

ICD 08241

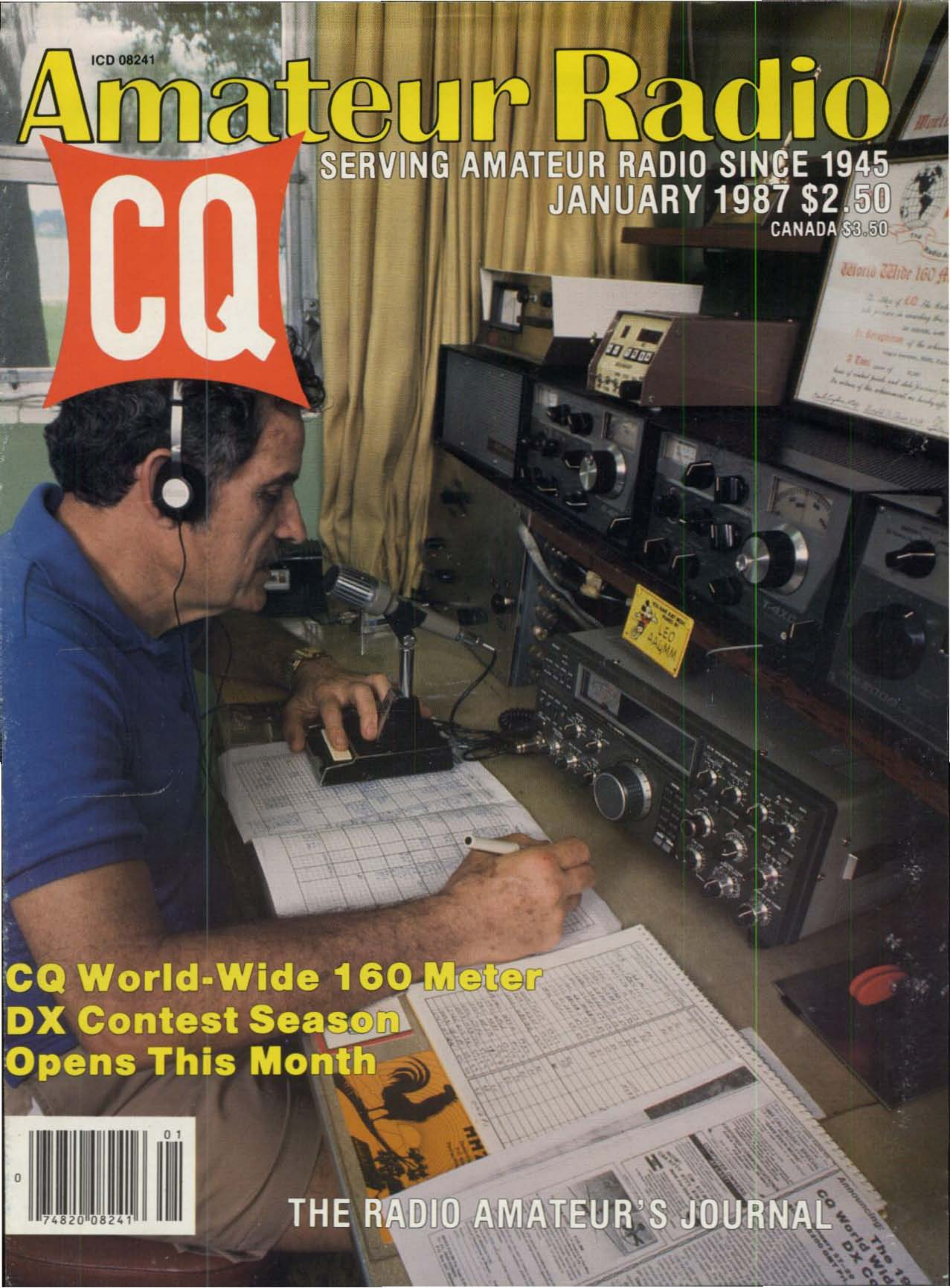
# Amateur Radio

SERVING AMATEUR RADIO SINCE 1945

JANUARY 1987 \$2.50

CANADA \$3.50

# CQ



**CQ World-Wide 160 Meter  
DX Contest Season  
Opens This Month**



THE RADIO AMATEUR'S JOURNAL

World Wide 160 ft  
The value of CQ...  
In recognition of the...  
2 Year...  
has of...  
the value of the...

Logbook and other documents on the desk, including a yellow call sign sticker that reads 'LEO W4LMM'.

# KENWOOD

...pacesetter in Amateur radio

NEW!  
ALL-MODE

## All-Mode Mobility!

### TR-751A

#### Compact 2-m all mode transceiver

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

- Automatic mode selection, plus LSB

CW	USB	FM	USB	FM
----	-----	----	-----	----

- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option

- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter

- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

#### Optional accessories:

- CD-10 call sign display
- PS-430, PS-30 DC power supplies
- SW-100A/B SWR/power meter
- SW-200A/B SWR/power meter
- SWT-1 2-m antenna tuner
- TU-7 38-tone CTCSS encoder
- MU-1 modem unit for DCL system
- VS-1 voice synthesizer
- MB-10 extra mobile mount
- SP-40, SP-50B mobile speakers
- PG-2N extra DC cable
- PG-3B DC line noise filter
- MC-60A, MC-80, MC-85 deluxe base station mics.
- MC-43S UP/DOWN mic.
- MC-55 (8-pin) mobile mic.



