (3)	18-20 (1)	13-14 (1)
	00-01 (2)	20-23 (4)	20-22 (2)	07-12 (1)*
	01-02 (1)	23-01 (3)	22-00 (3)	
Western USA	18-19 (1)	16-17 (1)	12-16 (1)	04-05 (1)
	19-20 (2)	17-18 (2)	16-18 (2)	05-06 (2)
	20-21 (3)	18-20 (3)	18-22 (3)	06-14 (3)
	21-23 (4)	20-01 (4)	22-02 (4)	14-15 (2)
	23-00 (3)	01-02 (3)	02-04 (3)	15-16 (1)
00-01 (2)	02-03 (2)	04-05 (2)	05-10 (1)*	
01-02 (1)	03-04 (1)	05-07 (1)	10, 14 (2)*	
			14-15 (1)*	

#See explanation in "How To Use Short-Skip Charts" in the box at the beginning of this column.

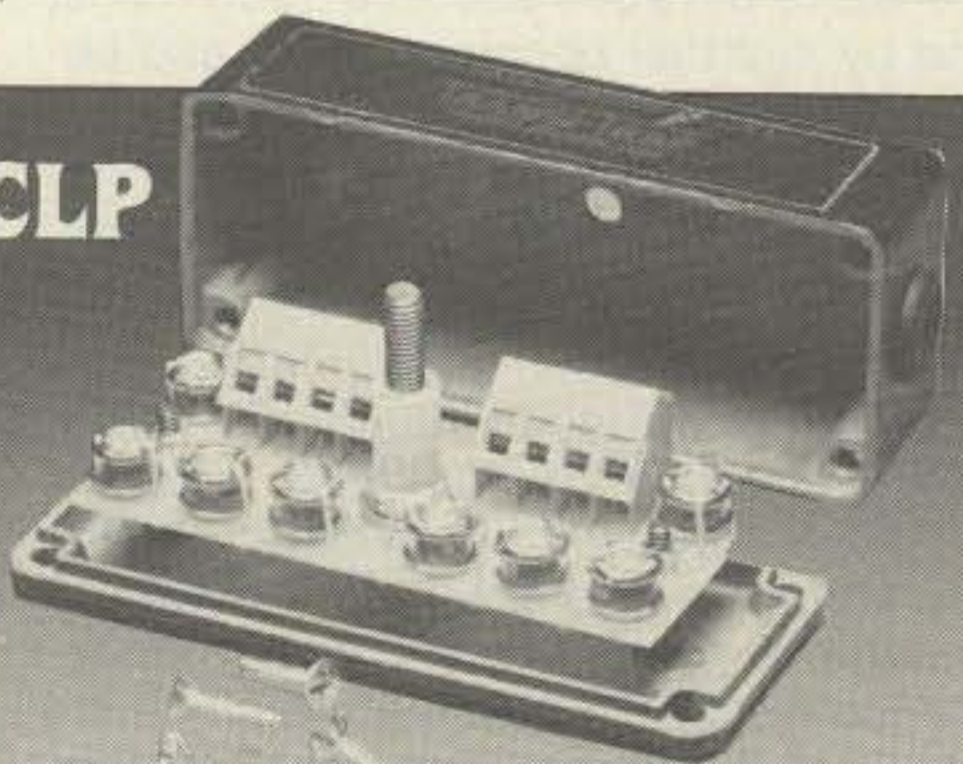
\*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2), or higher.

Note: The Alaska and Hawaii Propagation Charts are intended for distance greater than 1300 miles. For openings over shorter distances, use the preceding Short-Skip Propagation Chart.

Check for 6 Meter openings at times when the 10 Meter forecast rating is shown as (4).

## Alpha Delta Model CLP Rotor Control Line Transi-Trap® Surge Protector

# NEW



Protect your valuable communications equipment against destructive lightning-induced surge voltages that occur on the control lines to your rotor control and remote antenna switch boxes. Straightforward installation — no soldering.

- Protects up to eight 16 AWG wire control line cables . . . covers the most commonly used rotor and remote switch models. Requires no modification to control boxes.
- Utilizes eight NEMP-rated high surge current field-replaceable gas tube Arc-Plug® cartridges. Each line is individually protected.



# ALPHA DELTA COMMUNICATIONS, INC.

P.O. Box 51117, Phoenix, Arizona 85076 • (602) 966-2200



current solutions to current problems

- High quality G-10/FR4 glass epoxy printed circuit board construction. Your control line connects directly to special industrial grade PC mount connectors for best low inductance discharge performance. Computer designed. No soldering required.
- Equally effective for modem/phone line protection. The low capacitance gas tube Arc-Plug cartridges accommodate high baud data transmission and greatly outperform competitive MOV models.

Model CLP Control Line Transi-Trap Protector . . . . . \$49.95

Also check out our line of time-proven Transi-Trap coax cable surge protectors. At your Alpha Delta Dealer. Or order direct in U.S.: add \$4.00 for postage and handling. MasterCard and VISA accepted. Arizona residents add Sales Tax. Exports quoted.

(See the Last Minute Forecast at the beginning of this column.)

Chances for meteor-scatter VHF openings should be pretty good between January 2nd and 4th, coincident with the occurrence of the *Quadrantids* meteor shower. This is expected to be a major shower, which should peak on January 3rd with a count of approximately 40 meteors an hour.

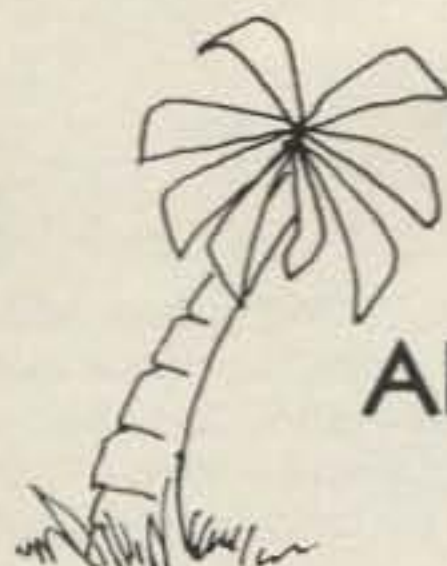
Some auroral-type openings should be possible during January. Fairly widespread auroral activity can occur during the month when HF conditions are Below Normal or Disturbed. Check the Last Minute Forecast for appropriate dates.

Not many trans-equatorial (TE) openings are expected this month, since a seasonal slump usually occurs during January. Some infrequent openings may be possible, however, between southern tier states and countries well south of the equator in this hemisphere. The best time to check for TE openings on 6 meters is between 7 and 10 PM local time.

Propagation conditions on the HF bands should be off to a good start during January, and they are expected to remain at a high level throughout the New Year.

73, George, W3ASK





31st ANNUAL  
**TROPICAL HAMBOREE**  
 AMATEUR RADIO & COMPUTER SHOW  
 ARRL SOUTHEASTERN DIVISION CONVENTION  
**FEBRUARY 2-3, 1991**  
 DADE COUNTY YOUTH FAIR & EXPOSITION FAIRGROUNDS



- 200+ EXHIBIT BOOTHS • 1,000 INDOOR SWAP TABLES • 300 CAMPSITES WITH HOOK-UPS
- FREE PARKING 15,000 VEHICLES • EXAMS FOR AMATEUR LICENSES • WOUFF HONG INITIATION
- SPECIAL CONVENTION PROGRAMS & ACTIVITIES FOR EVERYONE

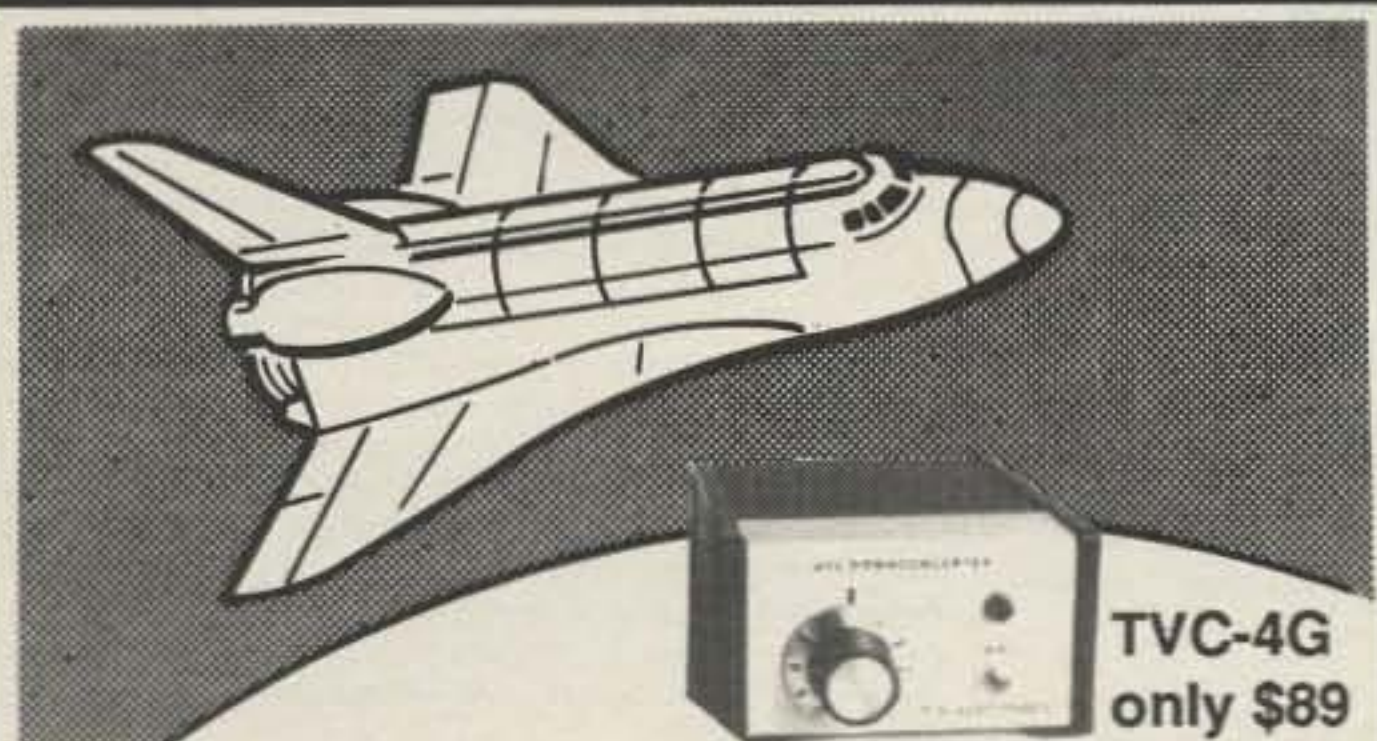
FRIDAY SPECIAL!!!  
**EDUCATIONAL C.E.U. WORKSHOP**  
**FOR PROFESSIONAL & VOLUNTEER INSTRUCTORS**  
 CONDUCTED BY THE ARRL EDUCATIONAL ACTIVITIES DEPARTMENT

Registration: \$5.00 Advance — \$6.00 Door • Valid Both Days (Advance deadline Jan. 22)  
 Swap Tables: \$20.00 each + Registration • Power: \$10.00 per User.  
 Campsites: 3 Days (Fri., Sat., Sun.) \$40.00 • 4 Days (Thurs., Fri., Sat., Sun.) \$55.00  
 Headquarters Hotel: Miami Airport Marriott — \$65.00 Single, Double  
 Call: (305) 649-5000 — Speak Only to Reservation Department  
**Must** Mention "Tropical Hamboree" to Get Special Rate. Deadline Jan. 19, 1991.  
 After Deadline, Special Rates on Room Available Basis Only

**WRITE TODAY**  
**FOR DETAILED BROCHURE**  
**& RESERVATION FORMS**

Send to: Chairman, Evelyn Gauzens, W4WYR  
 2780 N.W. 3rd Street, Miami, FL 33125  
 Tel.: (305) 642-4139 • Fax: (305) 642-1648

**AMATEUR TELEVISION**



**TVC-4G**  
 only \$89

**SEE THE SPACE SHUTTLE VIDEO**

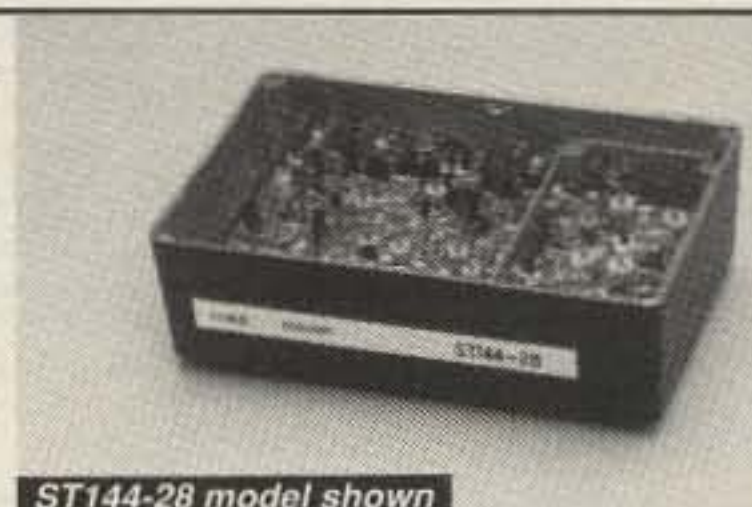
Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Satcom F2-R transponder 13. If it is being done in your area on 70 CM, all you need is one of our TVC-4G ATV 420-450 MHz downconverters, add any TV set to ch 3 and 70 CM antenna. Others may be retransmitting weather radar during significant storms. Once you get bitten by the ATV bug - and you will after seeing your first picture - show your shack with the TX70-1A companion ATV transmitter for only \$279. It enables you to send back video from your camcorder, VCR or TV camera. ATV repeaters are springing up all over - check page 411 in the 90-91 ARRL Repeater Directory. Call for a copy of our complete 70, 33 & 23 CM ATV catalog.

(818) 447-4565 m-f 8am-5:30pm pst. Visa, MC, COD  
**P.C. ELECTRONICS** Tom (W6ORG)  
 2522 S. Paxson Ln Arcadia CA 91007 Maryann (WB6YSS)

CIRCLE 59 ON READER SERVICE CARD

**220 MHz Amateur Transverter**

Convert Your 10m Multimode Transceiver to a 220 MHz Multimode Transceiver



ST144-28 model shown

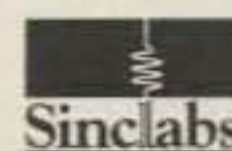
I.F.: 28-30 MHz — R.F. 220-220 MHz

Transmit Section: 10 watts output;  
 Receive Section: Low Noise; 20 dB conversion gain

Model	Description	Price
ST144-28	2m Transverter	\$259.00
ST220-28	220MHz Transverter	\$259.00
Other Products Available		
WJ-100	2 water cooling jackets with rubber gaskets for 7289 and 7815R tubes	\$20.00
<b>2-way Coaxial Power Dividers (N-connectors)</b>		
SPD2-144/432N	2m/70cm	\$49.00
SPD2-220N	220 MHz	\$49.00
SPD2-902N	33 cm (902-928 MHz)	\$49.00
SPD2-432/1296N	70 cm/23 cm	\$49.00
<b>6 foot Coaxial (RG213) Jumper Cables</b>		
SJU-NM-NM	N-Male : N-Male	\$30.00
SJU-NM-NF	N-Male : N-Female	\$30.00
SJU-NM-UM	N-Male : UHF-Male	\$30.00
SJU-UM-UM	UHF-Male : UHF-Male	\$30.00

Manufactured by: **Sinclabs Inc.**  
 Specialty Products Division  
 85 Mary Street  
 Aurora, Ontario L4G 3G9

Available from:  
 East Coast Amateur Radio, Inc.  
 496 McConkey Drive  
 Tonawanda, New York 14150  
 (716) 835-8530  
 Complete line of Amateur Products available



CIRCLE 73 ON READER SERVICE CARD



### Quality Microwave TV Antennas

WIRELESS CABLE - IFTS - MMDS - Amateur TV  
Ultra High Gain 50db(+) • Tuneable 1.9 to 2.7 Ghz.

- 36-Channel System Complete \$149.95
- 12-Channel System Complete \$114.95
- Call or write (SASE) for "FREE" Catalog

**PHILLIPS-TECH ELECTRONICS**  
P.O. Box 8533 • Scottsdale, AZ 85252

LIFETIME WARRANTY

(602) 947-7700 (\$3.00 Credit all phone orders)  
MasterCard • Visa • COD's • Quantity Pricing

CIRCLE 55 ON READER SERVICE CARD

**NextDay** **QSLs**  
*Two-Color Rainbow Assortment*

Call Today & We Ship *NextDay 2nd Day ASAP*

Baraboo, Wisconsin Sauk County <b>KOZZ</b>	100	\$29.95	\$24.95	\$19.95
	200	\$39.95	\$34.95	\$29.95
	400	\$49.95	\$44.95	\$39.95
	500	\$54.95	\$49.95	\$44.95
	1000	\$99.95	\$89.95	\$79.95

Info \$1  
**AntennasWest**  
(801) 373-8425

All orders ppd 2nd day air / priority mail.  
For overnight air delivery add \$10.  
Box 50062-C, Provo UT 84605

CIRCLE 11 ON READER SERVICE CARD

**Macintosh**   
*Largest collection in the world! Free information* **Software**

ZCo Corporation  
P. O. Box 3720, Nashua, NH 03061  
(603) 888-7200 Fax: (603) 888-8452

**VARIABLE VOLTAGE REGULATOR**  
Featured In Ham Radio Magazine, July '89

**Adjustable Output For Any Fixed DC Supply**  
37-1.5 VDC @ 1.5A  
Assembled and Tested Unit—\$18.00 ppd.  
Complete Instructions included.

Terms: Check or Money Order

**MERCURY SYSTEMS, ATTN: K3HW**  
26 W. Route 70, Suite 286 • Marlton, NJ 08053

**U.S. AMATEUR RADIO MAIL LISTS**

Labels, floppy disks, CD-ROM, mag tape.

- Newly licensed hams
- All upgrades
- Updated each week

**BUCKMASTER PUBLISHING**  
Route 3, Box 56  
Mineral, Virginia 23117  
703/894-5777 visa/mc 800/282-5628

**GEM QUAD PRODUCTS (1987) LTD.**

Chosen By Amateurs For Over 15 Years. Winner of the Manitoba Design Institute Award of Excellence. Will Accommodate New Bands From 2 To 20 Meters.

**Fiber Glass Quad Antenna For 10, 15, and 20 Meters**

2 Element \$265.00  
3 Element \$420.00  
4 Element \$565.00

Kit Includes: Spider, Arms, Wire, Balun Kit and Boom Where Needed  
Price is F.O.B. Boissevain.  
Includes U.S. Customs Duty.

**Boissevain, Manitoba, Canada R0K 0E0**  
P.O. Box 291, Telephone (204) 534-6184



# 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.

**QSL CARDS:** Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSLs, Dept. C, 310 Commercial, Emporia, KS 66801.

**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 \$2 s/h, \$3 s/h foreign orders, U.S. funds only. Order now from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Book catalog \$1.00, free with order.

**HAMS: USE AIRMAIL POSTAGE** not IRCs. Many countries, monthly bargains. List: #10 SASE. William Plum, 12 Glenn Road, Flemington, NJ 08822.

**SCANNER OWNERS:** *The Scanner Listener's Handbook* tells you how to hear more on your scanner radio. Lists band assignments from 25 MHz to over 2000 MHz, plus receivers, scanners, antennas, accessories, systems, and much more. \$14.95 plus \$2 s/h, \$3 foreign, US funds. Catalog \$1, free with order. Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

**CW Lite** is the **easiest** Morse code training method in the world, bar none! And it is the **fastest**, too. Just close your eyes and relax. This powerful **hypnosis cassette tape** does the rest. **Subliminals** speed you along! Only \$14.95 ppd in US (NY residents add \$1.12 tax). (Attention instructors: Quantity discounts available for classes.) Order today! **PASS Publishing**, Box 570, Stony Brook, NY 11790.

**POST CARD QSL KIT.** Converts Post Cards, Photos, to QSLs! Stamp brings circular. K-K Labels, P.O. Box 412, Troy, NY 12181-0412.