Actual size front panel

### TR-9500

#### 70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi—10W, Low—1W. SSB 10W.
- Automatic band/memory scan. Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.



# KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

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

# KENWOOD

...pacesetter in Amateur radio

NOW  
BUILT-IN  
CTCSS!

## By Popular Demand!

### TH-21BT/31BT/41BT

The smallest HT™ is now even better! The new "BT-Series" gives you a plus—a built-in DIP switch programmable CTCSS encoder! Now you can access more than one "private line" over the air! The original TH-21A Series (The Smallest HT™) is still available from the VHF leader—Kenwood!

• **High or low power.**

Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.

• **Pocket portability!**

Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) with PB-21.

• **Expanded frequency coverage (TH-21BT/A).**

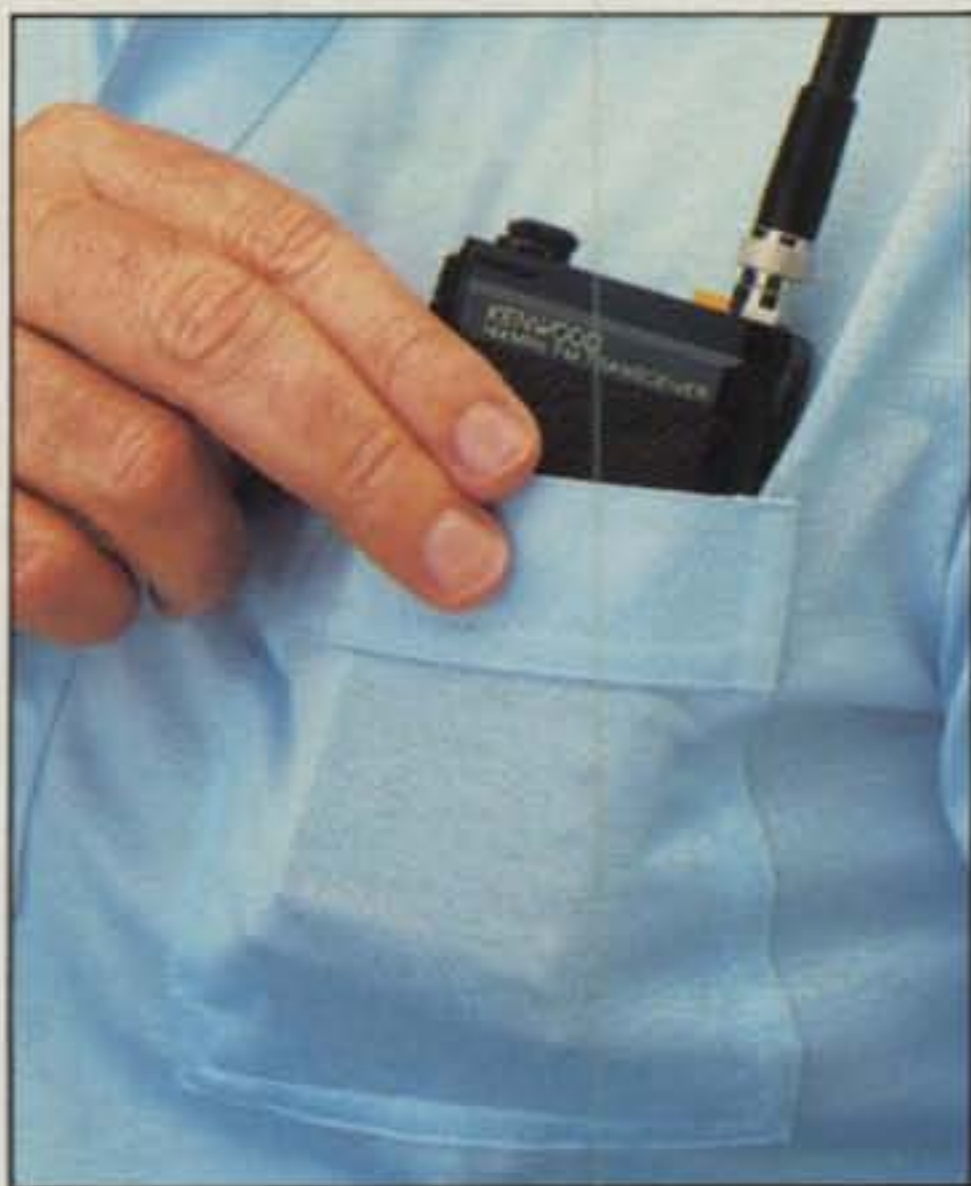
Covers 141.000-150.995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.

**TH-31BT/A:** 220.000-224.995 MHz in 5-kHz steps.

**TH-41BT/A:** 440.000-449.995 MHz in 5-kHz steps.



DIP switch programmable CTCSS encoder built-in!



• **Easy-to-operate, functional design.**

Three digit thumbwheel frequency selection and top-mounted controls increase operating ease.

• **Repeater offset switch.**

TH-21BT/A:  $\pm 600$  kHz, simplex.

TH-31BT/A:  $-1.6$  MHz, reverse simplex.

TH-41BT/A:  $\pm 5$  MHz, simplex.

• **Standard accessories:**

Rubber flex antenna, earphone, wall charger, 180 mAh NiCd battery pack, wrist strap.

• **Quick change, locking battery case.**

The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.

• **Rugged, high impact molded case.**

The high impact case is scuff resistant, to retain its attractive styling, even with hard use.