**EMBROIDERED EMBLEMS, Enameled Pins,** your design, excellent quality. Free booklet. Box 682, Dept. 67, Littleton, NH 03561 (603-444-3423).

**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 missionaries—equipment loaned; weekday net, 14.280 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 @ 75¢ (thru 1975) and \$1.00 (1976-up) each, including shipping. \$3.00 minimum order. W6LS, 45527 Third Street East, Lancaster, CA 93535-1802.

**CERTIFICATE** for proven contacts with all ten American districts. SASE to W6LS, 45527 Third Street East, Lancaster, CA 93535-1802.

**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, K4TJW, 4941 Scenic View Drive, Birmingham, AL 35210.

**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 29th year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate—no long wait for results. Send business-size SASE for sample copy. \$15 for one year (24 issues). P.O. B. 2057C, Glen Ellyn, IL 60138-2057; or P.O. Box 15142C, Seattle, WA 98115.

**MUSEUM SEEKING** vintage radio/television broadcasting equipment, literature, microphones, transcriptions, Radios, TV's. Van Dyke, Squires Ave., E. Quogue, NY 11942 (516-728-9835).

**QSL SALE!** 100 QSL cards \$8, 200/\$11, 300/\$14, 500/\$20, 1000/\$33. Free shipping. Guaranteed correct. Many new designs. Phone or write today for samples or ordering. Shell Printing, KD9KW, Box 50, Rockton, IL 61072 (815-629-2193).

**MACINTOSH HAM SOFTWARE—DX HELPER™** shows bearing, distance, gray line, Great Circle, MUF, call-sign identifier, CW code practice, more! **SATELLITE PRO™** shows graphics, view from space, az, el, alt, more! Write or call for info. MacTrak® Software, P.O. Box 1590, Port Orchard, WA 98366 (206-871-1700).

**SURVEILLANCE/COUNTERSURVEILLANCE** devices catalog. Cameras, bug detectors, video camera detectors, transmitters, communications, and much more. Catalog \$3.00. DSP, P.O. Box 1275-CQ, Redondo Beach, CA 90278.

**QUALITY QSL'S AT A QUALITY PRICE:** For Samples send \$1.00 (refundable with order) to S & S Printing, P.O. Box 843, Cabot, Arkansas 72023.

**\$.250 WORLD BEAM HEADINGS** 150 U.S. city selection with \$6.95 DX ATLAS purchase. 630 Countries and Islands listings, prefixes, zones, times, DXCC, QTH/QSL info. Free Cities list. **AMATEUR DX BLUE BOOK**, 4920 Mayflower St., Cocoa, FL 32927.

**Contest Code** is your ticket to CW Contesting and DXing! This powerful series of **hypnosis cassette tapes** teaches you to copy the essentials for working DX and contests. Code recognition is conditioned at 30/40 WPM on the **High Speed** cassette and at 50/60 WPM on the **Ultra High Speed** cassette. In no time at all, you will be slugging it out with the best of them! **Subliminals** boost your speed. Only \$14.95 each ppd, in US (specify which program you want) or \$27.95 for both. (NY residents add 7.5% sales tax.) **PASS Publishing**, Box 570, Stony Brook, NY 11790.

**HOME BREW PROJECTS LISTS:** SASE to WB2EUF, P.O. Box 708, East Hampton, NY 11937.

**COLLECT KEYS?** You'll enjoy W1IMQ's illustrated references. "Introduction to Key Collecting," 64 pages, \$9.95. "Vibroplex Collector's Guide," 87 pages, \$14.95. Add \$2.00 s/h to total. Artifax Books, Box 88-C, Maynard, MA 01754.

**DESCRAMBLERS: OAK M35B, \$39.95.** Also **JERROLD, ZENITH, SCIENTIFIC ATLANTA,** etc. Guaranteed. Cable Plus, 14417 Chase #481, Panorama City, CA 91402 (1-800-822-9955).

The *World Ham Net Directory* lists special interest ham nets for DXers, missionaries, weather watchers, retired persons, and many other interests. \$9.95 plus \$2 shipping (\$3 foreign) US funds from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Catalog \$1.00, free with order.

Ready to explore VHF/UHF operating? Get Ed Noll's *Basic Guide to VHF/UHF Ham Radio*. Covers equipment, antennas, propagation, repeaters, contesting, band plans, and more. All the basics you need! Just \$6.95 plus \$2 shipping (\$3 foreign) US funds from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Catalog \$1.00, free with order.

**HAVE AM CAPABILITY?** Join SPAM (Society for the Promotion of AM). For information and membership, send \$1 and SASE to SPAM, WB6TRQ, Box 62, Potrero, CA 92063.

**CB-TO-10M CONVERSIONS:** FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog \$2. CBCI, Box 31500CQ, Phoenix, AZ 85046.

**RTTY JOURNAL:** Published ten times per year. Covering the digital modes of RTTY, AMTOR, FAX, PACKET, plus technical and other interesting articles about this fascinating phase of Ham radio. \$12.50 per year USA, foreign slightly higher. RTTY JOURNAL, 9085 La Casita Ave., Fountain Valley, CA 92708.

**WANTED: HAM EQUIPMENT AND OTHER PROPERTY.** The Radio Club of Junior High School 22, NYC, Inc. is a nonprofit organization granted 501(C)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. As 1991 begins, please look over whatever unwanted equipment you may have, and call us. We will pick up or arrange shipping. You will receive the tax deduction, but most important, the privilege of know that your gift really made a difference in the education and upbringing of a youngster. Write to us at: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Round-the-clock hotlines: Voice (516) 674-4072, FAX (516) 674-9600.

**PACKET PICTURES FOR PC and Clones:** These disks are full of color pictures already converted to the MFJXFER format for passing via packet. Three disks containing pictures of cars, planes, schematics, and miscellaneous drawings are \$10.00; PSE specify CGA or EGA pictures. Six disks containing both CGA and EGA pictures are \$20.00. Each disk contains a "USER EASY" viewing program that allows pictures to be displayed and viewed in either CGA or EGA format (VGA will display also). If you have the new MFJXFER.EXE program, and the PC or clone, these pictures will display to your screen and save to disk as they are being received. Order from: Buck4ABT, 506 Pheasant Ridge Drive, Warner Robins, Georgia 31088. Sorry, no COD, or charge cards.

**THE DX MAGAZINE** is your monthly DX reference: DXpedition reports, equipment and software reviews, six meters, awards, QSL information, and more. Sample only \$1.00. Box 50-C, Fulton, CA 95439 (707-523-1001).

**FREE CATALOG:** Save hundreds on sought-after electronic, electro-mechanical, and computer related hardware and components—including hard-to-find items. Call toll free: 1-800-776-3700. American Design Components/Dept. 110-011, 815 Fairview Avenue, Fairview, NJ 07022.

**THE DX BULLETIN** is your premier weekly source of all DX information: DXpeditions, propagation, QSL routes, and much more. SASE or call for samples. Box 50-C, Fulton, CA 95439 (707-523-1001).

**AFRAID OF FCC TESTS?** Let your C64/128 drill you. All questions on 5 1/4 inch disk. With instructions. Full screen diagrams if used. Your call on screen and on optional printed summary. Tech or General \$19.95. Advanced or Extra \$24.95. Ppd. Ralph Parlette, WB6JOY, 27 Morning Sun, Mill Valley, CA 94941 (415-383-0507).

**"HAMLOG" COMPUTER PROGRAM:** Full features. 18 modules. Auto-logs, 7-band WAS/DXCC. Apple, IBM, CP/M, Kaypro, C128, \$24.95. CQ-KA1AWH, PB 2015, Peabody, MA 01960.

**CABLE T.V. CONVERTERS:** Jerrold™, Oak, Scientific Atlantic, Zenith and many others. "New" MTS stereo add-on, mute & volume. Ideal for 400 & 450 owners! Call 1-800-826-7623. B & B INC., 4030 Beau-D-Rue Drive, Eagan, MN 55122.

**SELL:** Rare, complete 74 years QST collection from issue one. Minimum offer \$3,000. K6IR, 16904 George Washington, Rockville, Maryland 20853-1128 (301-774-7709).

**HAM RADIO REPAIR CENTER,** quality workmanship. Solid state or tube, all makes and models. Also repair HF amplifiers. A-Z Electronic Repair, 3638 E. Indian School Rd., Phoenix, AZ 85018 (602-956-3024).

**25-420 MHz MILITARY AVIATION FREQUENCY DIRECTORIES** for NORTH AMERICA—over 20,000 newly researched listings. HAP1, Box 754, Flemington, NJ 08822-0754 (201-806-7134).

**QUALITY QSLs.** NEW Full Color Satellite!! ARRL, Cartoon, Patriotic, Mike & Key, Telegraph Keys, Historic. State Outlines. Quantities start at 100. Economy cards (State Outlines & Plain). **Plastic Cardholders.** Display 20 cards. Three—\$4.50. Four up \$1.30 each. More information? Business SASE with 45¢ postage. **Rusprint,** Rt. 3, Box 192CQ, Spring Hill, Kansas 66083.

**WANTED:** Pre-1980 microcomputers and magazines for Museum KK4WW. Dave Larsen, Blacksburg Group, P.O. Box 1, Blacksburg, VA 24063 (703-763-3311).

**WANTED:** Your help donating IBM-PC clone, technical and call books for IARN Soviet emergency radio service. I will personally deliver equipment to UB5WE. David Larsen, KK4WW, 703-763-3311.

**Spider Antenna™**  
U.S. Patents 4349825, 4460896 Made in U.S.A.



**Presenting the family of Spider™ Multi-Band Antennas**

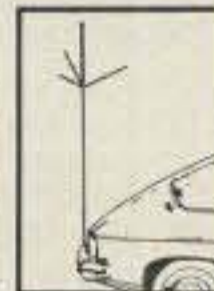
Four amateur bands (10, 15, 20, and 40 meters) at your command without having to change resonators or retune — just band switch your rig. Also available are the 75, 12, 17 and 30 meter bands. Needs no antenna tuner. Custom made with highest quality workmanship and materials.

**Wherever you roam, on Land or Sea . . . or even at Home**

**On Land**

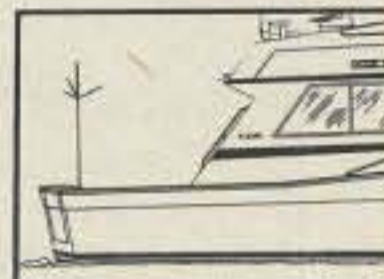


Suitable for use on any motor vehicle from a compact automobile to a motor home or trailer. Work four bands without stopping to change resonators.



**Or Sea**

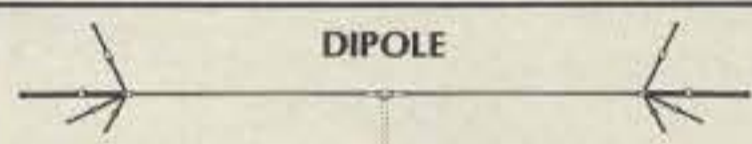
The Spider™ Maritimer is for use on or near the ocean. Highly polished stainless steel and nickel-chrome plated brass. Commercial marine frequencies (8, 12, 16 and 22 MHz) are also available.



**At Home**



If you live in an apartment, condominium or restricted area, the Spider™ may well be the answer to your antenna problems.



**MULTI-BAND ANTENNAS**  
7131 OWENSMOUTH AVENUE, SUITE 263C  
CANOGA PARK, CALIFORNIA 91303  
TELEPHONE: (818) 341-5460

**Over 75,000 active amateurs in over 125 countries throughout the world read and enjoy a different kind of ham magazine every month. They read CQ.**

**It's more than just a magazine. It's an institution.**

**SUBSCRIBE TODAY!**



The Radio Amateur's Journal  
76 N. Broadway, Hicksville, NY 11801

Please send me CQ for  Life  3 Years  2 Years  1 Year

New  Renewal  Start with \_\_\_\_\_ issue

Save \$12.45  
Save \$27.80  
Save \$43.20

1 year - 12 issues \$22.95  
2 years - 24 issues \$43.00  
3 years - 36 issues \$63.00

Name \_\_\_\_\_ Call \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Charge My Order To:  Payment Enclosed \$ \_\_\_\_\_  
 MasterCard  VISA

My account number is: \_\_\_\_\_

# Advanced Antenna Analysis Program

Announcing ELNEC -- the smart antenna analysis program

Advanced doesn't mean "complicated". It means smart. Powerful. And above all, easy to use. ELNEC combines the power and versatility of MININEC with a friendly, easy-to-use menu structure, detailed plots, and advanced analysis features in a program unsurpassed for fast, easy, and accurate antenna analysis. With ELNEC you can analyze the performance of nearly any type of antenna in its actual operating environment, without having to count "pulses" or keep track of where sources and loads went when you made a change. Want to change a wire length? Just tell ELNEC the new length and it does the rest. Interested in phased arrays? ELNEC has true current sources. Of course there's a very detailed manual. And no copy protection hassle.

ELNEC runs on any PC-compatible computer with 360k RAM; CGA/EGA/VGA/Hercules graphics; and 8/9 or 24 pin Epson-compatible dot matrix or HP LaserJet/DeskJet printer. Two versions are available, optimized for use with and without a coprocessor.

ELNEC is just \$49.00, postpaid to USA, Canada, Mexico (add \$3.00 for air mail to other countries). VISA AND MASTERCARD ORDERS are accepted for your convenience -- please include card number and expiration date. Specify coprocessor or noncoprocessor version. Order or write for information from

Roy Lewallen, W7EL  
P.O. Box 6658  
Beaverton, OR 97007

CIRCLE 19 ON READER SERVICE CARD

## 1990 U.S. CALL DIRECTORY (on microfiche)

Call Directory - by callsign .....\$10  
Name Index - by last name .....\$10  
Geographic Index - by state/city .....\$10  
All three - \$25  
\$3 shipping per order

**BUCKMASTER PUBLISHING**  
Route 3, Box 56  
Mineral, Virginia 23117

703/894-5777 visa/mc 800/282-5628

**DON C. WALLACE, W6AM:** The history of amateur radio, by Jan D. Perkins, N6AW. Hardbound, 450 pages. Prepublication price \$19.95 plus \$2.00 shipping and handling. California residents add \$1.35 sales tax. Offer valid until 1/31/91. Available from Wallace & Wallace, 11823 Slauson Avenue, Suite 38, Santa Fe Springs, CA 90670.

**CW? No Problem.** You can increase your speed, no matter how many times you've failed before. **Results guaranteed** when you follow the instructions. PASS Publishing's **CW Mental-Block Buster** program helps you **explode mental blocks** that hold you back. Based on 40 years of research, the **CW Mental-Block Buster** uses guided meditation, dynamic visualizations, and powerful affirmations to blast through mental blocks. **You can do code!** That means new bands, more contacts, more fun! (This is not a CW practice tape.) The **CW Mental-Block Buster** audio cassette and practice booklet are only \$24.95 ppd. in the US (NY residents add \$1.87 sales tax). (Quantity discounts available for classes.) PASS Publishing, P.O. Box 570, Stony Brook, NY 11790.

**AMIGA, MACINTOSH, ATARI XL/XE/ST** Amateur Radio PD software \$4.00 disk. Two-stamp SASE brings catalog. Specify computer! Kinetic Designs Hamware, Box 1646, Orange Park, FL 32067-1646.

**AMP REPAIR CENTER:** Quality repair, 90 day warranty. OMEGA ELECTRONICS, 4209 Live Oak Road, Raleigh, NC 27604 (919-231-7373).

DRAKE R-4A with SSB Filters, T-4X with Power Supply. Excellent Condition. Asking \$400. W2LU, 716-872-1508.

**FM STEREO TRANSMITTER** kit including PC board and components. Transmitter is tunable from 88-108 MHz to transmit audio from your disc player, VCR, TV, or any line level source to any FM radio throughout your home, yard, or car. Send \$24.00 to WJD Electronics, RD #2 Box 80A, Middleburg, PA 17842-9572.

**CERTIFICATE** for your very **FIRST QSO**. Send date and call-sign of station contacted. \$4.00. First Award, 1335 N. Harbison Ave., Indianapolis, IN 46219.

**"TEN-TEC":** Best Price. Call For Quote!! OMEGA ELECTRONICS, 800-782-1530.

**MANUALS AVAILABLE:** For all SWAN, CUBIC COMMUNICATIONS, and SILTRONIX equipment. Send your request to: Brock Publications, P.O.B. 5004, Oceanside, CA 92054, phone 619-757-0372.

**SURVEILLANCE/COUNTERSPY!** Elite catalog—**LOW PRICES!** Bug Detectors, Jammers, Phone Security, Transmitters, Voice Changers, Recorders, Personal Protection, more... Send \$5.00 to **SPYWORLD**, P.O. Box 851-A, Midvale, UT 84047.

**2510/2600 OWNERS:** Add 12 Meters in less than 1 Hour. Required parts supplied. Easy Instructions. \$49.95. Edward Oros, 2629 Sapling Drive, Allison Park, PA 15101.

MORSE CODE AND RTTY Program Disk does send and receive. VIC-20, C-64 \$5, tape \$6. Codeware, Box 3091, Nashua, NH 03061.

STAINLESS STEEL U-BOLTS, Turnbuckles, Eye Bolts, Screw Eyes, Bolts, Screws. Small quantities, free catalog. ELWICK, Dept. 799, 230 Woods Lane, Somerdale, NJ 08083.

**MORE POWER—BETTER, NOISE-FREE RECEPTION—RFI AND LIGHTNING PROTECTION!** Illustrated Manual on GROUNDING YOUR STATION PROPERLY! \$7.00 ppd. KB4UGW's SHACK SOLUTIONS, POB 581-c, Leeds, AL 35094-0581.

ROSS'S\$\$\$ USED January (ONLY) SPECIALS: KENWOOD TS-830S \$879.90, TS-930S \$1150.00, TV-506 \$209.90, MC-60A \$89.90, TH-45A \$219.90, BC-10 \$35.90, SM-220, BS-8 \$439.90, ICOM IC-R70 \$495.90, IC-R71A, EX-257, FL-32A, 30, 70 \$799.90, IC-471A \$589.90, RC-10 \$35.00, AT-500 as is \$249.90, SP-20 \$99.90. DRAKE MN-2700 and balun \$349.90. MFJ 989B \$219.90, 984 \$219.90. ATLAS 220-CS Power Supply \$129.90. LOOKING FOR SOMETHING NOT LISTED?? CALL OR SEND SASE. HAVE OVER 190 USED ITEMS in stock. MENTION AD. Prices cash, FOB Preston. Hours Tuesday-Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

JOIN GROUP 05/91. Ham expedition operating in Soviet Ukraine. Help with your Soviet license, lodging, equipment, travel, etc. KK4WW and UB5WE. Audio tape by UB5WE all about Soviet hams, DXing, QSLing, equipment, history, regulations, and much more. Very informative, \$9.97 to Victor Gorchavsky, UB5WE, P.O. Box 1, Blacksburg, VA 24063-0001.

WANTED: Will pay premium for 2 copies of Don Miller's "Amateur Radio DX Handbook." Duncan, Box 81466, San Diego, CA 92138.

**"TUBES"** New 3-500Z \$98 ea. two or more. New 572B \$65 ea. two or more. OMEGA ELECTRONICS, 800-782-1530.

# PacComm Presents ..... more packet enjoyment

## The HandiPacket Heavy Duty Portable Packet Controller



- Shirt Pocket Size - Only 1.28 x 2.55 x 4.15 inches
- 10 hour built-in battery pack
- All metal case for strength and low noise
- Open Squelch DCD
- Personal Message System, 32k RAM
- Belt clip, mounting strap, radio and computer cables, battery charger included.

**Only \$229.95**

**PacComm Packet Radio Systems, Inc.,**  
3652 W. Cypress St., Tampa, FL 33607

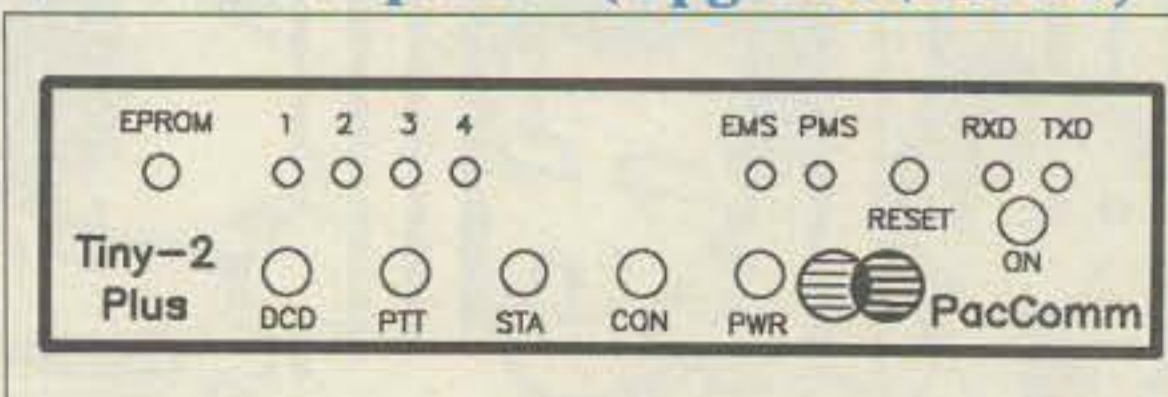
Orders: (800) 223-3511 [in FL (813) 874-2980]  
Technical: (813) 875-6417

## The TINY-2 PLUS

The popular TINY-2 with:

- Up to 4 EPROMS, switch or software selectable
- Up to 1/2 megabyte of battery backed RAM
- Improved Personal Message System
- Open Squelch DCD
- Hardware clock
- RS-232 Activity LEDs
- Firmware allows over-the-air programming
- Existing TINY-2 and MICROPOWER-2 are upgradeable.

**\$229.95 complete (Upgrade \$109.95)**



Europe: Europdata Systems, Antwerp, Belgium  
Latin America: PacComm LA, San Jose, Costa Rica  
Australia: Blamac Pty Ltd, Coomba, NSW  
New Zealand: Ryel Electronics, Christchurch  
Japan: Ueda Musen, Osaka

CIRCLE 52 ON READER SERVICE CARD

**HEATHKIT AMATEUR RADIO EQUIPMENT** reconditioned, aligned, and calibrated. RTO Electronics, 4166 Maple Street, Berrien Springs, MI 49103 (phone 616-473-3201).

**RADIO OPERATOR'S LOGBOOK** Computer program. Used throughout the world. \$25 to Alan Weinberg, 1769 S. Citation, Tucson, AZ 85713.

**HAM RADIO REPAIR!** All makes, Surplus, Homebrew, Amplifiers. Telo Technology, 1305 Uplands, Camano Island, Washington 98292 (206-387-3558).

**ROSS'S\$\$\$ NEW January (ONLY) SPECIALS:** J.S.C. RG-213 500 ft. \$150.00. KENWOOD TM-241A \$394.90, TR-8400 \$349.99, TS-440S, WAT \$1209.90, TM-631A \$629.90, TS-711A \$889.90, TS-940S/WAT \$2055.00, VFO-700S \$149.90, RM-76 \$34.90, MB-4000 \$11.00, TH-41AT \$209.90. ICOM IC-228A \$369.90, IC-229H \$409.90, IC-2400A \$683.90, IC-725 \$770.90, IC-2SAT \$317.50, IC-751A \$1449.90, IC-3200A \$459.99. YAESU FT-1000D \$3559.00, FT-411E \$329.90, FT-470 \$399.90, FV-101DM \$229.90, SC1 \$145.99, FT-757GXII \$1019.90. HEATHKIT HW-24-HT \$349.99, SB-1000 \$679.90, HW-24-T \$424.90. CUSHCRAFT ARX-2B \$41.90, AR-270 \$54.50, AP-8 \$169.90, A147-11 \$54.90. SEND SASE FOR USED LIST. All L.T.O. (Limited Time Offer). LOOKING FOR SOMETHING NOT LISTED?? CALL OR WRITE. Over 9039 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. Preston. Hours Tuesday-Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

S.O.S. I am a refugee in Sweden and I was a radio amateur. This hobby is my everything. I need your unwanted equipment, parts, books, etc. Please help. Nebil Charchafche, Allinga Vagen 7B:408, 22234 Lund, Sweden.

**MINT HEATH SB-221 2 kW HF amplifier, 15-80 meters, \$599.** Mint Collins 30L1 kW amplifier, 10-80 meters, \$550. Palomar Tuner-Tuner, \$75. Collins 516F2 power supply for "S-Line," \$175. Ten-Tec 229B antenna tuner, covers 160-10 meters, 2 kW, \$250. Dentron GLA-1000B HF amplifier, 1 kW, \$325. Add shipping to all items. K3UKW, Tony Musero, 215-271-8898.

**COLLINS NEW TUBE SETS:** KWM2 \$95 less finals, 75S3 \$65, 32S3 \$60 less finals, 75A4 \$85. Bob, WE2T, 716-334-1103.

**PRECISION REGULATED DC POWER SUPPLIES.** Converts 120VAC to 13.8VDC. Applications: Trickle battery charging, 2 meter linear amplifiers, car tape/stereo, test bench. Free brochure. Sunco Electronics, P.O. Box 1116C, Miami, FL 33054-1116.

**The 50 MHz DX Bulletin:** Up-to-date worldwide 6M news. \$1.00 for info and sample. Harry Schools, KA3B, 1606 S. Newkirk Street, Philadelphia, PA 19145.

**Amateur Radio Repair Service:** Over 25 years experience. RTO Electronics, 4166 Maple Street, Berrien Springs, MI 49103 (phone 616-473-3201).

**PICTURE QSL CARDS** of your shack, etc., from your photo or black ink artwork. 500 \$26.00, 1000 \$40.50. Also non-picture cards. Custom printed cards, send specifications for estimate. Send 2 stamps for illustrated literature. Generous sample kit \$2.00, half pound of samples \$3.00. Raum's, RD 2, Orchard Road, Coopersburg, PA 18036. Phone 1-215-679-7238.

**COMMODORE 64 HAM PROGRAMS:** 8 disk sides, over 200 Ham programs, \$16.95. 25¢ stamp gets unusual software catalog of Utilities, Games, Adult and British Disks. Home-Spun Software, Box 1064-AR, Estero, FL 33928.

**Morse code got you down?** Why let a mental block stand between you and upgrading? Use PASS Publishing's **CW Mental-Block Buster** to blast through those barriers. Just follow the instructions for 30 days—**Results Guaranteed!** Based on 40 years of research, the **CW Mental-Block Buster** uses guided meditation, dynamic visualizations, and powerful affirmations to blast through mental blocks. **You can do code!** That means new bands, more contacts, more fun! (This is not a CW practice tape.) The **CW Mental-Block Buster** audio cassette and practice booklet are only \$24.95 ppd. In the US (NY residents add \$1.87 sales tax). (Quantity discounts available for classes.) PASS Publishing, P.O. Box 570, Stony Brook, NY 11790.

Statement of Ownership, Management and Circulation Nov. 12, 1990, CQ Amateur Radio, 76 North Broadway, Hicksville, NY 11801. Publication #0007893. Issued monthly, subscription price \$22.95 per year (12 issues). Publisher: Richard A. Ross; Editor: Alan M. Dorhoffer, owned by CQ Communications, Inc. Stockholders: Richard A. Ross, Alan M. Dorhoffer, Thomas Kneitel, Arthur S. Salsberg. Circulation (Average of Preceding 12 Months): Net Press Run 107,080, Sales Through Dealers and News Agents 32,401, Mail Subscriptions 43,298, Total Paid 75,699, Free Distribution 2,755, Total Distribution 78,454, Copies Not Distributed 1,500, Returns from News Agents 27,126, Total 107,080. Circulation (Single issue nearest filing date): Net Press Run 128,095, Sales through Dealers and News Agents 34,014, Mail Subscriptions 59,045, Total Paid 93,059, Free Distribution 2,800, Total Distribution 95,859, Copies Not Distributed 1,500, Returns from News Agents 30,736, Total 128,095. /s/ Richard A. Ross, Publisher

# "VOICEBOX"

## Digital Voice Recorder

### Features:

- Use for any repeat message.
- Send your CQ, QTH, NET, Contest QSL, ID info, etc., in your own voice without saying a word!
- Create messages by talking into your Station Mic, then replay them instantly at the touch of a button.
- Up to 5 varied-length switch-selectable messages.
- "Soft Sector" pushbutton enables instant reprogram of message lengths - up to 1 minute (up to 2 minutes with additional memory chips ordered below).
- "No Key" switch enables Record or Replay message "off air". Messages heard thru built-in monitor speaker.
- "Mix" switch allows recorded message with Mic override.
- Microphone functions work normally (Up/Down, etc.)

### Specifications:

Can be operated with ANY equipment, any low impedance mic. Operates from 12 volt DC, with AC adaptor supplied. Front panel controls. Cabinet is RFI shielded and measures 6 1/4 "W x 2 1/4 "H x 7 "D. Includes built-in monitor speaker with volume control. Battery backup keeps messages for 8-12 hours without external power. State-of-the-Art 32KBPS Sampling Rate for natural sounding audio.

SEE NOV '90  
CQ FOR  
LEW McCOY  
REVIEW!



### Prices

In Kit Form with Digital Voice Board Assembled and Tested	<b>\$189.95</b>
Complete Unit Assembled and Tested (1 Year warranty, allow 30 days delivery)	<b>\$279.95</b>
Additional 1 Meg x 1 Dram (30 seconds per Dram)	<b>\$9.95 ea.</b>
Manual with Schematic and Parts List (credit applied upon purchase)	<b>\$5.95</b>

### GenWest Engineering

14401 North 51st Street  
Scotsdale, AZ 85254 (602) 996-9264

CIRCLE 35 ON READER SERVICE CARD

### CW? It's Soooo Easy!

**CW Lite** is the easiest Morse code training method in the world, bar none! And it is the fastest, too. Just close your eyes and relax. This powerful **hypnosis cassette tape** does the rest. **Subliminals** speed you along! Only \$14.95 ppd in US (NY residents add \$1.12 tax). Order today!

PASS Publishing, Box 570, Stony Brook, NY 11790

### G5RV All-Band QuickKits™

created by Antennas West Box 50062, Provo, UT 84605

<ul style="list-style-type: none"> <li>• Fast &amp; Easy to Build</li> <li>• Fail-Safe visual instructions</li> <li>• No measuring or cutting</li> <li>• Everything included</li> <li>• Finish antenna in minutes</li> </ul>	<ul style="list-style-type: none"> <li>• Double Size G5RV \$59.95</li> <li>• Full Size G5RV \$35.95</li> <li>• Half Size G5RV \$25.95</li> <li>• Quarter Size G5RV \$19.95</li> <li>• Marconi Adapter kit \$ 7.95</li> <li>• 200' Dacron 250# line \$11.95</li> </ul>
--	---

Build your own from scratch. Order TechNote #124-C \$5.95 ppd USA. Call 801-373-8425 for Tech advice. Order Hot-Line: 1-800-926-7373

CIRCLE 11 ON READER SERVICE CARD

# HANDHELDS

## YAESU FT-470 2M/440 MHz Dual-Band Operation Perfected



- |  |                    |
|--|--------------------|
| • Simultaneous Receive of Both Bands     | • Extended Receive |
| • Dual VFO's Each Band                   | • 42 Memories      |
| • Scanning Features                      | • PL Encode/Decode |
| • Keypad and Rotary-Dial Frequency Entry | • DTMF Auto Dialer |

Full Yaesu Line With All Your Favorite Accessories.



### The Radio Place

2964 Freeport Blvd., Sacramento, CA 95818  
(916) 441-7388—CALL COLLECT!!

CIRCLE 130 ON READER SERVICE CARD

## Heterodyne Headache #14.256

Get fast relief with **MagicNotch**



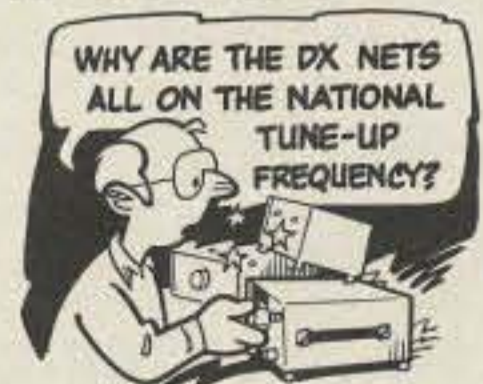
Magically removes all heterodynes caused by tuners, carriers, CW, computer birdies and other similar QRM!

Why listen to carriers?

Save your ears with MagicNotch!

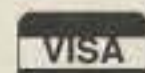
- Fully automatic. No tuning necessary.
- Easily installs between the rig and external speaker or headphones.
- Can be left on all the time while operating SSB.
- 2 color LED shows filter operation.
- S4 DX can be worked under a 20 over 9 carrier. You could be the only one in the pileup still copying the DX.
- Requires 12VDC—usually available from the acc jack on your rig.

Call today for a recorded demonstration!



Introductory Special

**\$99<sup>95</sup>**



plus \$5 shipping & handling  
CA residents please add sales tax

j-Com · Dept. C · P.O. Box 336 · Ben Lomond, CA 95005 · (408) 336-3503

CIRCLE 16 ON READER SERVICE CARD



### Call Sign Jewelry Shows Your Pride

14 Karat Gold jewelry with your Call Sign. Col- lar pins, necklaces, tie pins, lavalieres, charms, Operator Rings, Call Sign Watches. Look great! Quality craftsmanship. Send for free information:

**KB2MB, H&M Jewelry**

26 Edgecomb Road • Binghamton, NY 13905  
607-797-5458

THIS MONTH'S GOODIE FROM THE CANDY STORE



**ICOM IC-725**  
UNDER \$800.00

Similar Savings On Kenwood, Astron, Yaesu, Hy-Gain, Alinco, Etc. All L.T.O.

**ICOM IC-471H \$939.90**

Over 9034 Ham Items in Stock, all Prices, Cash FOB Preston. More Specials in HAM-ADS. Looking for Something not Listed? Call or Write

**ROSS DISTRIBUTING COMPANY**

78 S. State Street, Preston, Id. 83263 - Telephone (208) 852-0830  
Hours Tue.-Fri. 9-6 - 9-2 Mondays. Closed Sat. & Sun.

### AMIGA - Commodore CHIPS... PARTS... UPGRADES

8520A CIA.....	\$17.95	A2000 Keyboard.....	\$114.95
8526A CIA.....	12.25	A500 Keyboard.....	109.50
6567 VIC.....	15.95	A500 Heavy Duty P/S.....	89.95
1750 Clone 512K Cartridge.....	169.95	A2000 Heavy Duty P/S.....	147.00
256 X 480 NS.....	7.95	Keyboard For A1000.....	129.95
1 MEG X 1/100 NS.....	7.95	A500 Service Manual.....	36.00
1X4 MEG/80 S/C ZIP (A3000).....	54.75	A2000 Service Manual.....	39.00
PLA/B2S100.....	12.95	A501, 512K Upgrade RAM Cart.....	89.95
A2000, 2MB Upgrade Bd.....	339.00	Special A500, 150W, P/S.....	109.00

### Commodore Diagnostician \$6.95 prepaid

Fantastic Tool For Locating Faulty C-64/1541/1571 Chips on Commodore Computer Drives (over 24,000 sold)

### NEW, POWERFUL REPAIRABLE C-64 POWER SUPPLY

- 13-month warranty • UL Approved
- Complete schematic included
- External fuse - runs cool
- Heavy duty - perfect for "packet"
- Conservatively rates @ 1.8 amps

**\$24.95**  
plus  
UPS

Amiga Upgrade... New 1 Megabyte "Fatter AGNUS" Chip 8372A \$99.50 with simple step/step 10 min. instructions and chip puller.

SEND FOR NEW FREE 27 PAGE CATALOG ON EXCLUSIVE PRODUCTS

**THE GRAPEVINE GROUP, INC.**

3 Chestnut Street, Suffern, NY 10901

1-800-292-7445 • (914) 357-2424

FAX (914) 357-6243

Dealer Prices Available Prices Subject to Change

CIRCLE 95 ON READER SERVICE CARD

## R-4C Enhancements

### MIX-4 Solid State R-4C 3rd Mixer

The Solution to the One Remaining Problem with the Drake / Sherwood R-4C

Noisy 6EJ7 third-mixer tubes have plagued R-4C owners for years. Eliminate frying, crackling, microphonics, and power-line buzz with the MIX-4. Other R-4C modules: (AMP-4, PD-4, & PS-4).

MIX-4: \$59.00, plus \$5.00 shipping per order.

## County Hunters Software

◆ "CHERRIES" ◆

Designed by a top county hunter for county hunters. Works on all IBM-type computers. Hard disk suggested. New manual with version 1.207.

\$69.00, plus \$5.00 shipping per order.

## Sherwood Engineering, Inc.

1268 South Ogden Street, Denver, CO 80210  
(303) 722-2257 Monday - Friday 9 A.M. - 5 P.M.

## RADIO REPAIR

ALL Makes and Brands  
\$25.00/Hour + Parts

Send UPS Insured, Include Manuals  
We Add Trust and Satisfaction to Each Repair

Ed Kuhnley, KI4RF

4484 Tumbleweed Trail

Port Orange, FL 32127

(904) 788-6701 • (305) 384-1788

### Work Rare CW DX!

**CONTEST CODE.** This powerful hypnosis cassette tape teaches you to copy the essentials for DX and contests. High Speed (30/40 wpm) or Ultra High Speed (50/60 wpm). Subliminals speed you along! Only 20 min./day for 30 consecutive days. Each tape \$14.95 (Specify which program you want) or both for \$27.95 ppd in US (NY add \$1.12 or \$2.10 tax).

PASS Publishing, Box 570, Stony Brook, NY 11790

### "Specialist in RF Connectors and Coax"

Part No.	Description	Price
PL-259/USA	UHF Male Phenolic, USA made	\$ .70
PL-259/ST	UHF Male Silver Teflon USA	1.50
UG-21D/U	N Male RG-8, 213, 214 Delta	3.25
UG-21B/U	N Male RG-8, 213, 214, Kings	5.00
9913/PIN	N Male Pin for 9913, 9088, 8214 Fits UG-21 D/U & UG-21 B/U's	1.50
UG-21D/9913	N Male for RG-8 with 9913 Pin	3.95
UG-21B/9913	N Male for RG-8 with 9913 Pin	5.75
UG-146A/U	N Male to SO-239, Teflon USA	6.00
UG-83B/U	N Female to PL-259, Teflon USA	6.00

### The R.F. Connection

213 North Frederick Ave., #11 CQ  
Gaithersburg, MD 20877 • (301) 840-5477  
800-783-2666

Prices do not include shipping and are subject to change.  
VISA/MC, add 4%; UPS, COD add \$3.50/order

## TELEX hy-gain

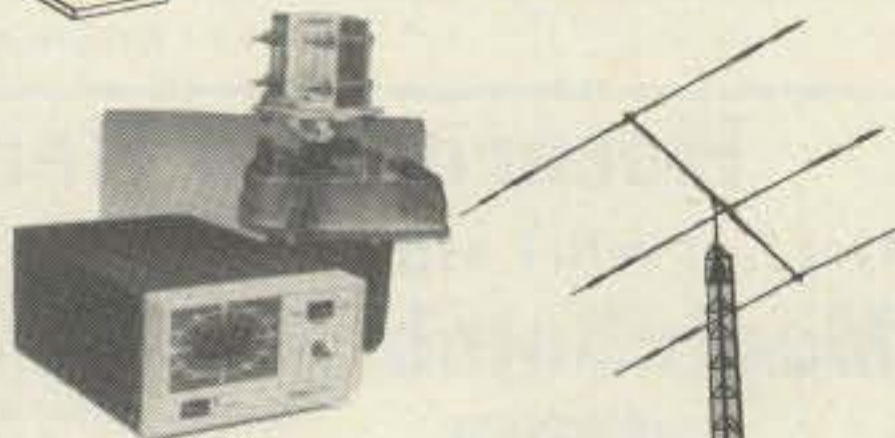


Call The Nation's  
Newest Authorized  
Telex/Hy-Gain Dealer For  
Full Line Sales

1-800-331-5308  
(201) 775-0121

Tri Banders The Famous TH7DX  
Thunderbird, Explorer 14, TH3JRS,  
TH5MK2 Monobanders—  
Discoverer and Long Johns, HF  
Verticals—New DX-88, 8-Band 80-10  
Meters, VHF Beams And Verticals,  
Oscar Antennas, Towers And  
Rotators

CALL TODAY!