**Optional accessories:**

- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 NiCd 180 mAh battery
- PB-21H NiCd 500 mAh battery
- BC-2 wall charger for PB-21H
- BC-6 2-pack quick charger
- DC-21 DC-DC converter for mobile use
- BT-2 manganese/alkaline battery case
- EB-2 external C manganese/alkaline battery case
- SC-8/8T soft cases with belt hook
- BH-3 belt hook
- AJ-3 thread-loc to BNC female adapter
- RA-8A/9A/10A StubbyDuk antenna
- TU-6 sub-tone unit (TH-21AT/A only)

More information on the Smallest HT™ is available from Authorized Kenwood Dealers.

## KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

TH-series transceivers shown with optional StubbyDuk antenna. Specifications and prices are subject to change without notice or obligation. Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

# KENWOOD

...pacesetter in Amateur radio

**NEW!**  
Computer Interface!

## “DX-cellence!”

### TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

• **100% duty cycle transmitter.**

Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.

• **High stability, dual digital VFOs.**

An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning “feel”.

• **Graphic display of operating features.**

Exclusive multi-function LCD sub-

display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.

• **Low distortion transmitter.**

Kenwood's unique transmitter design delivers top “quality Kenwood” sound.

• **Keyboard entry frequency selection.**

Operating frequencies may be directly entered into the TS-940S without using the VFO knob.

• **QRM-fighting features.**

Remove “rotten QRM” with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.

• **Built-in FM, plus SSB, CW, AM, FSK.**

• **Semi or full break-in (QSK) CW.**

• **40 memory channels.**

Mode and frequency may be stored in 4 groups of 10 channels each.

• **Programmable scanning.**

• **General coverage receiver.**

Tunes from 150 kHz to 30 MHz.

• **1 yr. limited warranty.**

Another Kenwood First!

**Optional accessories:**

• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external



Interface IF-232C/IF-10B

speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.



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



More TS-940S information is available from authorized Kenwood dealers.

## KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

# MASTHEAD

## EDITORIAL STAFF

Alan M. Dorhoffer, K2EEK  
 Editor  
 Gail M. Schieber  
 Associate Editor  
 Lew McCoy, W1ICP  
 Technical Representative

## CONTRIBUTING STAFF

Frank Anzalone, W1WY  
 Contest Chairman  
 John A. Attaway, K4IIF  
 Chairman, CQ DX Committee  
 Steve Bolia, N8BJQ  
 WPX Contest Director  
 Larry Brockman, N6AR  
 Robert Cox, K3EST  
 W.W. Contest Directors  
 Hugh Cassidy, WA6AUD  
 DX Editor  
 Leo Haijsman, W4KA  
 WAZ Awards Manager  
 Dave Ingram, K4TWJ  
 Amateur Specialties  
 George Jacobs, W3ASK  
 Propagation Editor  
 Dorothy H. Johnson, WB9RCY  
 USA-CA Director  
 Steve Katz, WB2WIK  
 VHF Editor  
 Norman Koch, K6ZDL  
 WPX Award Manager  
 Frederick O. Maia, W5YI  
 Amateur Licensing  
 Donald McClenon, N4IN  
 160 M. Contest Director  
 Karl T. Thurber, Jr., W8FX  
 Antennas & Accessories  
 Adrian Weiss, K8EEG/Q  
 QRPp Editor  
 Bernie Welch, W8IMZ  
 Contest Advisor  
 Bill Welsh, W6DDB  
 Novice Editor  
 Billy Williams, N4UF  
 CQ DX Awards Manager

## BUSINESS STAFF

Richard A. Ross, K2MGA  
 Publisher  
 Dorothy Kehrwieler  
 General Manager  
 Arnie Sposato, KA2TYA  
 National Advertising Manager  
 Tori Hazlett  
 Sales Assistant  
 Jack M. Gutzeit, W2LZX  
 Advertising Consultant  
 Frank V. Fuzia  
 Controller  
 Arlene Caggiano  
 Accounting  
 Cheryl Chomicki  
 Customer Service

## PRODUCTION STAFF

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

Offices: 76 North Broadway, Hicksville, NY 11801.  
 Telephone: 516 681-2922. CQ (ISSN 0007-893X) is published monthly by CQ Publishing Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year \$18.00, two years \$35.00, three years \$52.00; Canada/Mexico—one year \$20.00, two years \$37.00, three years \$54.00; Foreign—one year \$22.00, two years \$43.00, three years \$64.00; Foreign Air Mail—one year \$75.00, two years \$149.00, three years \$223.00. Entire contents copyrighted CQ Publishing Inc. 1986. 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:** Leo Drescher, AA4MM of Orlando, Florida warms up for the CQ WW 160 Meter DX SSB Contest next month. This month 160 meter CW fans have a go at the CW section, Jan. 23-25. Photo by Larry Mulvehill, WB2ZPI.

JANUARY 1987

VOL. 43, NO. 1

## FEATURES

COLLECTING OLD RADIO GEAR.....	Neil D. Friedman, N3DF	13
AN AMATEUR PACKET RADIO PRIMER, PART III—OPERATING PACKET RADIO.....	Jonathan L. Mayo, KR3T	18
<b>ANNOUNCING: THE 31ST ANNUAL CQ WORLD-WIDE WPX CONTEST</b> .....		25
CALCULATING WIND STRESS ON TOWERS AND GUY WIRES, A PROGRAM FOR THE COMMODORE C-64	George E. Black, WA0YJX	28
CQ REVIEWS: THE KENWOOD MC-55 MOBILE MICROPHONE	John J. Schultz, W4FA/SV0DX	32
HOW TO BUILD THE LITTLE DIPPER, A LOW-COST DIP OR PEAK METER.....	Cornelio C. Nouel, KG5B	36
A PRINTOUT OPTION FOR "THE DXER'S FRIEND," A COMPUTER DIRECTION-FINDER PROGRAM FOR THE COMMODORE C-64	Fred A. Sontag, N0CAO	40
CQ REVIEWS: AEASOFT MORSE UNIVERSITY	Lew McCoy, W1ICP	42
SO YOU DON'T WANT TO BE A NOVICE ANYMORE?	Peter O'Dell, KB1N	44
THE "U" ANTENNA, A HIGH-PERFORMANCE DX RECEIVE ANTENNA FOR 80 AND 160 METERS.....	Bob Farkaly, K9RHY	50
OLDIES CAN STILL BE GOODIES.....	Gerald Samkofsky, N4ZB	52
CQ SHOWCASE: NEW AMATEUR PRODUCTS.....		56
VHF: PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER.....	Steve Katz, WB2WIK	59
ANTENNAS AND ACCESSORIES: ANTENNA POTPOURRI	Karl T. Thurber, Jr., W8FX	66
TICKET TALK: INFO ON AMATEUR RADIO LICENSING	Frederick O. Maia, W5YI	72
NOVICE: THE NOVICE ROUNDUP CONTEST AS AN OPPORTUNITY.....	Bill Welsh, W6DDB	97

## DEPARTMENTS

AWARDS: STORY OF THE MONTH—ED A. SANDERS, WA6VJP	Dorothy Johnson, WB9RCY	75	
DX: DX INFO FROM AROUND THE WORLD	Hugh Cassidy, WA6AUD	79	
PROPAGATION: SHORT-SKIP CHARTS FOR JAN. AND FEB.	George Jacobs, W3ASK	90	
CONTEST CALENDAR: CONTESTS FOR JAN. AND EARLY FEB., RESULTS OF THE 1986 FRENCH DX CONTEST	Frank Anzalone, W1WY	92	
ZERO BIAS.....	4	ANNOUNCEMENTS.....	8
OUR READERS SAY.....	6	HAM SHOP.....	102

# Zero Bias

## AN EDITORIAL

**W**ell, we made it through another one. The new year is upon us and we can put away the words and music to *Auld Lang Syne* for another year. It's 1987 and perhaps we can look at things a little differently in the year to come.

One of the things I touched on last month was a proposed project for clubs. This involved studying and reviewing local zoning codes with respect to amateur radio antennas. Obviously, the idea and goal should be to head off problems rather than look for loopholes to counter a pending action. Let's face it. Antenna problems and court battles have been around for a long time. Most of us have read about the more famous of these cases with passing interest as something happening to someone somewhere else. What's been the common thread?

One common thread is our individualistic belief that we have an inalienable right to pursue our (pastime, service, hobby) to the utmost. This is intrinsically associated with an antenna system. We "feel" this is so, and therefore it must be true. Most of us have benefited from a form of benign neglect with regard to zoning enforcement. No one said anything or complained about our antennas, in a sense giving a tacit reinforcement to our belief of inalienable rights. When we read about someone else's problems, it was just that—someone else's problems. The concern could have been short lived or even extend to a contribution to a legal fund, but in general it was and is removed from our daily cares.

Another common thread is that of feeling like a pariah when it becomes your turn to suffer the indignation of a threat to your inalienable right. Not too many folks want to come to your aid or send money to help your cause when you bear the weight of the law. Even a few locals might not want to "make waves" lest they too become noticed. For the few who have made life miserable for other amateurs in the community (not counting irate neighbors), help will be a very long time, if ever, in coming.

These and other common threads weave a cloth that tears easily. Zoning boards and planning boards are becoming stricter, and enforcement is tightening around the country. The days of just putting up an antenna or even a medium-size tower with disregard for local ordinances are winding down. The days of assuming that if there was a complaint filed you could pop down to village hall and get a variance are winding down, if they still exist at all.

Is the picture bleak and hopeless? No! What it means is that we really are members of the community in which we reside, and we have to work within the same rules as everyone else. It's called government and politics. It means that our objection to our neighbor painting his house purple with yellow polka-dots is just as valid as his objection to our antenna. Valid to a point, that is.

Outside of those of us who reside in condos and planned communities in which the subject of antennas and radiating devices came up

when we signed a restrictive covenant in order to purchase the property, most of us move into areas oblivious to local zoning codes. We pick a house, an apartment, or an area to live in for various socio-economic reasons which generally do not involve amateur radio. After we move in and most of the cartons are unpacked, the broken items replaced, and the kids registered for school, and just before the new wallpaper has to be picked, the amateur radio gear finds its home. We simply have to get an antenna up or we'll go crazy. Even if we've lived here for a long time, once the antenna bug bites, it's all over. We can plan down to the last detail, including the last scrap of coax, just how we're going to do it, and then we go full bore ahead. The thought of any zoning law is nonexistent, and most of us wouldn't know where to find out about the laws. Well, they exist, and it's in our best interest to read them BEFORE we actually start to do something.