MC, VISA, AMX  
K2EDQ

M - F (8 - 5)  
SAT (8 - NOON)

**Pilot** ELECTRIC COMPANY, INC.

1300 Hwy. 35 • Neptune, NJ 07753  
(201) 775-0121 • FAX 201-775-3635

CIRCLE 44 ON READER SERVICE CARD

DELTA LOOP TYPE ANTENNA, 4-element, 10-15-20, \$525.00.  
Lightning Bolt Antennas, RD #2 Rt. 19, Volant, PA 16156  
(412-530-7396).

**MORSE TERMINALS** allow sending and receiving Morse Code with your computer. For Tandy Color (\$39.95), Tandy 1000 (\$49.95), and IBM compatible computers (\$49.95) plus \$3 shipping. CW Processors reduce noise and QRM \$34.95. CW, Packet, RTTY, AMTOR Processor \$49.95. Hundreds of PD programs for IBM and COCO. Free Catalog, Dynamic Electronics, Box 896, Hartselle, AL 35640 (205-773-2758).

FOR SALE: Kenwood TS-930S/AT, Excellent Condition. W1WRN Callbook or 203-423-2285. You Pay Shipping.

**BATTERY PACK REBUILDING:** Send Your Pack—48HR Service. ICOM: BP2/BP3/BP22 \$19.95, BP5/BP8/BP23/BP70 \$24.95, BP24 \$26.96, BP7 \$32.95. KENWOOD PB21 \$15.95, PB21H \$15.95, PB21H/PB6 \$21.95, PB25/26 \$24.95, YAESU FNB9 \$19.95, FNB10/17 \$23.95, FNB11 \$27.95, FNB4/4A \$36.95. "U-DO-IT INSERTS" ICOM: BP2/BP3/BP22 \$16.95, BP23 \$17.95, BP5/BP8/BP24/BP70 \$21.95, BP7 \$27.50; KENWOOD: PB21 \$12.95, PB6 \$16.95, PB21H \$18.95, PB24/25/26 \$19.95; TEMPO: S \$22.95; YAESU: FNB9 \$16.95, FNB10/17 \$19.95, FNB4/4A \$32.95; AZDEN: \$19.95. "NEW PACKS W/CASE: ICOM BP8B (BS CHG) \$34.95, BP8AA (WL CHG) \$39.95; YAESU: FNB2 \$19.95, FNB17 \$34.95; SANTEC: 142/1200 \$22.95. FREE CATALOG. \*3.00 Shipping/order, PA + 6%, VISA-M/C + \$2.00. CUNARD, R.D.6 Box 104, Bedford, PA 15522 (814-623-7000).

**1,712 DX CERTIFICATES** described in 1991 edition K1BV's huge directory. \$17.75. Ted Melinosky, 525 Foster Street, South Windsor, CT 06074-2936.

**QSL CARDBOXES and INDEX DIVIDERS.** Eliminate broken shoeboxes and cluttered drawers. GET ORGANIZED! Sturdy boxes hold 1000 QSLs up to 6 1/2 inches wide. Send SASE to: 7-Mike Hamstuff, P.O. Box 14455, Scottsdale, AZ 85267-4455.

FOREIGN TELEGRAPH, radio, and ham keys wanted. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

FOR SALE: R/S DX300 SW Receiver, \$125. Xerox 16/8 CPM computer with 10 meg HD \$350. More info: P.O. Box 518, Whitehouse, FL 32220.

FOR SALE or TRADE: CQ/HR/QST/73 Magazines. SASE or call 508-947-4444, KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

CQ MAGAZINES: 1988 entire year, 12 issues, \$10 postage paid, include SASE in case sold. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

HAMMARLUND HQ-180A general-coverage receiver in mint condition with matching speaker. This unit is a collector's delight. Even have the original boxes to ship. Write KD4AJ at 1968 Huntington Hall Court, Atlanta, GA 30338.

HEATHKIT model H-89A computer, 5 1/4 inch drives, RAM, 12 inch amber monitor, disks, many CPM and HDOS programs. WKJV, P.O. Box 7349, Huntington Beach, CA 92615.

W5YI REPORT back issues, 5/15/82 to present, \$15. hr/WESTLINK REPORT, 11/5/76 through 9/19/86, \$15. Both, \$25 FOB. Stuart Oserman, WA9ZPL, 7729 Church, Morton Grove, IL 60053-1623 (708-965-0963).

WANTED: Bandswitch for Hammarlund HQ-110 receiver or information where to get one. Sever, W8IM, 1701 Harcourt Drive, Leesburg, FL 34748.

WANTED: 6 meter gear such as IC-502, FT-620B, etc. Write to Q.R. Davis, WA9WME, 1905 Blackiston Mill Rd., Jeff, IN 47130.

SELL: Collins 75A3 w/mech filter, \$100 or best offer plus shpg. Also 2kw variacs; one—115 volts in/0-130 volts out; one—230 volts in/0-260 volts out. Each \$50 plus shpg. K8CSG—CB address.

HEATHKIT SB500 2 meter Transverter and PS \$75. K9ALD, Rt. 5 Box 70, Mahomet, IL 61853.

KENWOOD TS-180S, all filters with PS-30, clean excellent condition, \$600 shipped. WA2SHE (518-883-5007).

REALISTIC HTX-100 10 meter SSB/CW transceiver, very good condition, \$185. Charles Bright, WE0R, 4115 Buckley Ridge Court, St. Louis, MO 63125 (314-544-5584 after 4 PM Central Time).

NEED Radio Shack Modem II. Fred Gunther, 1307 Shaw, Moses Lake, WA 98837-3133 (509-762-9294).

WANTED: Owner's manual or copy for Clegg FM 28 two meter xceiver. Will pay. W1BLR 603-527-0366.

JOHNSON VIKING 122 VFO with original manual. Cabinet in good condition, \$65. Include SASE in case already sold. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

SELL: KW roller inductor. 22t. #8 silver plated 3.5 inch dia. Double roller contact 0.25 inch drive. \$25 + shipping. HV xfmr 2/2.5kv @ 0.5A oil-filled. 10" x 10" x 10" approx. \$75. Two 11H 0.5A chokes, herm. sealed \$30 ea. Shipping xtra. BC-221 freq. meter w/calib. book \$25 plus shipping. K8CSG, CB address.

TET SURPLUS antenna parts, SASE info. G. Rattmann, 14250 Calle De Vista, Valley Center, CA 92082.

SACRIFICE my \$3000 retirement magnetic sign machine. SASE/details. Sam Davis, K4RGK, Glenwood, AL, 36034.

LIKE NEW. Commodore 128 Computer; 1571 Disk Drive; Star Gemini II Printer, lots of software programs, \$500 F.O.B. or Trade for TS 530S. Basham, 563 W. River St., Cave Junction, OR 97523.

WANTED: Screw-base flashbulbs. 6-7 inch screw-base flashbulb holder. RiteWay plastic 4 x 5 holders. Modern 200 + mm 4 x 5 lens. Toyo-Omega 45D lens board. T.N. Colbert, WA8MLV, Burton, Ohio 44021.

SBE-34 Mike \$8, SB2-CW Code Adapter \$35, Precision E-200 IG-GEN 90-240 MHz \$50. Other items. K6KZT, 805-528-3181.

MIRAGE MP-1 (HF), MP-2 (VHF) SWR/Wattmeter, \$50 ea. MFJ-486 Grandmaster w/remote, AC, \$80. Daiwa CN520 SWR, \$30. W4FA, 302 Glasgow, Greenville, NC 27858.

Buy: Amateur Radio Equipment, good/bad. For large list/\$1 and SASE. Joe Bedlovics, 239 Dover Street, Bridgeport, CT 06610.

FOR SALE OR TRADE. CQ/HR/QST/73 magazines. SASE or call 508-947-4444. KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

WANTED: YAESU TC-2 and TC-6 2/6 M converters and YAESU SP-101PB Speaker. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

SELL BC-221 freq. meter w/calib. book, \$25 + shipping. K8CSG, CB address.

HEATHKIT model H-89A computer, 5 1/4 inch drives, RAM, 12 inch amber monitor, disks, many CPM and HDOS programs. W0KJV, P.O. Box 7349, Huntington Beach, CA 92615.

HAL PCI-2000 RTTY/CW/ASCII card for PC. With software and manual, \$100. IRL FSK-500 with loop supply, \$50. U Ship. Bill, K8TBW, 419-435-4127.

WANTED: Wiring diagrams for Eico 1032 adjustable power supply and Eico 3770 stereo receiver. W4NZY, 119 North Birchwood Ave., Louisville, KY 40206-1521.

WANTED: Any operational military radio equipment with accessories. Send list and info to EJW, P.O. Box 63, Fords, NJ 08863.

FOR SALE: AEA CPI \$50; Palomar RX Noise Bridge \$50; Kenwood TS-530S, mint, \$575. L. Basham, W7TCT, 563 W. River St., Cave Junction, OR 97523.

WANTED: Schematic for ICOM-726. Rick Thompson, 2079 111th Lane, Coon Rapids, MN 55433-3604.

FOR SALE: R/S DX300 SW Receiver, \$125. Xerox 16/8 CPM computer with 10 megs HD, \$350, or good HF Transceiver. P.O. Box 518, Whitehouse, FL 32220.

WANTED: Kenwood DM-81 Dipmeter, Datong ANF, Bird 100c, 250A, PEP Kit, ICOM IC-765, Bearcat 590XLT. K0MK, 4912 Vermilion, Gilbert, MN 55741.

WANTED: KDK FM-50 rig for 6 meter FM, any condition. Call 606-236-6510. WQ4Z, George Griebel, 650 Chestnut Grove, Parksville, KY 40464-9624.

WANTED: Schematic (manual) and coil sets for Unelco Electronics Corp., Baltimore, Md., Model 1914 solid-state short-wave radio, .54-31.5 MHz. Alvin Bernard, N14Q, P.O. Box 690098, Orlando, FL 32819 (407-351-5536).

SELL ATV SYSTEM. PC Electronics TX-70-1 70 cm transmitter, TVC-4G 70 cm downconverter, TVC-12G 23 cm downconverter, Mirage D15N amp, \$425. Will ship UPS COD. John, KG6XT, 818-889-4677.

WANTED: Viewmaster Focusing Viewer No. 2011, 24 inch close-up lens for Viewmaster camera. V. Ouzoonian, 1565 E. Highland Ave., Redlands, CA 92374.

WANTED: Sub-miniature Cameras, any make or model. V. Ouzoonian, 1565 E. Highland Ave., Redlands, CA 92374.

FOR SALE: Memory keyer with power supply, "MIMIC" 4 memories, all bells and whistles, factory wired, with manual, \$40. Bencher paddle, black base, \$40. Both for \$75. Contact Art, K1VKO, 203-853-0587.

HEATHKIT HG-10B VFO, excellent, \$45 plus UPS. KD2HW, 101-23 Lefferts, Jamaica, NY 11419.

TELEGRAPH EQUIPMENT WANTED. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

FOR SALE: Like new, Kenwood AT 250 Automatic Tuner, \$275. New MFJ 949 D 300W Tuner, with cross-needle SWR/wattmeter, dummy load, in warranty, \$140. Courier Model 500 Port-A-Lab Tester, \$75. Teconic 900A/5D 2M Sweep Gen., 200-400 MHz, \$150. HP 650 A Test Oscillator, \$50. HP 500 A Audio Generator, \$50. Navy Model LAF-3 RF Sig. Gen., \$50. Eico Model 425 Scope, \$300. Bruce, 750 N. Garden, Fresno, CA 93727 (209-255-8967).

COLLINS NEW TUBE SETS for KWM2 \$95 less finals, 75S3 \$65, 32S3 \$60 less finals, 75A4 \$85. Bob, WE2T, 716-334-1103.

SWAP: Speed-X model #501 bug for a sideswiper key, camel-back key, or a McElroy Junior bug. Dave Pennes, WA3LKN, 5220 Winterberry Drive, Apt. C, Indianapolis, IN 46254.

FOR SALE: TS430S w/FM, \$525 (no P.S.). FL2100B linear w/2 spare 572B tubes, \$300. Commodore C-128 w/disk drive 1541 plus lots of extras, \$350. K8SCA, 4400 N. Squirrel Rd., Pontiac, MI 48326.

COLLINS mechanical filters. Two type F-250-Z-4, p/n 526-9130-00. \$20 ea., \$35 pr. AA1K, Jon Zaimes, 145 Farm House Ln, Bear, DE 19701.

WANTED: Schematic and service manual for Hickok Model 288AX signal generator. \$7 W6HNI, P.O. Box 1017, Carpinteria, CA 93014.

WANTED: Memory Expander for Early Model Tandy 1000 (now is 128K). Call 606-236-6510. WQ4Z, George Griebel, 650 Chestnut Grove, Parksville, KY 40464-9624.

CONTEST OTH: 1.5 acres, 4 towers, 5 HF Yagis, 3BR house, finished ham shack, game room, den, \$150,000. Jon Zaimes AA1K, 145 Farm House Ln, Bear, DE 19701 (302-834-8323).

By popular demand...  
...an event you won't want to miss!

# T.G.I.K.\*

(\*Thank goodness it's Kenwood.)

A Kenwood Radio Rally  
as only Kenwood could put it together.

- Meet and exchange ideas with Kenwood factory experts
- Special discounts
- Refreshments
- A free opportunity to play the Kenwood "Money Machine"—where everyone who plays, wins

Watch for T.G.I.K.  
Coming soon to your area!

# KENWOOD

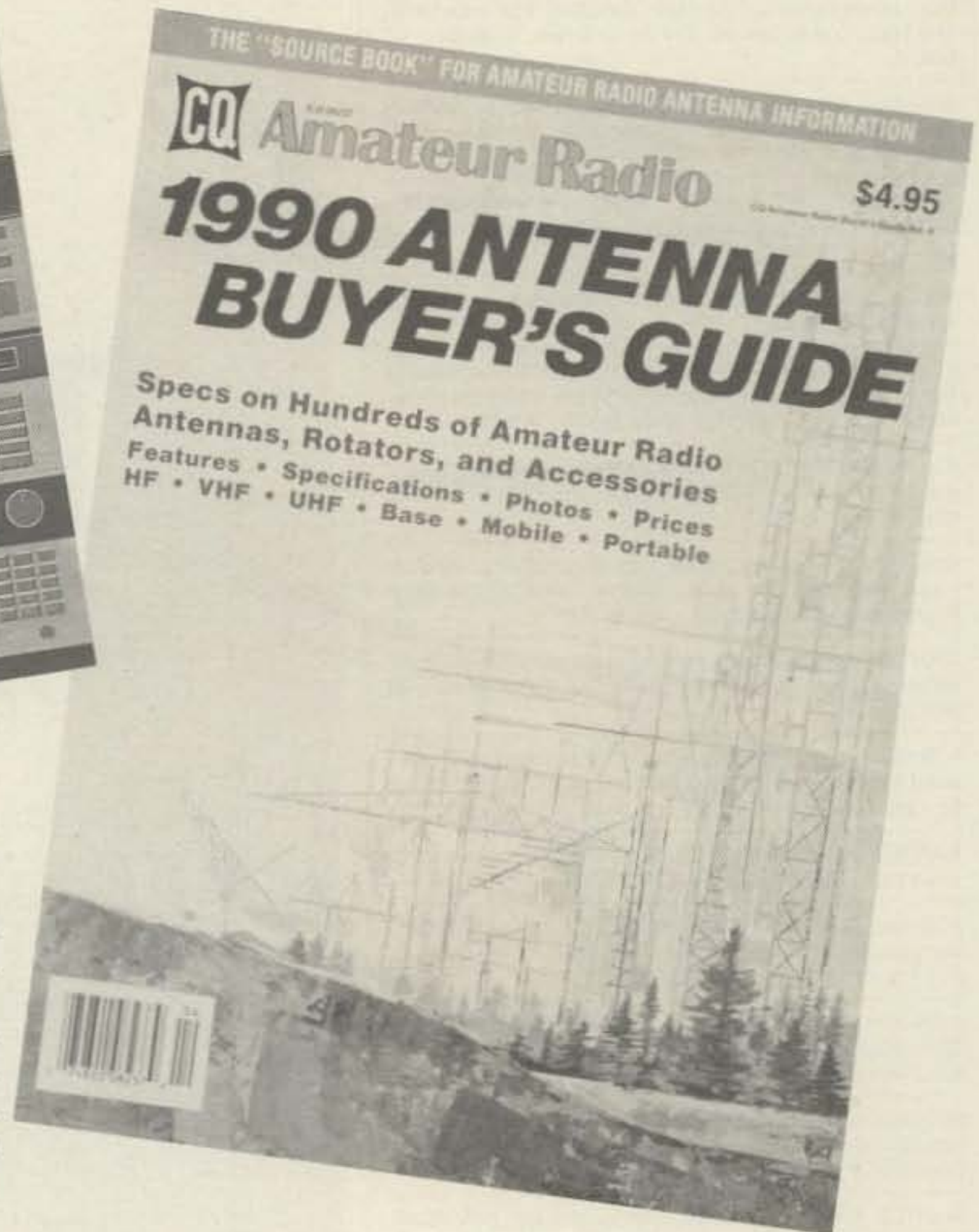
...pacesetter in Amateur Radio



# Amateur Radio Buyer's Guides



You can buy with confidence when you have all the facts. The 1991 Equipment Buyer's Guide gives you in-depth coverage of HF/VHF/UHF rigs and accessories. All the information is here in one handy, concise directory with descriptions, technical specifications, model numbers, retail prices and photographs. How do you get a ham license? What's the latest on the code-free license? What equipment do you really need to work the satellites? Should you buy a computer for your shack? How do you add computer control to your rig? You can buy with confidence when you have all the facts. Order the 1991 Equipment Buyer's Guide today!



You'll need the Antenna Buyer's Guide to squeeze every last dB out of your antenna dollars. Make sure you get the best possible antenna system for the best price! HF and VHF, UHF, directional and omnidirectional, vertical and horizontal, mobile and portable—they are all covered in depth. Tuners, cables, wattmeters and more! You'll find detailed charts, specification, photos and retail prices. Advice on getting the proper tower and antenna permits from a leading authority on PRB-1. Step-by-step guide to putting up your first beam! The bands are hotter than ever right now. You can't afford to wait.

## ORDER YOUR BUYER'S GUIDES TODAY!

Don't miss the most valuable buying guides in the Amateur Radio Field!

YES, please send me \_\_\_\_\_ copies at \$4.95 each:

- EQUIPMENT BUYER'S GUIDE  
 ANTENNA BUYER'S GUIDE

Name \_\_\_\_\_ Call \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Send only \$4.95 each today. Foreign: \$6 U.S. funds.  Check  Money Order

MasterCard  VISA  Amex Card No. \_\_\_\_\_ Expires \_\_\_\_\_

Signature \_\_\_\_\_ (required on all charge orders)

Mail to: CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801/FAX: 516-681-2926



ICOM R71A receiver \$675; KENWOOD TS520, CW filter, DC supply \$450; DRAKE MN4 tuner \$135. All mint cond. Don Burns, 4410 Reading Rd., Dayton, OH 45420 (1-513-256-0345).

WANTED: KDK FM-50 rig for 6 meter FM, any condition. Call 606-236-6510, WQ4Z, George Griebe, 650 Chestnut Grove, Parksville, KY 40464-9624.

1990 CALLBOOK: U.S. \$12, Foreign \$14. Only have one copy each, include SASE in case sold. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

DOUBLY BALANCED MIXERS: Mini-Circuits SCM-1, same specs and pinout as SBL-1, \$5.50 ea. postpaid. P.D. Ingalls, KD7SE, 671 Morton, Ashland, OR 97520.

JUNIOR HIGH SCHOOL RADIO CLUB needs donations of unwanted equipment, books, parts, etc. Thank you. G. Skloot, c/o JHS 180, 320 B. 104 Street, Rockaway Park, NY 11694.

FOR SALE: Collection of electronics books. Old and current. SASE for list. C.W. Beckett, 116 Tawn Dr., East Flat Rock, NC 28726.

WANTED: Drake L-7 linear and manual. Also 572-B tubes. W6JVK, 1521 Scenic Drive, Pasadena, CA 91103 (818-793-7374).

WANTED: Copy of DX Edge for C-64. Also 1990 DX Callbook, used or will take set. Sandy Roman, 204 Cardinal Dr., White House, TN 37188.

FOR SALE: Kenwood 550 watt transceiver. LSB, USB, CW. Very powerful, great DXer. Also MFJ-941D Antenna tuner and RCA power mike. Call 312-880-5315.

NORTHERN LIGHTS. Author seeks ham-related experiences with and observations of the Northern Lights (Aurora Borealis). Send letter, IBM disk, or audio tape. Pictures (to be returned) most welcome. Matt, N8BPI, P.O. Box 25004, Lansing, MI 48909.

ATTENTION COLLINS COLLECTORS. Complete "S" Line, 75S3-C, 32S3, 512F-2, 312B-4 console, and 30L-1 amplifier. High serial number Winged Emblem. Excellent w/manuals. Package only. Prefer pick up. Send bid to: Charlie, KD4AJ, 1968 Huntington Hall Ct., Atlanta, GA 30338. Will respond to all inquiries.

OLD RECEIVERS \$25 to \$75, Signal Generators R.F. and Audio, TRS-80 Software, other items. K6KZT, 805-528-3181.

## SIMPLEX REPEATER

ALL YOU NEED IS A SIMPLEX RADIO AND ONE FREQUENCY



- NO DUPLEXER NEEDED
- VOICE MAIL
- VOICE IDer
- DTMF PROGRAMABLE
- REMOTE FUNCTIONS

**BRAINSTORM  
ENGINEERING**  
(818)249-4383  
7 DAYS A WEEK

\$329 WITH PL DECODER INSTALLED  
\$229 WITHOUT PL DECODER

TEN-TEC: Corsair II and 561 Power Supply, mint, \$1150; 229B Antenna Tuner \$140; Speech Processor \$40; Electret Mic \$25. Basham, 563 W. River St., Cave Junction, OR 97523.

HALLICRAFTERS SX-25 \$75, S-120 \$50, S38-E \$45, S38D \$35, SR-42x \$25, CB-7 \$10, CRX-1 \$30, others. K6KZT, 805-528-3181.

FOR SALE: Xerox 16/8 CPM computer with 10 megs of HD, several manuals, \$350 or trade for good used HF transceiver. Also R/S DX 300 SW Receiver, comes with repair manual, \$125. More info on above item send SASE to: P.O. Box 518, Whitehouse, FL 32220.

TELEGRAPH, HAM, and wireless keys wanted. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

FOR SALE or TRADE. CQ/HR/QST/73 magazines. SASE or call 508-947-4444, KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

WANTED: Yaesu FT-625RD memory option only and TC-2/TC-6 2M and 6M converters w/manuals. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

HUSTLER 6-BTV and B and W AC 1.8-30 antennas. Both very good condition w/coax. Best offer(s). K3AQR, 904 68th Ave. West, Bradenton, FL 34207.

WANTED: Transverter 432 MHz for 10 meter rig. Call 606-236-6510. WQ4Z, George Griebe, 650 Chestnut Grove, Parksville, KY 40464-9624.

FOR SALE: Radio, TV, video, electronics, communications... literature, magazines, journals, catalogs, prospectus, brochures. Rich Pilewski, Broniewsk 12, Sierpc 09-200, Woj. Ptoczek (Poland).

## CW A BREEZE - UNDER \$20!

CW pros copy words instead of letters. Now you can, too! Easily! **GUARANTEED!** Improved courses for 1991. **QSO-TRAINER** Course (mod. speed, instant success) \$16.95. The **QSO-MASTER** Course (The "Plateau Buster" 8-14 wpm) \$14.95. The **QSO-PRO** Course (All the way to EXTRA!, 16-22 wpm) \$14.95. US & CAN add \$3 ship & handling, \$4 others. IL, IN, MI, MN, OH, WI add sales tax. Each set has two, high-quality, 60-min. code tapes & complete instr. **ORDER TODAY!** Check, M.O., Visa/MC

**AVC INNOVATIONS, INC. Dept CX**  
P.O. Box 20491, Indpls., IN 46220-0491

Business size SASE Gets Details

CIRCLE 83 ON READER SERVICE CARD

### Digital Voice Message Recorder/Announcer

ONLY  
\$159.95  
4.00 S/H



Instantly Xmit Your Natural Voice Messages With A Push Of A Button • Contesting • Call CQ • Off Air Recording • Working DX • Identifying • Speaker • Auto PTT Keying • AUX In/Out Jacks • DC Adaptor Included

**CALL TOLL FREE 1-800-736-3960**



**DIGITECH CONCEPTS**  
200 W. Main • Roberts, WI 54023  
(715) 749-3960

CIRCLE 46 ON READER SERVICE CARD

# WARNING

## SAVE YOUR LIFE OR AN INJURY

Base plates, flat roof mounts, hinged bases, hinged sections, etc., are not intended to support the weight of a single man. Accidents have occurred because individuals assume situations are safe when they are not.

Installation and dismantling of towers is dangerous and temporary guys of sufficient strength and size should be used at all times when individuals are climbing towers during all types of installations or dismantlings. Temporary guys should be used on the first 10' or tower during erection or dismantling. Dismantling can even be more dangerous since the condition of the tower, guys, anchors, and/or roof in many cases is unknown.

The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy wire, anchor, or base failures. **Used towers in many cases are not as inexpensive as you may think if you are injured or killed.**

Get professional, experienced help and read your Rohn catalog or other tower manufacturers' catalogs before erecting or dismantling any tower. A consultation with your local, professional tower erector would be very inexpensive insurance.

Paid for by  
the following:

**ROHN.**

6718 West Plank Road  
P.O. Box 2000  
Peoria, Illinois 61656

**TNT The No-Tune Window Antennas**

No pruning. TNT is No-Tune on 80 cw, 40, 20, 17, 12 & 10. TNT/2 is No-tune on 40, 20 & 10. Work other bands w/ tuner. DX & Gain rise w/ frequency.	No tuning.	No knobs to twist.
Ready to Use Now Includes Custom 100 ft. RG-5x feedline	Kink-Proof Wx-Sealed Low Noise	No traps or Resistors Insulated to 3000 V Rated 500 Watts
Call to Order WindowTechNote #126 \$6.95 ppd USA Info: 801-373-8425	<b>TNT</b> \$89.95 +\$8 Window 137 ft. long P&H	<b>TNT/2</b> \$79.95 +\$7 Window 68 ft. long P&H
<b>AntennasWest</b> Box 50062, Provo, UT 84605	Order Hotline: 800-926-7373	

CIRCLE 11 ON READER SERVICE CARD

## Electronic Repair Center Servicing

Amateur Commercial Radio

The most complete repair facility on the East Coast.

Large parts inventory and factory authorized warranty service for Kenwood, Icom and Yaesu.

**SEND US YOUR PROBLEMS**

Servicing "Hams" for 30 years, no rig too old or new for us.

**HAMTRONICS, INC.**

4033 Brownsville Road

Treose, Pa. 19047

**215-357-1400**



CIRCLE 33 ON READER SERVICE CARD

**CABLE TV CONVERTERS**  
Why Pay A High Monthly Fee? Save \$100's A Year

- All Jerrold, Oak, Hamlin, Zenith, Scientific Atlanta, and more.
- 60 Day Money Back Guarantee
- Shipment within 24 hours
- Visa/MC and C.O.D.

**WE WILL BEAT ANYONE'S PRICE**  
No Illinois Orders Accepted

**Electronic Engineering**  
P.O. Box 337, Barrington, IL 60011  
Free catalog 1-800-542-9425 information 1-708-540-1106

**HamCall / CD-ROM**  
500,000 HAMS plus 1,000's of Public Domain Amateur Radio Programs and Data

CD-ROM Disc \$50.00  
Questar Retrieval Software \$50.00  
Shipping (per order) \$5.00  
Sony CDU-6100 player \$549.00

**SUCKMASTER Publishing**  
Rt. 3, Box 56 - Mineral, Virginia 23117  
703-894-5777 - 800-282-5628

**HI-PERFORMANCE DIPOLES**

Antennas that work! Custom assembled to your center freq. ea. band - advise HL of center and each end - hang as inverted "V" - horizontal, vert dipole, sloping dipole - commercial quality - stainless hardware - legal power - no-trap, high-efficiency design. Personal check, MO or C.O.D. (\$3)

MPD-5*	80-40-20-15-10M max-performance dipole 87' long	\$105ppd
MPD-2	80-40M max-performance dipole, 85' long 362	\$5-\$68 ppd
HPD-3*	160-80-40M hi-performance dipole 113' long	\$79 ppd
SSD-8*	180-80-40-20-15-10M space saver dipole 71' long	\$125 ppd
SSD-5*	80-40-20-15-10M space-saver dipole-specify L 42' \$105	\$2-\$108 ppd
SSD-4*	80-40-20-15M space-saver dipole-specify L 48' \$83	\$67-\$ 96 ppd

\*9-bands with wide-matching-range tuner.

SASE for catalogue of 30 dipoles, slopers, and space-saving, unique antennas

706-394-3414 **W9INN ANTENNAS** BOX 393 MT. PROSPECT, IL 60056

CIRCLE 127 ON READER SERVICE CARD

**HI-VOLTAGE RECTIFIERS**  
6KV @ 1A 4/\$20. PPAID

8 TO 14KV UNITS AVAILABLE JAN. 91

**K2AW's "SILICON ALLEY"**  
175 FRIENDS LANE, WESTBURY, NY  
ZIP 11590 516-334-7024

**COUNTY OUTLINE MAP BOOK**  
3076 US Counties  
\$10 US \$12.50 DX

County Hunter QSL Service  
CH Supplies, MRCs, Logs, QSLs  
Computer cards. SASE for prices

**Mobile QSL Bureau**  
P.O. Box 6436  
Florence, SC 29502

**ROBERT HALL ELECTRONICS**  
**AMATEUR RADIO REPAIR**

MAIL: P.O. BOX 280363  
SAN FRANCISCO CA 94128-0363

SHOP: 1660 MCKEE RD.  
SUITE A  
SAN JOSE, CA 95116  
(408) 729-8200

**CW ? No Problem !**

**CW Mental Block BUSTER** explodes mental blocks about CW! Hypnosis, visualization, affirmations. Based on 40 yrs. research. Includes Tape and Workbook. Results Guaranteed. Not a CW practice tape. Only \$24.95 postpaid in U.S. (NY residents add \$1.87 sales tax.) Order today!

**PASS Publishing, Box 570, Stony Brook, NY 11790**

**QSLs by W4MPY**

- Quality printing
- Fast personal service
- Reasonable prices
- FREE Samples

**Wayne & Lola Carroll**  
682 Mt. Pleasant Road  
Monetta, SC 29105

**NEW YAGI OPTIMIZER**

YO 3.5 features calibration to NEC. This provides better accuracy for critical HF designs, much better accuracy for VHF/UHF designs, elimination of frequency offsets, accurate modeling of large-diameter elements, and little or no adjustment of constructed antennas. YO 3.5 is the most accurate Yagi design tool presently available, and includes an extensive array of automatic optimization and plotting features. YO 3.5 models tapered elements, mounting brackets, gamma-T-hairpin-beta matches, stacked Yagis, ground, and does frequency scaling. YO 3.5, \$100. YOC 3.5 (1.7-2.7 times faster), \$140. YOjr 1.5 (fewer features), \$50. Add 6.25% CA, \$5 overseas. For IBM PC.

**Brian Beezley, K6STI, 507 1/2 Taylor, Vista, CA 92084**

**G4ZPY PADDLE KEYS**  
(INTERNATIONAL)  
WORLD'S LARGEST SELECTION OF HAND BUILT MORSE KEYS  
FINEST QUALITY BRITISH CRAFTSMANSHIP

For Details send Business size S.A.S.E. to  
**Charles Tryor, N4LMY**  
7809 10th Avenue South  
Birmingham, Alabama 35206

**AMATEUR RADIO EQUIPMENT**

CALL **Comm P I Inc.** 800-942-8873  
For Your Best Price

Authorized dealer for Icom, Kenwood, Yaesu, ASTRON, Belden, Bencher, AEA, Cushcraft, MFJ, RF Concepts, Hustler, Kantronics, Wilson, Diamond, Ham-10, Larsen, Wm. M. Nye, B&W, ARRL, Ameritron, Epsom, Farr Corner, DTK

1057 East 2100 South, Salt Lake City, UT 84106  
801-467-8873

CIRCLE 132 ON READER SERVICE CARD

WANTED: Screw-base flashbulbs. Modern 200+ mm lens and shutter for 4 x 5 camera. Lens board for Toyo 45D. T.N. Colbert, Burton, OH 44021.

HEATH UNITS, Digital Multimeter \$20, 3 inch Scope \$35, Distortion Meter \$25, Ant Meter \$20, GR-91 Receiver \$50, others. K6KZT, 805-528-3181.

BUY: Amateur Radio Equipment, Good/Bad. For large list/\$1 and SASE. Joe Bedlovies, 239 Dover Street, Bridgeport, CT 06610.

FOR SALE: R/S DX-300 SW Receiver, good condition, \$125. Xerox 16/8 computer (CPM), 10 megs HD \$350. More Info send SASE to: P.O. Box 518, Whitehouse, FL 32220.

10 YEAR GIANT CLEANOUT SALE. Shack overloaded. Tons of test equipment, microwave, radios, parts, antiques, variacs, more. Big list, SASE please. J. Cohen, 200 Woodside, Winthrop, MA 02152 (617-846-6312).

FREE LIST of ham, electronic, and telegraph publications for an SASE. Dick Randall, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

FOR SALE or TRADE. CQ/HR/QST/73 magazines. SASE or call 508-947-4444, KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

WANTED: BC-1016 Undulator Unit, ICOM IC-SP2 Speaker and Yaesu SP-101PB speaker w/cables. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

ATTENTION SATELLITE ENTHUSIAST. Yaesu FT-736R dual-band duplexed transceiver new in factory carton. Grand prize at the Atlanta Hamfest, never used. Also have N4HY Quik Trak IBM compatible computer software, unopened. You save \$200 over the published discounted price. Call Charlie, KD4AJ, after 7, 404-396-0276.

FOR SALE: 1954 Gonset five element tri-beam with Gordon rotor. Make offer. Pick-up only. I.D. Byars, W4KKO, 1-615-668-8451.

WANTED: Manual, power cord, microphone for KDK Model # FM-2015R. Kevin, P.O. Box 5032, Springfield, VA 22150-5032.

HEATHKIT model H-89A computer, 5 1/4 inch drives, RAM, 12 inch amber monitor, disks, many CPM and HDOS programs. W0KJV, P.O. Box 7349, Huntington Beach, CA 92615.

**Taking a Ham Test?**

Study for all exams at your PC.  
NOVICE THROUGH EXTRA CLASS  
BOTH WRITTEN AND MORSE CODE

All 5 Classes  
One low price!  
Only **\$39.95**  
postpaid on five 5 1/4 360K disks.

**Pass the Theory License Ham Exams**  
IBM compatible software contains all 1,931 actual questions, multiple choices and answers appearing in the written tests of every VEC. Review questions by license class or subelement. Print out actual tests or practice taking written examinations right at your computer keyboard... from the beginning Novice to the top-of-the-line Extra Class. (4 Disks) **BONUS!** 200-page Radio Amateurs Licensing Handbook... plus the current Part 97 FCC Ham Rules & Regulations!

**Having Trouble with the Code?**  
**Morse Academy** software actually teaches all 43 required code characters and then steps you up through the Extra Class 20 WPM level using sophisticated computer aided instruction techniques. Adjustable tone, standard or Farnsworth spacing. Sends text or random generated characters... even properly constructed code exams. Many features... even a 40-page on-disk manual! (1 Disk)

**Guaranteed to do the job!**  
**Fast service... Shipped within 24 hours!**

**The W5YI Group**  
P.O. Box 565101, Dallas, TX 75356  
CALL TOLL FREE  
1-800-669-W5YI (9594)

CIRCLE 41 ON READER SERVICE CARD

FOR SALE: Heathkit HW-99, partially assembled, best offer.  
WANTED: Service manual for HR-2600, Vibroplex Vibrokeyer,  
MFJ-815B. KB5AYO, Rt. 1 Box 580-B, Reserve, LA 70084.

FOR SALE: SWAN TV-2 two meter transverter with 5894 final  
in good condition, \$50. KA2MCU, Box 4753, Schenectady, NY  
12304-4753.

ANTENNAS: Butternut HF2V 80/40M Vertical \$120, Spider  
Multi-Band Mobile 10/15/20/40/80 resonators \$130. KA1DZP,  
Dave Smith, 5 White Rock Dr., Gorham, ME 04038.

"Collectors": Bendix-Navigator 420, portable three-band ra-  
dio (Includes Broadcast, LF [190 to 400], Marine, 1.6 to 4.5),  
black plastic case with carrying case and "Consolan Antenna,"  
\$50. K3UKW, Tony Musero, 215-271-8898. Add UPS.

WANTED: Heat dissipating, black, IERC tube shields P/N  
TR5-5025B or P/N TRN5-5015B. Fits 12BA6 tube. W8TSF,  
1300 Lynn Dr., Lancaster, OH 43130 (614-653-1927).

WANTED: DX Engr Speech Processor for Collins K2 Line. For  
Sale: Collins KWM2, all factory mods. NA2Z, 518-747-3194.

WANTED: SHACKMASTER SM-100. Alex, KD2KI, 212-684-  
1148.

WANTED: Memory Expander for Early Model Tandy 1000 (now  
is 128K). Call 606-236-6510. WQ4Z, George Griebel, 650  
Chestnut Grove, Parksville, KY 40464-9624.

CONTEST QTH: 1.5 acres, 4 towers, 5 HF Yagis, 3BR house,  
finished ham shack, game room, den, \$150,000. Jon Zaimas  
AA1K, 145 Farm House Ln, Bear, DE 19701 (302-834-8323).

### 12/24 Quartz Clock



- German Movement to Mil Spec  
Solid Brass Bezel, Battery Included
- Each Case Custom Made and  
Numbered  
Black Laminate and Solid Walnut  
4 1/2" x 5 1/2" O.A.
- \$44.50 PPD Continental USA, DX  
Add \$5.00 Money Order or Check

Mike Traffic, N1HX

Custom Cabinetry  
Jones Hill Road Ashby, MA 01431

## Mac IBM PC Study Aid for the Amateur Radio Exams The Perfect Gift

### Highlights:

- Runs on IBM PC's and compatibles (CGA or Hercules Graphics recommended) or Macintosh computers.
- Contains latest question pools, (Oct 1990), associated graphics and explanations on appropriate questions.
- Logs multiple study sessions and allows resuming at a later time. Returns to review missed questions if desired.
- Creates randomly generated sample tests on-line or written on Epson/IBM or Macintosh graphics printers.
- Analyzes performance showing areas for additional study then provides concentrated emphasis in these areas.
- Programs are available for Novice, Technician, General, Advanced and Extra Amateur class exams as well as Commercial Radio Telephone and Commercial Radar Endorsement. Each program sold separately.

### Reviewers Comment:

"The most advanced program I've tried ... Graphics are extraordinary ... This program should be your first consideration..."  
Gordon West WB6NOA, Worldradio Nov. '89

"Do I recommend the QSO Tutor? Heartily, yes! It really motivated me and it's a great way to test my progress. The learning is a natural by-product of the fun I am having."  
Jim Bail KA1TGA, 73 Magazine Review Jan '90

Now Available - Similar  
Commercial Radiotelephone license  
Tutor. \$39.95. Commercial Radar  
endorsement \$29.95.



Public Domain disk also  
available. Contains excellent  
morse code tutor as well as  
other Ham Radio programs.  
Cost is \$3 to cover materials  
and handling, \$2 if shipped  
with QSO TUTOR.