It's also in our best interest to learn how to use them to get what we want, preferably BEFORE any trouble ensues. Here it pays to become politic. Simply put, it means to be polite, friendly, nice to your village or city clerk and/or building inspector so that you can see a copy of your local zoning code. What you want to find out initially is what is now allowed and what is prohibited. The code will also tell you how the zoning variance board works and what you may need for them if it gets that far. If there is no specific prohibition on "Radio Antennas" (this classification usually lumps commercial and private-use antennas), check the index for "Hazardous Uses." This section will generally have provisos on "Electromagnetic Radiation," or what comes off the antenna. The nebulous word to look for here is NUISANCE. This word is the catch-all loophole. You can be technically correct, operating perfect equipment within the confines of your license in a totally mil-spec station, and cause some interference to someone. You then are potentially a "nuisance."

So how do you get what you want? Well, first we'll assume that you've checked out the local regulations that pertain to you. Second, write to the ARRL and request their information packet *Answers To Your Questions About Local Antenna Regulations*. Next, try to attend a meeting of the zoning board to see the process first hand. See what people bring, what questions are asked, and how they're answered. See who the board members are. They do come from your area and one might even be a neighbor. Applications and fees, permits and licenses are part of everyday life, so the next step is to get the right forms to fill out. Probably at this stage the most important person in your amateur radio life is the building inspector. Your attitude towards him can either create an adversary or someone who is willing to help you fill out the forms and walk you through the process. There's a very big difference between demanding and asking. Remember, if you have to get a variance, his input and recommendations are very important. Really,

what you want to do BEFORE you rush out and unlimber your shovel is to do your homework and be prepared.

PRB-1 is a definite asset in the process, but it is not a guarantee of that inalienable right. It still leaves a lot of things, including height, up to the local municipality. You still have to work within the system. A big part of that system is your neighbors. Those are the nice folks who live adjacent to you, who, if you antagonize them, will call you a NUISANCE before the zoning board. They don't have to know how much money you make a year, for whom you voted, or what religion you do or don't practice, but they SHOULD know that you plan to put up an antenna. Let's presume that you and your family are on pretty good terms with your neighbors. If they don't know already, let them know that you are a ham radio operator. Most people will recognize ham radio operator more easily than amateur radio operator. Tell them you're thinking about putting up an antenna so that you can talk around the world or farther than across town. Keep it in simple terms, and wherever possible invite them over to see your station. Objections will start to surface here. "Will it destroy my TV?" "Probably not; it's not likely." Deal with the questions as they come up. As with the building inspector, your attitude can make a friend or create an enemy.

Does all this sound hard, cumbersome, and futile? Well, it's not really any more difficult than what you had to go through to get your license. It's all new and strange and a lot of things to consider, but you can do it with a little (maybe a lot) of patience. You prepared yourself to take the license exam, so think of this as another form of exam for which you have to prepare. Government and politics are not dirty words or things with which other people have to deal.

Throughout the country there are court cases going on fighting antenna laws either before or after the fact. I can't think of an amateur who set out to deliberately break a zoning law (fair or unfair) to strike a blow for amateur radio antenna freedom. Amateur radio will probably benefit from certain precedents set by very costly litigation, but it's hard to think of that as the prime motivation. We as individual amateurs need antennas, and we want antennas of all sizes and configurations. Sometimes, unfortunately, it does require litigation to get what we need and want, and that process is expensive and very time consuming.

As I started out saying, perhaps we can look at things a little differently in the year to come. Perhaps we could explore a few more options offered by the system before we become litigants. Perhaps we could even find out how the system works and use it for our own advantage. It's obviously not an impossible system to learn; thousands of amateurs have been using it for years. There is a distinct advantage in learning how the system works. Besides being able to use it, you also know how to change it.

73, Alan, K2EEK

Or This Inexpensive

# It Really Shouldn't Be This Easy

Remember just a few years ago, how it took a roomful of equipment just to work RTTY. And if you wanted more than one mode it took a dedicated computer system costing thousands of dollars. The new AEA Pakratts are proving it doesn't take lots of equipment or money to enjoy working all bands in five different modes.

## First, A Good Idea

The idea behind the Pakratt is very simple. One controller that does Morse, Baudot, ASCII, AMTOR, and Packet, and works both HF and VHF bands. Of course the decoding, protocol, and signal processing software must be included in the unit, and connection to the computer and transceiver have to be easy. The unit also has to be small and require only 12 volts, so it will work both in the shack and on the road.

## Second, Computer Compatible

It doesn't matter what kind of computer you have, we have a Pakratt for you. The PK-64 works with the popular Commodore 64 or 128, and the PK-232 works with any other computer or terminal that has an RS-232 serial port. The PK-64 doesn't require any additional programs. Simply connect to the computer and transceiver and you're on the air. The PK-232 needs a terminal or modem program for your computer. The one you're using with your telephone modem will work just fine.

## Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs \$219.95, or \$319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs \$269.95 or \$369.95 with the HF option. The PK-232 costs \$319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

Prices and specifications subject to change without notice or obligation.