Call or write to order:

QSO Software  
208 Partridge Way  
Kennett Square, PA  
19348  
215-347-2109  
Voice or FAX

\$29.95\* per Class

Visa and MC accepted

\* PA residents add 6% Add \$2 each for IBM 3 1/2 disks

Ver 3.7

QSO Tutor

Copyright © 1988-1990 by WB3B

CIRCLE 48 ON READER SERVICE CARD

## Perfect Holiday Gift for all your Ham friends



Just in time  
for the Holiday  
Gift-Giving  
Season . . .

## 1991 Ham Photo Calendar

Great for the Shack or Office. Lists contest dates, Code Practice, Meteor Showers, Moon Phases, Historic Dates in Radio and Amateur Radio, Major Ham Conventions, Legal and Popular Holidays. Includes Zone Maps, Prefix/Zone Multiplier lists, Oblasts, VHF Grid locator, US Ham bands and privileges 160m to 23 cm. 11" x 18" when open, spiral bound to lay flat. Twelve full color 8" x 10" photos.

Be sure to order extras for those  
"last minute" gifts

Order your 1991 calendars now! For delivery to U.S., Canada, Mexico send \$11.95 each (\$10.90 each for 2 or more) and add \$2.00 for mailing and handling for each ship-to address. For overseas (DX) delivery, send \$16.00 each (\$15.00 when ordering 2 or more) sent to one address, air shipping included. For gifts, specify desired holiday greeting.

KB1T Radio Specialties  
Box 1015-C, Amherst, NH 03031

**Traxit** CENTRO DE VENTAS  
AUTORIZADO  
**YAESU U.S.A.**  
LIDER MUNDIAL EN  
RADIOCOMUNICACION  
HF VHF UHF

DISTRIBUIDORES AUTORIZADOS DE:  
**Yaesu • Astron • Cushcraft  
Connect Systems • Larsen**  
MAYOREO Y MENUDEO  
Embarcamos a cualquier lugar del mundo

INDUSTRIAL, COMERCIAL, PRIVADO,  
RADIOAFICION GARANTIA DE FABRICA!

Traxit, Inc.

707 West Pecan Blvd. • McAllen, TX 78501

Tels: (512) 682-6559/682-0844

FAX: (512) 682-1658

EN MEXICO

Av. del Bosque 6144-A

Col. Bugambillas • Puebla, Pue., Mexico

Tels: (22)445193/459180/459201

FAX: (22)445691 TOLL FREE: 95-800-0100475

CIRCLE 76 ON READER SERVICE CARD

Say You Saw It In CQ

## GAP Airwaves expands its Service to include 2m and 6m with the CHALLENGER DX-V & DX-VI

Unique Multiband Antennas that Utilize the Patented  
GAP Elevated Launch Technology

The Revolution in Antenna Design

That . . .

- Launches RF from an elevated GAP
- Eliminates earth loss
- Comes pre-tuned,  
No adjustments necessary
- Uses 3 short radials @ 25 feet
- Assembles in less than  
30 minutes
- Is self supporting w/drop in  
ground mount and is 31 feet high

but has **NO!!!**

- Traps
- Coils
- Transformers
- Baluns
- Resistors
- or Base Insulators

**Challenger DX-V \$199\***

Total bandwidth on  
40, 20, 15, 10, 6, 2 meters  
80 KHz on 80 meters

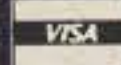
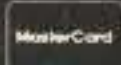
**Challenger DX-VI \$219\***

Total bandwidth on  
40, 20, 15, 12, 10, 6, 2 meters  
130 KHz on 80 meters

Best of all the **ENTIRE** antenna is always active!!

To Order Call—(407) 778-3728

\*Plus shipping and handling  
Florida residents add 6% tax



**GAP**  
ANTENNA PRODUCTS  
6010—Bldg J  
N. Old Dixie Highway  
Vero Beach FL 32967

CIRCLE 30 ON READER SERVICE CARD

# KENWOOD

# ICOM

# YAESU

1-800-231-3057  
713-729-7300

## MADISON Electronics Supply

FAMILY OWNED SINCE 1956

12310 ZAVALLA STREET  
HOUSTON, TEXAS 77085



CIRCLE 61 ON READER SERVICE CARD

## Enjoy NEVER CLIMBING YOUR TOWER AGAIN

Are you too scared or too old to climb? Never climb again with this tower and elevator tram system. Voyager towers are 13 and 18 inch triangular structures stackable to any height in 7 1/2', 8 3/4' or 10' section lengths. Easy to install hinge base, walk up erection. Next plumb tower with leveling bolts in base. Mount rotor and large heavy beams on Hazer tram and with one hand winch to top of tower for normal operating position. Safety lock system operates while raising or lowering. At last a cheap, convenient and safe way to install and maintain your beam. This is a deluxe tower system that you can enjoy today.

**SPECIAL TOWER PACKAGE:** 50 ft. high by 18" face tower kit, concrete footing section, hinged base, HAZER kit, Phillystran guy wires, turnbuckles, earth screw anchors, 10' mast, thrust bearing, tool kit, ground rod and clamp, rated at 15 sq. ft. antenna load @ 100 MPH. **\$1974.95.**

50' by 13" wide tower, same pkg as above	\$1670.95
HAZER 2 for Rohm 25-hvy duty alum 12 sq ft wind ld	324.95
HAZER 3 for Rohm 25-std alum 8 sq ft wind load	232.95
HAZER 4 for Rohm 25-hvy galv stl 16 sq ft wind ld	303.95
TB-25 Ball thrust bearing, 2 1/2" max mast dia	74.95
NEW HAZER VH-8 Transit System for Rohm 45, 22 sq ft wind load	860.00
NEW HAZER VH-9 Transit System for Rohm 55, 22 sq ft wind load	895.00

Satisfaction guaranteed. Call today and order by Visa, M/C or mail check. immediate delivery.

Glen Martin Engineering, Inc.  
Dept. C  
RR 3, Box 322,  
Boonville, MO 65233  
816-882-2734  
FAX: 816-882-7200



CIRCLE 54 ON READER SERVICE CARD

**AMP REPAIR CENTER:** Quality repair, 90 day warranty. OMEGA ELECTRONICS, 4209 Live Oak Road, Raleigh, NC 27604 (919-231-7373).

DRAKE R-4A with SSB Filters, T-4X with Power Supply. Excellent Condition. Asking \$400. W2LU, 716-872-1508.

**FM STEREO TRANSMITTER** kit including PC board and components. Transmitter is tunable from 88-108 MHz to transmit audio from your disc player, VCR, TV, or any line level source to any FM radio throughout your home, yard, or car. Send \$24.00 to WJD Electronics, RD #2 Box 80A, Middleburg, PA 17842-9572.

**CERTIFICATE** for your very **FIRST QSO**. Send date and call sign of station contacted. \$4.00. First Award, 1335 N. Harbison Ave., Indianapolis, IN 46219.

**"TEN-TEC":** Best Price. Call For Quote!! OMEGA ELECTRONICS, 800-782-1530.

**MANUALS AVAILABLE:** For all SWAN, CUBIC COMMUNICATIONS, and SILTRONIX equipment. Send your request to: Brock Publications, P.O.B. 5004, Oceanside, CA 92054, phone 619-757-0372.

**ROSS'\$\$\$\$ USED January (ONLY) SPECIALS:** KENWOOD TS-830S \$879.90, TS-930S \$1150.00, TV-506 \$209.90, MC-60A \$89.90, TH-45A \$219.90, BC-10 \$35.90, SM-220, BS-8 \$439.90. ICOM IC-R70 \$495.90, IC-R71A, EX-257, FL-32A, 30, 70 \$799.90, IC-471A \$589.90, RC-10 \$35.00, AT-500 as is \$249.90, SP-20 \$99.90. DRAKE MN-2700 and balun \$349.90. MFJ 989B \$219.90, 984 \$219.90. ATLAS 220-CS Power Supply \$129.90. **LOOKING FOR SOMETHING NOT LISTED?? CALL OR SEND SASE. HAVE OVER 190 USED ITEMS in stock. MENTION AD.** Prices cash, FOB Preston. Hours Tuesday-Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

**JOIN GROUP 05/91.** Ham expedition operating in Soviet Ukraine. Help with your Soviet license, lodging, equipment, travel, etc. KK4WW and UB5WE. Audio tape by UB5WE all about Soviet hams, DXing, QSLing, equipment, history, regulations, and much more. Very informative, \$9.97 to Victor Gorchavsky, UB5WE, P.O. Box 1, Blacksburg, VA 24063-0001.

**WANTED:** Will pay premium for 2 copies of Don Miller's "Amateur Radio DX Handbook." Duncan, Box 81466, San Diego, CA 92138.

**HEATHKIT AMATEUR RADIO EQUIPMENT** reconditioned, aligned, and calibrated. RTO Electronics, 4166 Maple Street, Berrien Springs, MI 49103 (phone 616-473-3201).

**"TUBES"** New **3-500Z** \$98 ea. two or more. New **572B** \$65 ea. two or more. OMEGA ELECTRONICS, 800-782-1530.

**RADIO OPERATOR'S LOGBOOK** Computer program. Used throughout the world. \$25 to Alan Weinberg, 1769 S. Citation, Tucson, AZ 85713.

**HAM RADIO REPAIR!** All makes, Surplus, Homebrew, Amplifiers. Telo Technology, 1305 Uplands, Camano Island, Washington 98292 (206-387-3558).

**ROSS'\$\$\$\$ NEW January (ONLY) SPECIALS:** J.S.C. RG-213 500 ft. \$150.00. KENWOOD TM-241A \$394.90, TR-8400 \$349.99, TS-440S, WAT \$1209.90, TM-631A \$629.90, TS-711A \$889.90, TS-940S/WAT \$2055.00, VFO-700S \$149.90, RM-76 \$34.90, MB-4000 \$11.00, TH-41AT \$209.90. ICOM IC-228A \$369.90, IC-229H \$409.90, IC-2400A \$683.90, IC-725 \$770.90, IC-2SAT \$317.50, IC-751A \$1449.90, IC-3200A \$459.99. YAESU FT-1000D \$3559.00, FT-411E \$329.90, FT-470 \$399.90, FV-101DM \$229.90, SC1 \$145.99, FT-757GXII \$1019.90. HEATHKIT HW-24-HT \$349.99, SB-1000 \$679.90, HW-24-T \$424.90. CUSHCRAFT ARX-2B \$41.90, AR-270 \$54.50, AP-8 \$169.90, A147-11 \$54.90. **SEND SASE FOR USED LIST. All L.T.O. (Limited Time Offer). LOOKING FOR SOMETHING NOT LISTED?? CALL OR WRITE.** Over 9039 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. Preston. Hours Tuesday-Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

**S.O.S.** I am a refugee in Sweden and I was a radio amateur. This hobby is my everything. I need your unwanted equipment, parts, books, etc. Please help. Nebil Charchafche, Allinga Vagen 7B:408, 22234 Lund, Sweden.

**MINT HEATH SB-221 2 kW HF amplifier, 15-80 meters, \$599.** Mint Collins 30L1 kW amplifier, 10-80 meters, \$550. Palomar Tuner-Tuner, \$75. Collins 516F2 power supply for "S-Line," \$175. Ten-Tec 229B antenna tuner, covers 160-10 meters, 2 kW, \$250. Dentron GLA-1000B HF amplifier, 1 kW, \$325. Add shipping to all items. K3UKW, Tony Musero, 215-271-8898.

**COLLINS NEW TUBE SETS:** KWM2 \$95 less finals, 75S3 \$65, 32S3 \$60 less finals, 75A4 \$85. Bob, WE2T, 716-334-1103.

**FOR SALE:** Kenwood TS-930S/AT. Excellent Condition. W1WRN Callbook or 203-423-2285. You Pay Shipping.

**WANTED:** Schematic and service manual for Hickok Model 288AX signal generator. \$? W6HNI, P.O. Box 1017, Carpinteria, CA 93014.

SBE-34 Mike \$8, SB2-CW Code Adapter \$35, Precision E-200 IG-GEN 90-240 MHz \$50. Other Items. K6KZT, 805-528-3181.

MIRAGE MP-1 (HF), MP-2 (VHF) SWR/Wattmeter, \$50 ea. MFJ-486 Grandmaster w/remote, AC, \$80. Daiwa CN520 SWR, \$30. W4FA, 302 Glasgow, Greenville, NC 27858.

Buy: Amateur Radio Equipment, good/bad. For large list/\$1 and SASE. Joe Bedlovies, 239 Dover Street, Bridgeport, CT 06610.

**FOR SALE OR TRADE.** CQ/HR/QST/73 magazines. SASE or call 508-947-4444. KA1VY, E. Guimares, 401 Bedford St., Lakeville, MA 02347.

**WANTED:** YAESU TC-2 and TC-6 2/6 M converters and YAESU SP-101PB Speaker. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

**SELL** BC-221 freq. meter w/calib. book, \$25 + shipping. K8CSG, CB address.

**HEATHKIT** model H-89A computer, 5 1/4 inch drives, RAM, 12 inch amber monitor, disks, many CPM and HDOS programs. W0KJV, P.O. Box 7349, Huntington Beach, CA 92615.

**HAL PCI-2000 RTTY/CW/ASCII card** for PC. With software and manual, \$100. IRL FSK-500 with loop supply, \$50. U Ship. Bill, K8TBW, 419-435-4127.

**WANTED:** Wiring diagrams for Eico 1032 adjustable power supply and Eico 3770 stereo receiver. W4NZY, 119 North Birchwood Ave., Louisville, KY 40206-1521.

**WANTED:** Any operational military radio equipment with accessories. Send list and info to EJW, P.O. Box 63, Fords, NJ 08863.

**FOR SALE:** AEA CPI \$50; Palomar RX Noise Bridge \$50; Kenwood TS-530S, mint, \$575. L. Basham, W7TCT, 563 W. River St., Cave Junction, OR 97523.

**WANTED:** Schematic for ICOM-726. Rick Thompson, 2079 111th Lane, Coon Rapids, MN 55433-3604.

**FOR SALE:** R/S DX300 SW Receiver, \$125. Xerox 16/8 CPM computer with 10 megs HD, \$350, or good HF Transceiver. P.O. Box 518, Whitehouse, FL 32220.

**WANTED:** Kenwood DM-81 Dipmeter, Datong ANF, Bird 100c, 250A, PEP Kit, ICOM IC-765, Bearcat 590XLT. K0MK, 4912 Vermillion, Gilbert, MN 55741.

**WANTED:** KDK FM-50 rig for 6 meter FM, any condition. Call 606-236-6510. WQ4Z, George Griebel, 650 Chestnut Grove, Parksville, KY 40464-9624.

**WANTED:** Schematic (manual) and coil sets for Unelco Electronics Corp., Baltimore, Md., Model 1914 solid-state short-wave radio, .54-31.5 MHz. Alvin Bernard, NI4Q, P.O. Box 690098, Orlando, FL 32819 (407-351-5536).

**SELL ATV SYSTEM.** PC Electronics TX-70-1 70 cm transmitter, TVC-4G 70 cm downconverter, TVC-12G 23 cm downconverter, Mirage D15N amp, \$425. Will ship UPS COD. John, KG6XT, 818-889-4677.

**WANTED:** Viewmaster Focusing Viewer No. 2011, 24 inch close-up lens for Viewmaster camera. V. Ouzoonian, 1565 E. Highland Ave., Redlands, CA 92374.

**WANTED:** Sub-miniature Cameras, any make or model. V. Ouzoonian, 1565 E. Highland Ave., Redlands, CA 92374.

**FOR SALE:** Memory keyer with power supply, "MIMIC" 4 memorys, all bells and whistles, factory wired, with manual, \$40. Bencher paddle, black base, \$40. Both for \$75. Contact Art, K1VKO, 203-853-0587.

**HEATHKIT HG-10B VFO,** excellent, \$45 plus UPS. KD2HW, 101-23 Lefferts, Jamaica, NY 11419.

**TELEGRAPH EQUIPMENT WANTED.** Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550-1851.

**FOR SALE:** Like new, Kenwood AT-250 Automatic Tuner, \$275. New MFJ 949 D 300W Tuner, with cross-needle SWR/wattmeter, dummy load, in warranty, \$140. Courier Model 500 Port-A-Lab Tester, \$75. Teconic 900A/5D 2M Sweep Gen., 200-400 MHz, \$150. HP 650 A Test Oscillator, \$50. HP 500 A Audio Generator, \$50. Navy Model LAF-3 RF Sig. Gen., \$50. Eico Model 425 Scope, \$300. Bruce, 750 N. Garden, Fresno, CA 93727 (209-255-8967).

**COLLINS NEW TUBE SETS** for KWM2 \$95 less finals, 75S3 \$65, 32S3 \$60 less finals, 75A4 \$85. Bob, WE2T, 716-334-1103.

**WANTED:** SHACKMASTER SM-100. Alex, KD2KI, 212-684-1148.

# COMPUTERIZE YOUR SHACK

Control up to eight digital radios simultaneously from your MS-DOS microcomputer! We offer a series of software/hardware packages that interface with most current synthesized rigs.

**ICOM:** IC-781, 765, 761, 751A, 735, 725, 726, 745 R71A, R7000, R9000, 271, 471, 1271, 275, 375 475, 575, CI-V

**KENWOOD:** TS-940, 440, 140, R-5000, 680, 711, 811

**YAESU:** FT-767, 757 GXII, 757 GX, 747, 9600, 736 212, 712

**JRC:** NRD 525

**COLLINS:** 651 S1

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

### A few of its many features:

- Adds sweep and scan to radios that don't allow this from front panel.
- Adds unlimited memories. Stores frequency, description call sign, sked time, and comments for each frequency, limited only by disk storage.
- Allows radio to be tuned from keyboard by use of arrow keys.
- Tabular screen display of all of the channels stored in memory, along with a full description of each including: MODE (LSB, USB, FM, etc.), eight character alphanumeric description, call sign, sked time, comments. Data files may be sorted by frequency, description, call sign, time, etc.
- Now with mouse control
- Built-in latitude/longitude calculator with database
- Pre-Program multiple schedules—sets frequency and mode at a given time and date.



- Full featured logging utility allows searching for previous entries by call sign. Separate log for each service.
- Able to automatically log hits while sweeping or scanning.
- Color coded program for easy use (will run on a monochrome system).
- Menus for amateur, AM-FM broadcast, television broadcast, S/W, aviation, marine, FAX, satellite with most popular frequencies stored. Menu maker utility allows custom menus defined by user.
- 50 page comprehensive user manual.
- Optional radio direction finder allows bearing information to be logged automatically.

*Call or Write today for more information.*

AVAILABLE FOR IBM PC,XT,AT, 80386 256K RAM 1 SERIAL PORT AND 1 FLOPPY MINIMUM

PROGRAM WITH INITIAL LIBRARIES.....129.95

RS-232 TO TTL INTERFACE (NEEDED IF DON'T HAVE MFRS INTERFACE)

EXT. INTERFACE ALLOWS 4 RADIOS (WITH SQUELCH DETECT)129.95

INTERNAL PC INTERFACE W/1 SERIAL & 1 RADIO PORT.....129.95

may be addressed as com1, com2, com3, com4 includes cables to radio

SPECTRUM ANALYZER MODULE.....(CALL FOR PRICE)

DIAGNOSTIC PROGRAM.....25.00

COMSET ALLOWS OPERATION ON COM3 AND COM4.....25.00

PROG. FOR UNIVERSAL M-7000, AEA PK232, KANTRONICS KAM

DIGITAL VOICE RECORDER OPTION!

ICOM UX-14 INTERFACES IN STOCK

COMPLETE SYSTEMS (RADIOS, INTERFACE, & COMPUTERS)..(CALL)

NEW! TSR COMMANDER, SETS FREQUENCY, MODE, ETC. POP-UPS

OVER ANY OTHER APPLICATION.....\$50.00

30 MINUTE VIDEO TAPE GUIDE TO SETUP AND OPERATION....19.95

CURRENT MENU		----- MAIN MENU -----		VERSION 9.1	
MEM 394 K	STACK 1 K	SELECT FUNCTION	MODE= USB	LOCAL : 16:54:00	
DATE: 10-24-1989				U.T.C.: 20:54:00	
1. READ MEMORY CHANNELS		7. MEMORY CHANNEL	DIAL		
2. INPUT DESIRED FREQUENCY		8. WRITE MEMORY TO VFO	VFO A		
3. 500 KHZ. UP		9. UTILITY MENU			
4. 500 KHZ DOWN		ALT-P. CHANGE MENU PAGE			
5. ACTIVATE/DEACTIVATE CLARIFIER		ALT-Z. DISPLAY OR PRINT LOG			
6. SWEEP BETWEEN 2 LIMITS		ALT-Q. END			
A. AVIATION (VHF) COMMUNICATION		D. F.M. BROADCASTING			
B. TELEVISION BROADCASTING		E. AMATEUR FREQUENCIES (VHF)			
C. COASTAL MARINE FREQUENCIES		F. MISCELLANEOUS FREQUENCIES (VHF)			
PORT= COM2	BAUD= 9600	CURRENT PARAMETERS		RDLY= 0.138	
UPPER - BAND LIMIT - LOWER		FREQUENCY	MODE	FILTER	SQ. ACTIV. ADDR
30.000 MHZ	0.100 MHZ	17.44300 MHZ.	USB	WIDE	38

- icom 781 MF/HF TRANSCEIVER -  
F1 781 F2 R9000 F3 R9000 F4 R9000 F5XCH A/BF6 VFOA F7 VFOB

**UPDATE ANY PREVIOUS DATACOM TO NEW DATACOM V For \$50.**

Order direct or from Universal Radio 800-431-3939, Gilfer Shortwave 800-GILFER-1

**CALL FOR COMPETITIVE ICOM PRICING**



IC-R9000



IC-R7000



IC-R71

**NEW!** IC-R72

And All Your Other ICOM Favorites



Authorized Dealer  
JST-135 Transceiver  
NRD-525 General Coverage Receiver

**DATACOM, INT.**

7678 Venetian St., Miramar, FL 33023

Orders: (800) 780-9505 • Info: (305) 987-9505

# Finally. . .the amplifier every amateur has always wanted



## ...the 3K-ULTRA

**We are satisfied that this is the finest HF linear amplifier we have ever offered. The 3K Ultra represents a vision and a resolve taken years ago to provide amateurs with the finest amplifier that we could possibly build. It is every amateur's dream.**

- ★ All amateur bands 1.8 to 24 MHz (Export models to 28MHz)
- ★ Remote control
- ★ All modes. . .SSB, CW, AM, FM, Amtor
- ★ Full legal power
- ★ Unique, high reliability design
- ★ Export commercial and MARS models available at higher power levels.

It is rugged, reliable, remotely tuned and offers full power and efficiency on all bands between 1.8 and 24 MHz. Frequencies above 24 MHz are available on export models. The amplifier offers 6 memory channels for automatic tuning on your choice of frequencies. A small, light-weight, remote control cabinet sits at the operating position, while the amplifier itself can be across the room, in a closet, or in the next room. We manufacture many other HF, VHF, and UHF amplifiers, all still available as before. All domestic and foreign inquiries are invited. Write for full specifications on the 3K Ultra or for our complete amplifier information packet. Don't wait any longer to own the amplifier you have always wanted.



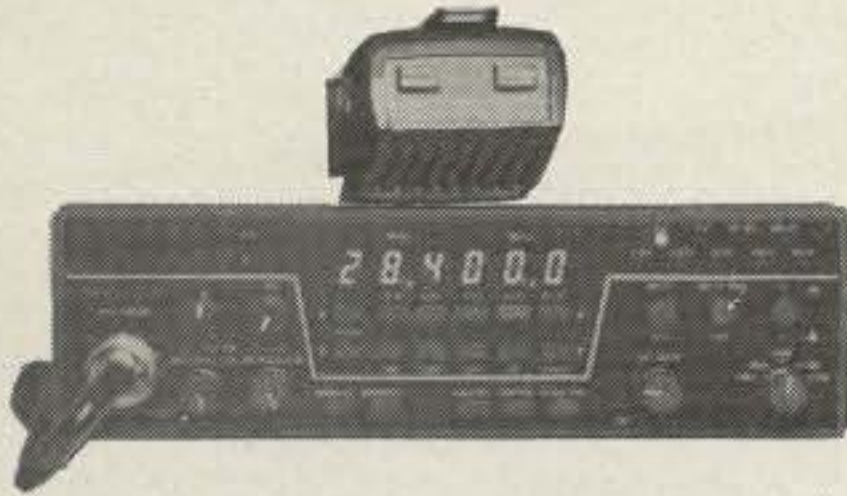
## Henry Radio

2050 S. BUNDY DR. LOS ANGELES, CA 90025 (213) 820-1234  
Toll free order number: (800) 877-7979 TELEX: 67-3625(Henradio) FAX(213)826-7790

CIRCLE 51 ON READER SERVICE CARD

# 10 METER DX IS HOT!

AND YOU CAN WORK IT WITH  
THE NEW RANGER AR 3500



- Compact Mobile Transceiver
- Microprocessor Controlled Design
- All Mode SSB/CW/AM/FM
- Effective Noise Blanker
- Five Selectable Memory Channels
- Programmable Band Scan
- Large Six Digit Frequency Readout
- Split Frequency Repeater Operation
- Dynamic Mic & Power Cable
- Mic with Frequency Scanning Buttons (optional)
- Limited 1 Year Factory Warranty by Clear Channel Inc. Issaquah, WA

### SPECIFICATIONS

**Frequency:** Range 28.0000-29.9999 MHz. in 100 Hz steps.  
**Sens.:** SSB/CW 0.3 µV, FM 0.5 µV.  
**Power:** SSB 25W PEP, 30W, CW, 8W FM  
**Input:** 12.5 V, 6A DC  
**Dimensions:** 2.4"x7.7"x11" Wt: 3 Lbs.

We made a special purchase of these fine transceivers and thus able to offer them at a very attractive price

**Special!**  
**\$319.95**

### AVAILABLE OPTIONS

- 100 Watt model .....\$399.95
- Mic w/Freq. Scan. Buttons ..... 45.00
- SP-1 Speech Processor\* ..... 45.00
- CW Auto break-in & pwr control\* ..... 45.00
- Service Manual AR3300/AR3500 ..... 20.00
- 3 Element Beam, 26-30 MHz ..... 99.95
- Penetrator Mobile Ant. .... 47.95
- Antron A-99 Vertical Base Ant. .... 49.95
- RS7A Pwr Supply for 30W Ranger .... 49.95
- RS35A Pwr Supply for 100W Ranger .. 134.95

\*sale price with radio purchase only  
 Offer limited to available stock  
 Send a SASE for detailed brochure

Quantity Pricing Available Foreign Orders Accepted  
 Orders received by 1 PM PST shipped UPS same day.  
 COD / VISA / MC Next day UPS delivery available  
 No extra charge for C.O.D. or VISA Mastercard Orders

ORDER DESK ONLY — NO TECHNICAL  
**(800) 854-1927**

ORDER LINE and/or TECH HELP  
**(619) 744-0728**

FAX (619) 744-1943

## Advertiser's Index

AEA/Adv. Elec. Applications.....	5, 44, 45
ARRL.....	64
AVC Innovations.....	42
Ace Communications.....	31
Advanced Computer Control.....	90
Alinco Electronics.....	6, 7
Alpha Delta.....	114
Amateur Electronic Supply.....	15
Amateur Wholesale Electronics.....	111
Ameritron.....	21
Antennas West.....	116, 119, 123
Antique Radio Classified.....	111
Artsci Publications.....	100
Ashton Inc.....	94
Associated Radio.....	70, 102
Astron Corp.....	110
Austin Amateur Radio Supply.....	61
Austin Custom Antennas.....	114
Azimuth Weather Star Comm.....	111
Barker & Williamson.....	38
Barry Electronics.....	87
Beezley, Brian, K6STI.....	102, 124
Bencher, Inc.....	64
Bilal Co./Isotron Ants.....	101
Brainstorm Engineering.....	123
Brinson Microwave Corp.....	102
Buckmaster Publishing.....	70, 116, 118, 124
Burghardt Amateur Center.....	19
CATS.....	70
CB City International.....	42
CQ Bookshop.....	80, 81
CRB Research.....	53
C & S Sales.....	86
Charlotte Hamfest.....	95
Cleveland Institute of Electronics.....	84
Colorado Comm. Center.....	101
CommPute, Inc.....	124
Communications Concepts Inc.....	90
Communications Electronics Inc.....	79
CompuServ.....	91
Cushcraft Antennas.....	8
Custom Clocks by Mike Traffie.....	125
DX Engineering.....	97
Dahl Co., Peter.....	97
Datacom International.....	31, 127
Dayton Hamvention.....	39
Digitech Concepts.....	123
Doc's Communications.....	57
Down East Microwave.....	105
EDCO/DAIWA.....	65
Electronic Engineering.....	124
Electronic Equipment Bank.....	71
Electron Processing.....	49
Engineering Consulting.....	30
G4ZPY Paddle Keys.....	124
G.A.P. Antenna Products.....	125
GRE America.....	42
Garant Enterprises.....	58
Gem Quad Products.....	116
Genwest Engineering.....	119
Grapevine Group, The.....	120
H & M Jewelry.....	120
Ham Radio Outlet.....	10
Hamtronics, Inc.....	23, 123
Henry Radio.....	128
ICOM America, Inc.....	66, 67, Cov. IV
J Com.....	119
JPS Communications Inc.....	93
Jan Crystals.....	23
Jun's Electronics.....	53
K2AW's "Silicon Alley".....	124
KB1T Radio Specialties.....	125
Kantronics.....	130
Kenwood, USA.....	Cov. II, 1, 2, 121
Lakeview Co.....	78
LaRue Electronics.....	16

(Continued on page 131)

# RF POWER TRANSISTORS

We stock a full line of  
Motorola & Toshiba parts  
for amateur, marine, and  
business radio servicing

SEE YOU AT THE  
MIAMI & ORLANDO  
HAMFEST

### Partial Listing of Popular Transistors in Stock

BFR96	\$ 2.75	MRF644	\$23.00	2SC2289	\$15.15
CD2664A	24.00	MRF646	26.00	2SC2290	14.75
Set/4 Matched	110.00	MRF648	31.00	2SC2290MP	39.50
ECG340	3.40	MRF660	14.00	2SC2312C	5.40
MRF134	16.00	MRF846	44.00	2SC2379	31.25
MRF136	21.00	MRF1946	15.00	2SC2509	10.85
MRF137	24.00	PT6619	19.75	2SC2509MP	24.60
MRF138	35.00	PT9847	22.75	2SC2539	19.75
MRF150	68.75	RF120	21.90	2SC2559	35.25
MRF171	34.50	SD1229	12.00	2SC2630	24.25
MRF172	58.75	SD1272	12.00	2SC2640	17.00
MRF174	80.00	SD1278-1	15.75	2SC2641	17.70
MRF207	4.75	SD1407	29.90	2SC2642	28.25
MRF208	18.95	SD1428	34.00	2SC2694	46.75
MRF212	20.40	SD1429-3	37.70	2SC2695	31.75
MRF224	17.75	SRF2072	12.75	2SC2782	37.75
MRF237	3.70	SRF3662	28.50	2SC2783	59.85
MRF238	16.00	SRF3775	14.75	2SC2879	21.90
MRF239	17.00	SRF3800	17.50	2SC2879 MP	49.50
MRF240/A	17.75	2N1522	11.95	2SC2904	32.50
MRF245	32.00	2N3553	3.00	2SC2905	34.50
MRF247	24.75	2N3771	3.50	2SC3101	12.25
MRF248	35.00	2N3866	1.25	40582	9.50
MRF261	14.50	2N4048	11.95	<b>LOW NOISE FIGURE</b>	
MRF262	13.00	2N4427	1.25	MGF1302	7.95
MRF264	14.00	2N5109	1.75	MGF1402	17.95
MRF309	79.75	2N5179	1.25	MRF901	1.50
MRF314	29.00	2N5589	19.95	MRF911 & 966	2.50
MRF317	68.50	2N5591	14.50	NE25137/2SK205	
MRF327	64.25	2N5641	17.90	NE41137/3SK124	3.50
MRF412	22.00	2N5642	18.90	U309 & U310	1.75
MRF421	24.00	2N5643	20.90	2N4416 & J310	1.50
MRF422	36.00	2N5944	12.00	3N204 & 3N211	3.00
MRF422MP	81.50	2N5945	12.00	<b>OUTPUT MODULES</b>	
MRF428	50.00	2N5946	15.00	(Partial listing only - call	
MRF429	39.00	2N6080	9.90	for numbers not listed)	
MRF433	12.75	2N6081	12.25	SAU4 440 LIN	49.50
MRF448	73.50	2N6082,3,4	14.75	SAV6 158	43.50
MRF450	13.50	2N6097	20.00	SAV7 144	45.50
MRF450A	14.25	2SB754	2.50	SAV12 144 HT	27.50
MRF453	16.00	2SC730	4.50	SAV15 222	59.75
MRF454	14.00	2SC1307	4.75	SAV17 144 50W	68.50
MRF454A	17.00	2SC1729	18.25	M57710A	38.70
MRF455	11.25	2SC1945	5.75	M57726 144	67.75
MRF455A	12.75	2SC1946/A	18.75	M47727 144	69.50
MRF458	20.00	2SC1947	9.75	M57729 440	69.95
MRF475	6.75	2SC1955	9.00	M57729H	72.95
MRF476	4.00	2SC1957	1.00	M57732L	35.70
MRF477	12.50	2SC1969	2.90	M57737 144	57.75
MRF479	15.00	2SC1971	4.80	M57741L/M/H	59.00
MRF485MP	23.75	2SC2028	1.95	M57745 LIN	94.95
MRF492	15.75	2SC2029	3.50	M57762 1296	76.60
MRF497	18.75	2SC2075	1.75	M57764 806	74.00
MRF515	3.00	2SC2094	21.80	M57788M	104.85
MRF555	3.50	2SC2097	29.00	M67742	109.85
MRF557	5.50	2SC2097MP	62.00	M67769 902 LIN	88.95
MRF559	2.25	2SC2099	29.50	MHW591	42.00
MRF607	2.50	2SC2166C	1.90	MHW592	44.75
MRF629	4.50	2SC2221	8.25	MHW710-1,2,3	63.00
MRF630	3.75	2SC2237	8.40	MHW820-1	83.00
MRF641	20.50	2SC2284A	24.75	MHW820-2	92.00

### TRANSMITTING TUBE SPECIALS

GE / PENTA / ECG		PENTA LABS		EIMAC	
6CA7	PL \$14.95	572B	* \$59.95	8874	\$349.50
6CL6	13.75	811A	12.95	8875	409.95
6GK6	ECG 13.95	813	36.80	8930 MIL	288.00
6HF5	*GE 17.95	833A	79.95	3CX800A7	329.95
6JB6	*GE 16.95	833C	89.95	3CX1200A7	459.95
6JS6C	*GE 19.95	5894	42.95	3CX1200D7	479.95
6KD6	*ECG 19.95	6146B	11.95	3CX1500A7	669.50
6LF6	*ECG 15.95	3-500Z	94.50	3CX3000A7	739.95
6LQ6	*GE 19.95	4CX250B	74.75	4CX250B	94.95
12BY7A	13.75	4CX300A	134.95	4CX350A	199.50
6550A	*PL 16.95	4CX350A	149.50	4X500A	399.95
8417	ECG 19.95	4CX1000A7	369.95	3-500Z	137.95
8950	*GE 20.75	4CX1500B	465.50	4-400C	159.95
M2057	*GE 24.95	4CX5000A	730.00		

Selected/Matched Tubes available where noted by (\*)

Sockets available for most Transmitting Tubes

Eimac & Penta tubes carry a one year Limited Warranty

Prices Subject To Change Without Notice

**MATCHED & SELECTED TUBE AND TRANSISTOR FINALS**

**IN STOCK FOR AMATEUR AND COMMERCIAL EQUIPMENT**

Orders received by 1 PM PST shipped UPS same day.

Next day UPS delivery available • We Export

No extra charge for C.O.D. (cash) or VISA/MC Orders

Ship/Hand. 1 lb. U.S. or Foreign Sm Pkt Air 10 oz. \$5.50

Min. Order \$20 Send S.A.S.E. for Catalog Quantity Pricing Avail.

ORDERS ONLY > (800) 854-1927 < NO TECHNICAL

ORDER LINE • INFORMATION • TECH HELP

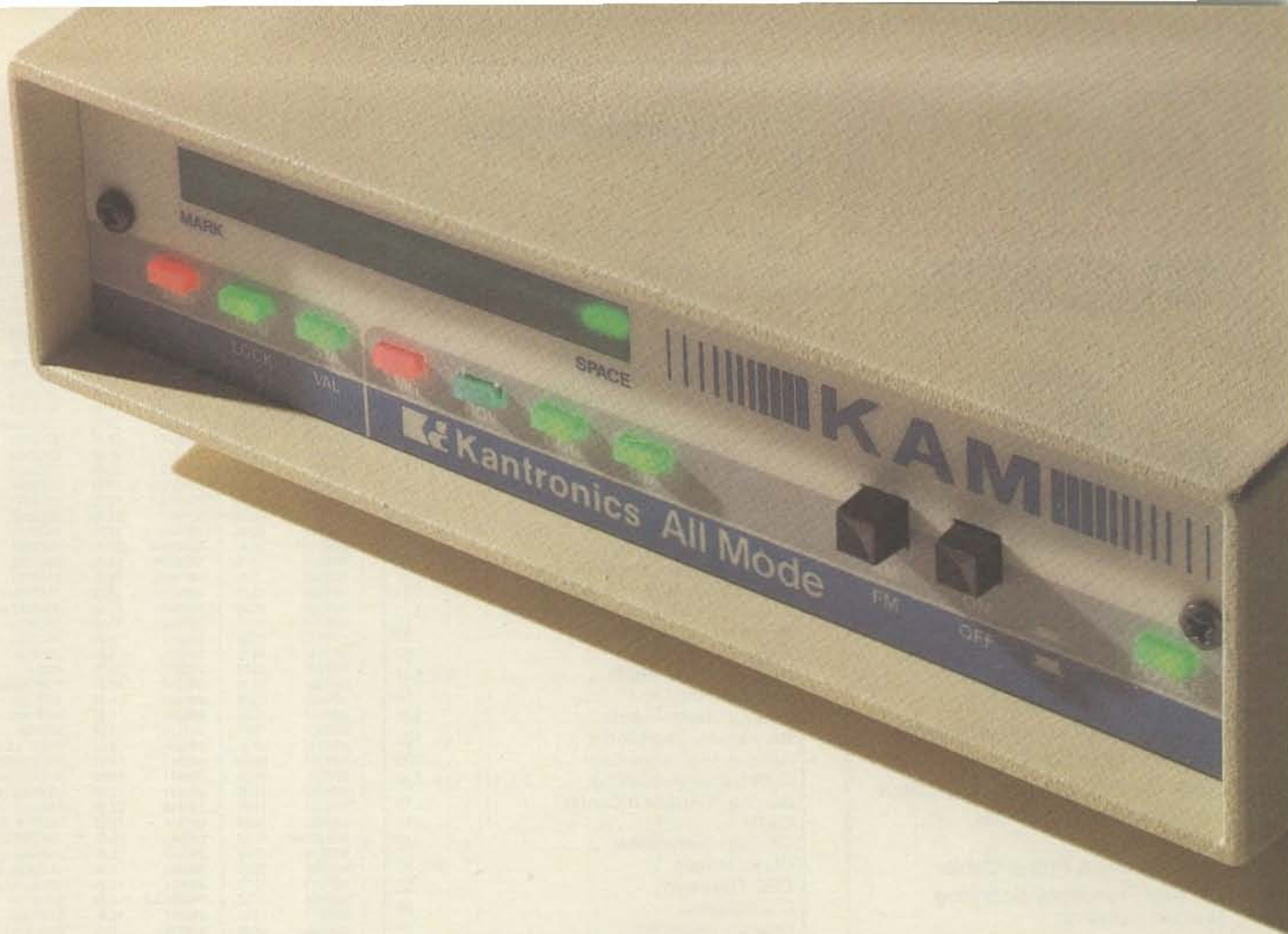
**(619) 744-0700**

FAX 619-744-1943



**RF PARTS  
COMPANY**

1320 Grand San Marcos  
California 92069



## KantronicsKAM

If you're looking for a flexible all-mode, if you're looking for a TNC to operate both HF and VHF digital modes, if you'd like one unit to operate RTTY, AMTOR, WEFAX, CW and Packet on HF, yet be keystroke switchable to VHF for packet, then you've found it, the Kantronics All Mode (KAM). Just ask a user!