## PAKRATT™ Model PK-64



## PAKRATT™ Model PK-232

## Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

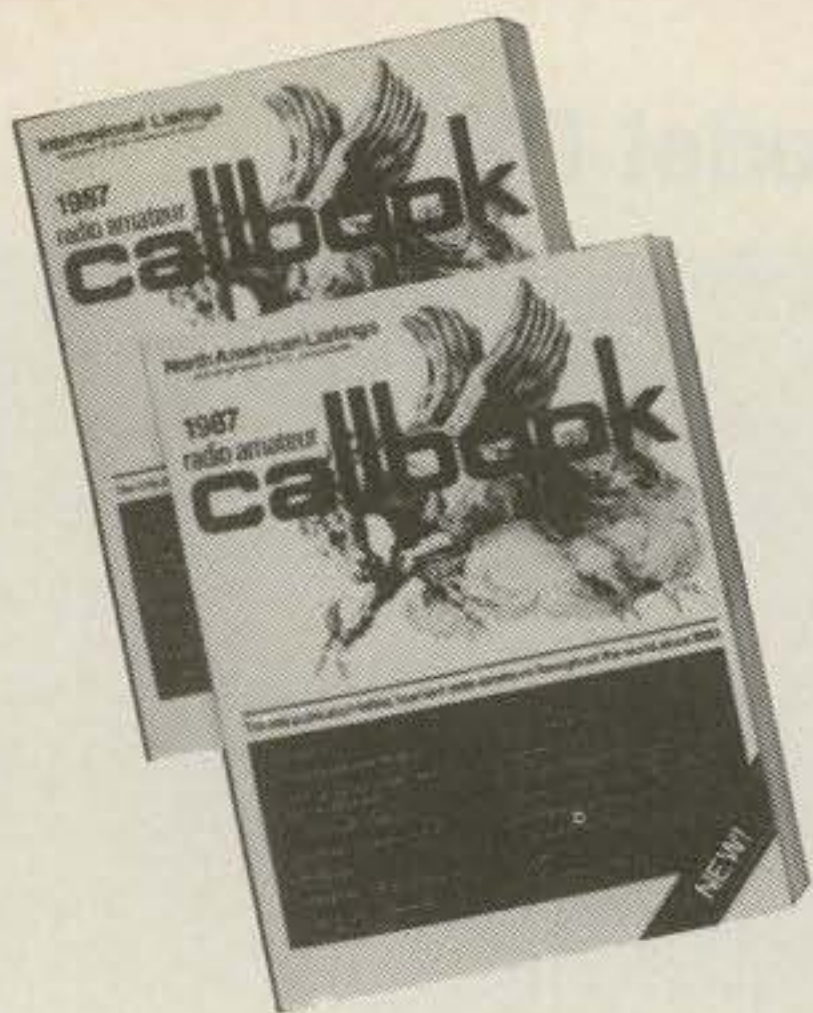
The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW  $F_c = 800$  Hz, BW = 200 Hz; HF  $F_c = 2210$  Hz, BW = 450 Hz; VHF  $F_c = 1700$  Hz, BW = 2600 Hz.

The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.

# AEA

Advanced Electronic Applications, Inc.  
P.O. Box C-2160, Lynnwood, WA 98036-0918  
206-775-7373 Telex 6972496 AEA INTL UW

# 1987 CALLBOOKS



## The "Flying Horse" sets the standards

Continuing a 66 year tradition, there are three new Callbooks for 1987.

The North American Callbook lists the calls, names, and address information for licensed amateurs in all countries from Canada to Panama including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The International Callbook lists the amateurs in countries outside North America. Coverage includes South America, Europe, Africa, Asia, and the Pacific area.

The 1987 Callbook Supplement is a new idea in Callbook updates; it lists the activity in both the North American and International Callbooks. Published June 1, 1987, this Supplement will include all the new licenses, address changes, and call sign changes for the preceding 6 months.

Publication date for the 1987 Callbooks is December 1, 1986. See your dealer or order now directly from the publisher.

- |   |         |
|---|---------|
| <input type="checkbox"/> North American Callbook<br>incl. shipping within USA                 | \$28.00 |
| incl. shipping to foreign countries   | 30.00   |
| <input type="checkbox"/> International Callbook<br>incl. shipping within USA                  | \$28.00 |
| incl. shipping to foreign countries   | 30.00   |
| <input type="checkbox"/> Callbook Supplement, published June 1st<br>incl. shipping within USA | \$13.00 |
| incl. shipping to foreign countries   | 14.00   |

### SPECIAL OFFER

- |   |         |
|---|---------|
| <input type="checkbox"/> Both N.A. & International Callbooks<br>incl. shipping within USA | \$53.00 |
| incl. shipping to foreign countries   | 58.00   |

\*\*\*\*\*

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

RADIO AMATEUR  
**callbook** INC.



Dept. Q  
925 Sherwood Dr., Box 247  
Lake Bluff, IL 60044, USA

Tel: (312) 234-6600



# Our Readers Say:

## Give Us Some Room

Editor, CQ:

Your editorial concerning the sad state of the Novice class of amateur radio license and ham population in general has genuinely hit home with this young amateur. Being 20 years old and a ham for 5 years, I have read your editorials with interest. Yes, as you have said, many of our radio clubs have let the Novice down by not welcoming and encouraging them during their early exposure to the hobby. Besides this, the Novice isn't really being exposed to all the varied facets of hamming by pounding out dits and dahs. Even though I am one of the few over the past years who has found the Novice bands interesting enough to continue in the hobby, many have dropped out. I just happen to like code; that's all. Novices should have a greater part in this expanding hobby. The Novice enhancement proposals provide this greater participation, especially in these years of bottomed-out Cycle 21.

Greater participation in the hobby can be had in four ways. First, have a national organization like the ARRL coordinate and sponsor a fantastic advertising campaign. (It can be done; they've done a fine job with the VE program!) Second, have as many radio clubs as possible sponsor a Novice and "upgrade" class that covers different equipment and on-the-air operation. Third, get the FCC to pass this Novice enhancement proposal. Fourth, the passage of a no-code, digital license restricted to the VHF and above frequencies. Can any of these hurt our hobby?

We, the present holders of ham tickets, are proud. Passing an amateur radio exam is an accomplishment. Let's not forget that. But we all realize what's happening to our ham population. Would we like amateur radio to continue for future generations to enjoy? (Myself included!) Let's not be selfish. Let's provide ham radio some room for expansion, for this electronic world is forever changing and growing. We need to grow with it.

Steven J. Gehring, NT0J  
Davenport, IA

## Packet Radio Frequencies

Editor, CQ:

For quite some time now there has been interference from packet radio stations on SSB existing QSO's. Without asking if the frequency is in use, they start

their transmissions. On a request for moving, the comment was made that between 14.100 and 14.107 no SSB is permitted there. Those frequencies are set aside for packet radio only.

It seems to me that there have been a few articles written on the subject of packet radio which make reference to the frequency of 14.103, which is in the international SSB portion of the band. The ARRL recommends the following frequencies for the 20 meter band to be used for packet radio: (1) 14076.5, (2) 14098.5, quoted from the ARRL handbook 1986 edition page 38-10. I think it would be to everyone's benefit if those frequencies were published so that any misunderstanding about packet radio frequencies can be cleared up.

Peter H. Schuyffel, VE3JPP  
West Hill, Ont., Canada

## An Old Friend Returns

Editor, CQ:

What a pleasant surprise it was when I saw a familiar by-line in the pages of an amateur radio magazine—Peter O'Dell, KB1N. I haven't heard from him in any of the magazines since he left the ARRL. I just wanted to drop Pete and the CQ staff a few words of thanks for bringing back an old friend.

Keep up the good work!

Wayne T. Yoshida, KH6WZ  
Fountain Valley, CA

## Waiting Ten Years

Editor, CQ:

I would like you to know that I really enjoyed your editorial in the September issue. I wish all amateur radio operators would read it. At the present time, I am getting ready to pass the Novice Class license. The amateur who got me excited about amateur radio thinks the Novice class license is a waste of time, and if he had any say in it, a Novice would return to CW only with a two-year non-renewable license. So as you can see, I have been somewhat discouraged.

I guess I have been waiting ten years or more for something like the new Novice enhancement. I totally agree on a Novice getting a taste of HF voice and VHF. Hopefully, the FCC will give the Novice the new privileges in the very near future.

Thanks for your time and your great editorial!

John K. Schaub  
Simi Valley, CA



# WELZ CORP.

LOADS • WATTMETERS



THE MOST POPULAR HAM RADIO ACCESSORIES are available from WELZ. WELZ brand easy-to-read power and VSWR meters and other high quality station accessories are used world-wide. WELZ, good enough to be the best.

# THL CORP.

AMPLIFIERS • COUPLERS



THL THE INDUSTRY LEADER IN DESIGN AND PERFORMANCE add-on accessory VHF/UHF amplifiers, antenna couplers and now HF LINEARS too. When power out is your problem, stop in for the THL brand solution.