It's the most flexible and evolutionary all-mode on the market! Since its first appearance in 1986, we've generated four major firmware upgrades, adding new capabilities each time. With release 3.0, in August of 1990, we added software carrier detect for squelch-free operation, reverse personal bulletin board forwarding, the new AMTOR 625, NAVTEX/AMTEX, a command to restore parameters and more!

And the KAM is tops in flexibility. The HF demodulator is user programmable, allowing keystroke selection of tone pairs. You can select any of the standard shifts (170, 425 or 850 Hertz - handy for MARS ops!) or you can set the MARK SPACE tones to any desired value within the unit's range, in one Hertz steps! You can program baud rate too, allowing for the operation or listening to off-rate baudot or other HF digital transmissions.

On CW we stand head-and-shoulders above the rest. You can program CW-filter bandwidth and center frequency to match receiver needs. If your HF rig doesn't have a CW filter, you can 'close it down' by decreasing the KAM's CW filter bandwidth! Better yet, you can match the KAM's CW demodulator filter to your particular receiver CW filter.

On packet you can operate on both HF and VHF simultaneously, enabling a host of new possible modes of operation. For example, you could have a QSO on HF packet while

leaving your VHF channel available for mail or connect. Or, you could set your station up as a gateway, allowing other stations to digipeat from VHF to HF or vice-versa. Or, you could have an RTTY QSO while leaving your VHF packet mailbox active. And more, with firmware update 3.0, your personal packet mailbox (PBBS) is enabled to allow reverse forwarding of messages to a larger BBS, such as RLI. And on and on!

And the unit is PC or C-64 friendly: an internal jumper allows TTL or RS-232 serial port operation without the additional need for a TTL/RS-232 adaptor for the C-64 serial port, saving you money.

The three-manual set is outstanding too, consisting of installation, operation and commands. All are indexed and cross referenced to each other for quick access to related information. The Operation's Manual contains information for beginners too.

Specs: size 1-3/4" by 6" by 9", weight 2-1/2 lbs, power requirements nominally 12 VDC at 300 ma. Input sensitivity 20 mvpp (FM), 100 mvpp (AM). Audio drive jumper selectable from 100 mv to 1.6 vpp.

Options: a 2400 baud QPSK modem for VHF/UHF operation, an MSK modem for advanced HF use, and a battery backup or SmartWatch for preserving mailbox contents/time during a power interruption.

Modes: CW, RTTY, ASCII, ARQ, FEC, WEFAX, AMTOR-625, NAVTEX/AMTEX and PACKET.

So there you have it, the flexible and evolutionary all-mode. For a detailed specification sheet contact Kantronics. The KAM, the all-mode that evolves with the state-of-the-art.



# TUNER-TUNER™



- Tune your tuner without transmitting.
- Save those finals!
- Operate easier, faster.

**Do you use an antenna tuner?** Then you need the new Palomar Tuner-Tuner to tune up your tuner without turning on your transmitter. The Tuner-Tuner connects between your tuner and your rig.

### Here's how it works:

1. Turn on the Tuner-Tuner. You'll hear a loud S9+ noise.
2. Tune your tuner until the noise drops out completely.
3. Turn off the Tuner-Tuner.
4. Start transmitting. SWR will be 1:1.

**What could be simpler?** You can tune up while listening to the other station call CQ. No need to move off frequency to tune up. No need to cause interference while tuning. No need to operate your rig into anything but 1:1 SWR.

### Users say:

"My new PT-340 Tuner-Tuner is **fabulous!**"—W9DXP (Illinois)

"The Tuner-Tuner is really a nice piece of equipment. It does everything you said it would do. FB OM."—K5JDF (Texas)

"This is a record as far as speed in deliveries go, and I have been extremely happy with the Tuner-Tuner's performance."—9V1XH (Singapore)

"I have to make a comment on your Tuner-Tuner - one word only - **FANTASTIC.**"—W3IOT (Pennsylvania)

**Order yours today!** If you use a tuner you need a Tuner-Tuner.



**Model PT-340 Tuner-Tuner** only **\$99.95** + \$4 shipping in U.S. & Canada. Calif. residents add sales tax. **FREE** catalog on request.

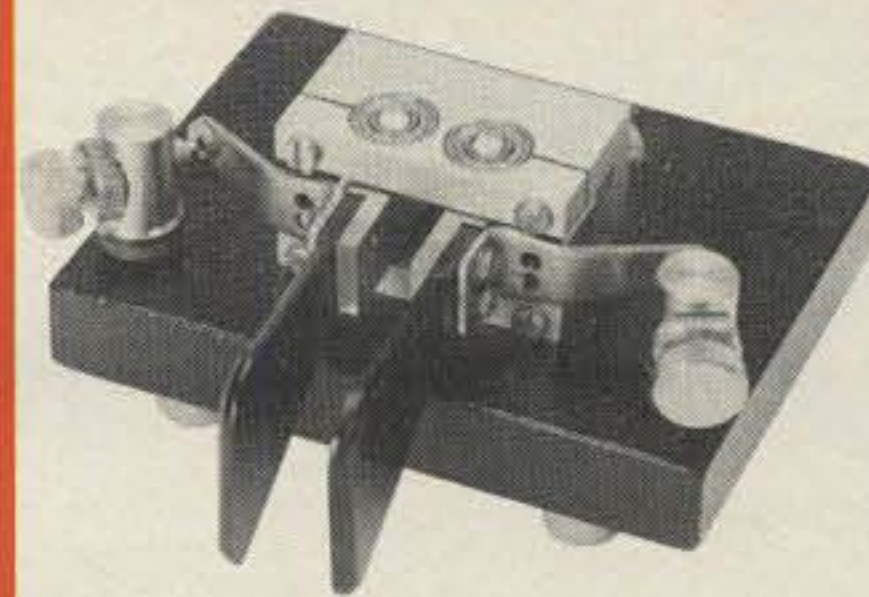
**PALOMAR ENGINEERS**  
 BOX 455, ESCONDIDO, CA 92033  
 Phone: (619) 747-3343

## Advertiser's Index

Lentini Communications.....	102
Lewallen, Roy, W7EL.....	118
MFJ Enterprises.....	27, 29
Madison Electronics.....	30, 126
Martin Engineering, Glen.....	126
Media Mentors.....	109
Memphis Amateur Electronics.....	38
Mercury Systems.....	116
Missouri Radio Center.....	132
Mobile QSL Bureau.....	124
Motron Electronics.....	102
N4EDQ Amateur Radio Sales.....	52
NCG Company (Comet Antennas).....	37
Nemal Electronics.....	38
Oklahoma Comm. Center.....	111
OPTOelectronics Inc.....	35
Orlando Hamcation.....	75
PASS Publishing.....	119, 120, 124
PC Electronics.....	115
Pac Comm.....	118
Pacific Cable Co.....	53
Palomar Engineers.....	94, 131
Payl Software.....	106
Periphex Inc.....	33
Phillips-Tech Electronics.....	116
Pilot Electronic Co. Inc.....	120
Pouch, The.....	109
QSLs by W4MPY.....	124
QSO Software.....	125
RF Concepts.....	63
RF Connection.....	120
RF Enterprises.....	85
RF Parts.....	129
Radio Amateur Callbook.....	28
Radio Place.....	119
Radio Repair by Ed Kuhnley.....	120
Radio Shack.....	43
Radio Works.....	31
RadioKit.....	75
Renaissance Development.....	49
Reno Radio.....	104
Robert Hall Electronics.....	124
Ross Distributing.....	120
SGC, Inc.....	17
Satellite City.....	89
Sensible Solutions.....	95
Sherwood Engineering.....	120
Sierra Technologies Group.....	9
Sinclubs, Inc.....	115
Sommer Antenna Systems.....	101
Spectrum International.....	100
Spider Antennas.....	117
Surplus Sales of Nebraska.....	95
Synthetic Textiles.....	70
TCE Laboratories.....	105
TNR Technical, Inc.....	75
Texas Towers.....	97
Trans World Cable Co.....	94
Traxit.....	125
Tropical Hamboree.....	115
Tucker Surplus Store.....	55
UNR-Rohn.....	123
Universal Amateur Radio.....	53
VHF Communications.....	38
W5YI Marketing.....	94, 124
W9INN Antennas.....	124
W & W Associates, Batteries "R" Us.....	37
West Radio School, Gordon.....	103
Williams Radio Sales.....	77
Wrightapes.....	109
Yaesu Electronics.....	59, Cov. III
Yost & Co.....	105
ZCo Corporation.....	116

We'd like to see your company listed here too. Contact Arnie Sposato, N2IQO, at 516-681-2922 or FAX 516-681-2926 to work out an advertising program tailored to suit your needs.

## KEY



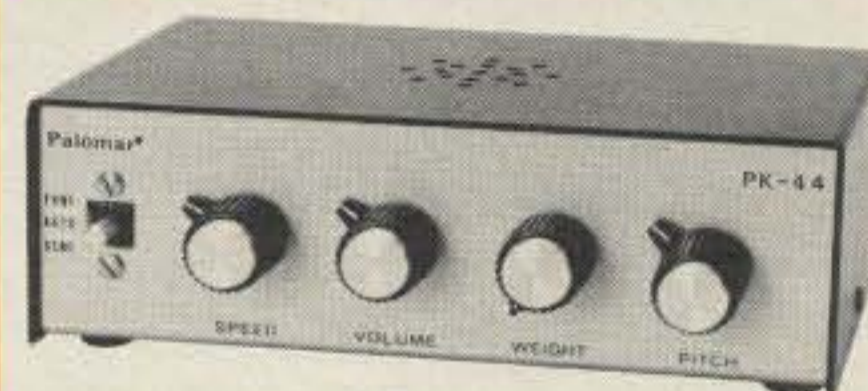
- Dual paddle
- Ball bearings
- Solid copper contacts
- Fully adjustable without tools
- Machined brass mechanism
- Heavy steel base
- Small footprint

Smooth effortless action. Rounded paddles are easy on the fingers. Knurled adjustment screws for spacing and tension of each paddle.

Enjoy the biggest improvement in keys in 20 years. Order yours today.

**Model PK-100 Key \$99.95** + \$4 shipping U.S. & Canada. Sales tax in Calif.

## KEYER



- Full featured.
- All controls on front panel.
- 1 amp. relay contacts.
- Keys + or - without adjustment.
- Keys any rig.
- 9-v battery operation.
- Fully RF proof.

Send CW effortlessly with the keyer that never makes a mistake. Full iambic keying with dot and dash memories. Monitor speaker. From the World's oldest manufacturer of electronic keyers.

**Model PK-44 Keyer \$99.95** + \$4 shipping/handling in U.S. & Canada. Sales tax in Calif.



Send for free catalog that describes our Key, Keyer, Noise Bridge, SWR Meters, Preamplifiers, Loop Antennas, Toroid Cores, and more.

**PALOMAR ENGINEERS**  
 BOX 455, ESCONDIDO CA 92033  
 Tel. (619)-747-3343

**ORDER  
TOLL-FREE  
1-800-821-7323**

MasterCard—VISA—Discover—COD

# RADIO CENTER

USA

AEA • ALINCO • ASTRON • ALPHA-DELTA • AMERITRON • ANTENNA SPEC • B & W • BENCHER • BUTTERNUT •

## KENWOOD



### TS-950SD

TRANSMIT THE ULTIMATE SIGNAL

- Digital Signal Processing
- Dual Frequency Receive
- Digital AF Filter • 100 Memories

CALL FOR DETAILS AND ORDER TODAY!

## YAESU



### FT-767GX

HF/VHF/UHF BASE STATION

- 160-10 Meter Standard
- Optional Plug-ins for 6M, 2M, 70cm
- Receive 100 kHz to 29.99 MHz
- AM, FM, SSB, CW, AFSK

CALL FOR ALL DETAILS!

**Special  
Holiday  
Savings**

## ICOM

### IC-2SAT

COMPACT, LIGHTWEIGHT  
2 METER HT

- Covers 140-150 MHz
- Simple Operation
- 48 Memory Channels
- VFO and Memory Scan
- Up to 5 Watts Output

CALL FOR ALL THE DETAILS!



## ALINCO



### DR-590

2 METER/440 MOBILE

- 45 W/2 Meter 35 W/UHF
- Cross Band Repeater Function
- Receiving and Scanning on Both Bands
- Detachable Front Control Panel

CALL FOR DETAILS!

**NEW!**

## KENWOOD



### TM-231A

COMPACT 2 METER FM

- 50 Watts, 20 Memories
  - Multiple Scanning Modes
  - Selectable, Built-in CTCSS Tone
- DON'T DELAY—CALL TODAY!

**SALE**

## YAESU



### FT-736R

WORK SATELLITES, MOONBOUNCE,  
TROPOSPHERE, AURORA...

- SSB, CW, FM
- 2 Meters and 60 cm With Optional Slots for 50, 220 MHz and 1.2 GHz
- 25 Watts on 144, 220, 440 MHz

CALL FOR ALL DETAILS!

**Special  
Holiday  
Savings**

## Kantronics



### DataEngine

- High Speed Packet
- Internal 1200 Baud Modem
- Off The Shelf 9600 Baud Packet With The DVR 2-2
- Internal 9600 Baud, G3RUH Type Modem Available

CALL TODAY!

## ALINCO



### DR-570T

VHF/UHF TWIN BANDER

- 45W on 2M/35W on 70cm
- Receive on both Bands at Same Time
- Extended Receiver Range
- More Features for the Money Than Anyone Else

ALL ALINCO SALE PRICED!

## KENWOOD

### TH-27A

2 METER SUPER  
COMPACT HT

- Receive 118-165 MHz
- Up to 5 Watts Output
- CTCSS Encode/Decode Built-in
- Multi-Function Scanning
- TH-47A, 70 cm Model

CALL TODAY!

**NEW!**



## YAESU

### FT-470

**Special  
Holiday  
Savings**

2 METER/70CM PERFECTED

- Simultaneous Receive On Both Bands
- Built-in PL Encode/Decode
- 10 Memories Each Band
- 2.3 Watts With 5W Optional

CALL FOR ALL THE DETAILS!



## HUSTLER

### G-10 10 METER COLINEAR VERTICAL

Fiberglass Construction  
1/2 Wave Gain Antenna

**SPECIAL SALE  
\$39.95**

(BELOW DEALER COST)

LIMITED SUPPLY—CALL TODAY

## ALINCO

### DJ-160T

DELUX 2 METER  
HANDHELD

- Receive 137-173.995 MHz
- 20 Memories
- 3 Watts Standard
- 3 Scan Modes
- Store Duplex/Simplex Pairs, Call Channel, 38 Encoding Subtones

CALL TODAY!



## MFJ SALE MFJ

LARGEST STOCK OF ALL  
YOUR MFJ FAVORITE  
ACCESSORIES  
CALL TODAY FOR  
BEST PRICE



### MFJ-1278

Multi-Mode Data Controller  
CALL FOR EXTRA SAVINGS

## YAESU

### FT-411

**Special  
Holiday  
Savings**

MAXIMUM 2 METER  
HT PERFORMANCE

- Dual VFO's
- 40 Memories
- Extended Receive
- Built-in PL Encode/Decode
- Auto. Repeater Shift

CALL FOR ALL THE DETAILS!



## CAROL CABLE

(Columbia Cable)

- 4080 Rotor Cable . . .22¢/foot
- 4090 H.D. Rotor Cable . . .34¢
- 1108 RG8, Mini . . . . .21¢
- 1198 RG8, Super Flex . . .30¢
- 1180 9913 Type . . . . .41¢
- 1176 RG213, Mil Spec . . .36¢

10% DISCOUNT ON FULL ROLLS

## ASTRON



- RS7A . . . \$49 • RS35M . . \$159
- RS12A . . . \$70 • VS35M . . \$174
- RS20A . . . \$89 • RS50A . . \$199
- RS20M . . \$109 • RS 50M . . \$219
- VS20M . . \$124 • RM50M . . \$259
- RS35A . . \$139 • VS50M . . \$232

102 N.W. Business Park Lane Kansas City, MO 64150  
Send SASE For Used List

Call Toll Free - 8 AM - 5 PM Mon.-Fri. 9 AM - 2 PM Sat.  
In Missouri Call—816-741-8118

WANTED: QUALITY USED GEAR, CASH OR TRADE

CUSHCRAFT • DIAMOND • DRSI

HEIL • HUSTLER • HYGAIN

# Power...and More!

## FT-212RH/ FT-712RH

### Frequency Synthesized VHF/UHF FM Transceiver

The compact, versatile FT-212RH is a 2 meter mobile that boasts a lot more than just high power. Inside its sturdy compact frame hides an impressive array of performance features plus high reliability. Choice of standard, or optional, high performance tone encoding microphones. **Power...and More!**

- **CTCSS:** Access any of the 37 standard CTCSS tone frequencies, plus 97.4 Hz can be displayed, selected and programmed into any memory for transmission.

- **19 Memories:** Each memory stores either programmable repeater shift or independence TX and RX frequencies.

- **Automatic Repeater Shift (ARS):** Enables selection of repeater transmitter offset automatically when tuned to the standard repeater subband.

- **Programmable Scanning:** Scans band, band segment or memories. Scan auto-resume with carrier drop of after 5 minute 5 second pause.

- **Tuning Steps:** Operator selectable steps in 5, 10, 12.5, 20 and 25 kHz.

- **CAT System Control:** Provides for external control of VFO frequency, mode and operator's personal computer.

- **Amber Backlit CLD Display:** Automatically controls the brightness of the display back lighting and pilot lamps.

- **Tone Encoding Microphone:** Choice of standard, or optional high performance DTMF tone encoding microphones.

- **Digital Voice System (DVS-1):** Optional system which allows local and remote digital voice recording and playback.

### Specifications

**Frequency Range:** RX: 140-174 MHz, TX: 144-148 MHz (modifiable for MARS and CAP)  
FT-212RH; 430-450 MHz on RX (FT-712RH)

**Power Output:** 45 Watts (FT-212RH); 35 Watts (FT-712RH)

**Case Size:** 5.5 (W) x 1.6 (H) x 6.3 (D) in.

**Weight (Approx.):** 2.8 lbs.

# YAESU

*Performance without compromise.<sup>SM</sup>*

CIRCLE 6 ON READER SERVICE CARD



# BREAKING THE BARRIER OF DUAL BAND COMMUNICATION



The dual banders of the future are here! ICOM's IC-24AT dual band handheld and IC-3220 dual band mobile provide you all the advantages with the most feature packed, power packed dual banders available.

Whether your needs require the mobility of the IC-3220 or the convenience of the IC-24AT mini-handheld, ICOM has the dual bander fit for you.

The IC-24AT mini-handheld and the IC-3220 mobile give you full operation on the 2-meter and 440MHz

amateur bands with outstanding flexibility and performance!

The IC-24AT offers 40 memories, 5 watts, programmable scanning, priority watch, a battery saver, plus a DTMF pad for autopatching...the list is endless. Among the many features

of the compact IC-3220 are a built-in duplexer, simultaneous dual band receive, auto dialing and a memory transfer function. For full details and specs on the IC-24AT and IC-3220, call the **ICOM Brochure hotline at 1-800-999-9877**. See them today at your quality ICOM amateur dealer.

  
**ICOM**  
First in Communications

CORPORATE HEADQUARTERS: ICOM America, Inc.  
2380-116th Ave. N.E., Bellevue, WA 98004  
CUSTOMER SERVICE HOTLINE (206) 454-7619  
CUSTOMER SERVICE CENTERS:  
3150 Premier Drive, Suite 126, Irving, TX 75063  
1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349  
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada  
2380-116th Ave. N.E., Bellevue, WA 98004

All stated specifications are subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 3220900