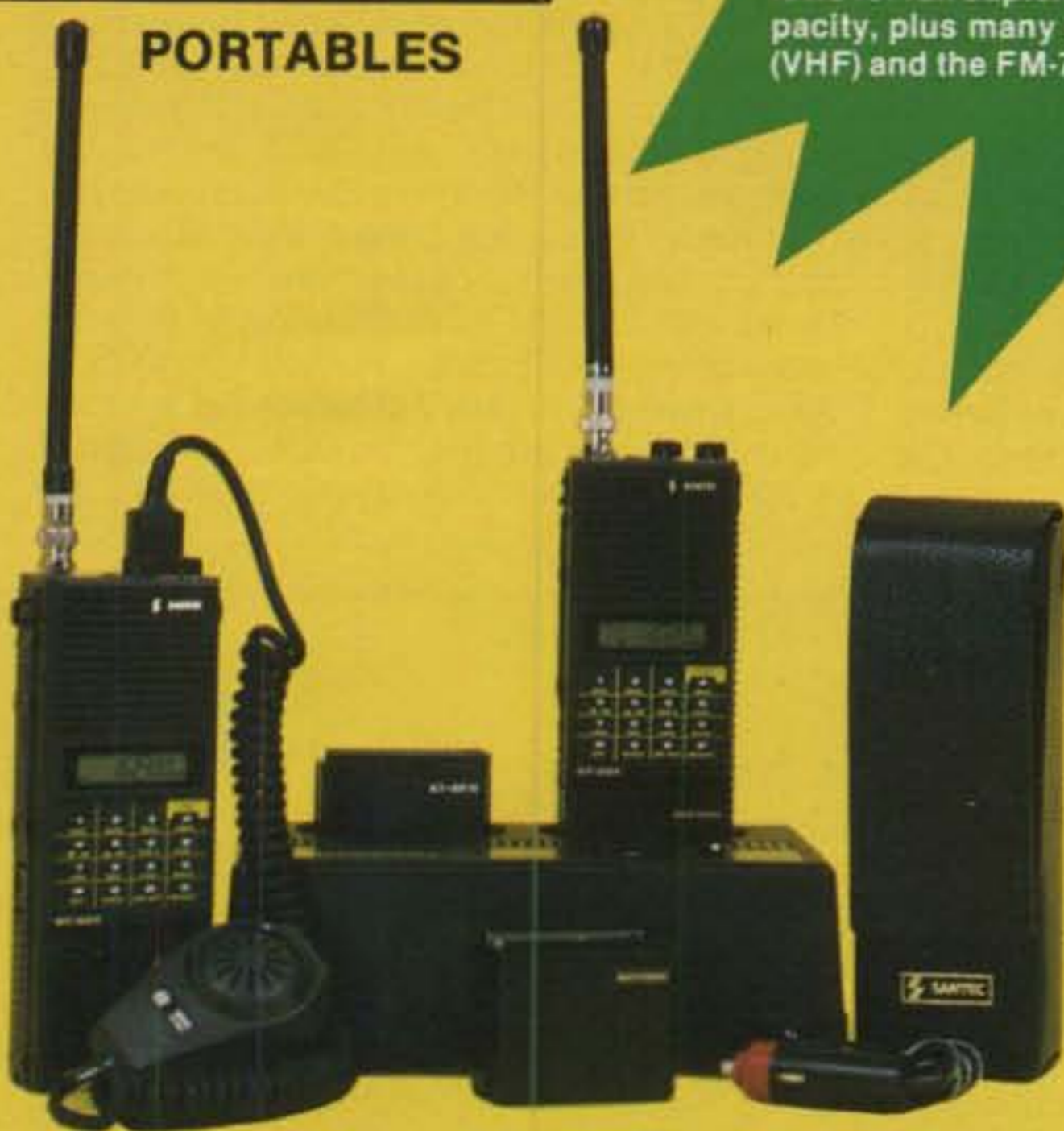
# KDK



COMPACT MOBILES MAKE FULL DUPLEX POSSIBLE KDK mobile radios are so small, TWO of them will fit in the space normally accomodating one full size mobile radio. This allows for full duplex cross band operation with 32 memory capacity, plus many other advantages. Check out the FM-240 (VHF) and the FM-740 (UHF) today.

# SANTEC

PORTABLES



LOOK CLOSELY AND YOU WILL CHOOSE SANTEC. Santec hand-helds are truly the BEST value + quality + performance combination available today. A Full 5 Watts output, Multi-mode Scan, 10 Memories and AUTO-DIALER make the SANTEC a fantastic hand-held radio. Try one yourself at your next trip to your favorite Ham Radio Shop.

# KENPRO

ROTORS • ACCESSORIES

WHEN YOU TURN YOUR ANTENNA, DO IT WITH KENPRO antenna aiming devices and accessories. From light to heavy-duty there's a KENPRO for you. NEW Satellite tracking AZ-EL units with external computer controller interface.



# ENCOMM

1506 CAPITAL AVENUE, PLANO, TEXAS 75074 PHONE - 214-423-0024 GIII FAX - 214-423-0081  
NATIONAL DISTRIBUTION FOR SANTEC - KDK - KENPRO - THL - WELZ - DIAMOND

# Announcing

• **Florida Two Meter Repeater Directions Available** -

The Hernando County ARA of Brooksville, Florida has sent a supply of updated Florida Two Meter Repeater Directories to all Welcome Centers in that state. These free directories can be obtained from the desk upon request. Copies will be sent by mail to anyone sending an SASE to the following address: Hernando County ARA, P.O. Box 1721, Brooksville, FL 33512.

• **Chico, California Testing Schedule** - The Golden Empire ARS of Chico, California has its FCC amateur radio operator testing schedule for 1987. The tests will be coordinated on the first Sundays of January, March, May, July, September, and November 1987. The tests will be held from 12:30 PM to 2:30 PM in the N.T. Enloe Hospital Conference Hall #3. All test sessions are preregistration only. For more information write to Gears VEC, P.O. Box 508, Chico, CA 95927, and include an SASE.

• **Midwinter Swapfest in Waukesha Co., WI** - The 15th Annual Midwinter Swapfest will be held on Saturday, January 10 at the Waukesha Co. Expo Center Forum from 8 to 3 PM. Admission: \$2.00 in advance, \$3.00 at door. Tables (4 ft.): \$3.00 in advance, \$4.00 at door (electrical outlet \$5.00, as available). Advance deadline January 2, 1987. Dealers welcome. Amateur exams given; write for details. Sponsored by the West Allis Radio Amateur Club. For tickets or information write: WARAC Swapfest, P.O. Box 1072, Milwaukee, WI 53201 (SASE).

• **Special Event Station WA5SWV** - The Sante Fe ARC and the Northern New Mexico ARC will operate special event station WA5SWV on January 10-11 from Santa Fe to help celebrate New Mexico's Diamond Jubilee and 75th year of statehood. Operation will be on 20 and 40 meters General phone bands and the center of the 40 meter Novice band. For certificate, send QSL and SASE to: New Mexico Diamond

## It's A Girl!

Our Art Director, Elizabeth Ryan, has never missed a deadline yet! In keeping with this outstanding record, Liz gave birth to a baby girl on October 31st—nine weeks early, so as to be sure not to miss her January 7th deadline. Mother and daughter Jillian Ann are doing just fine, now three weeks later, and we're happy to note that Liz will be staying on as our Art Director.

Jubilee, 922 Hickox St., Sante Fe, NM 87501.

• **HOSARC Double 7** - The Hall of Science ARC will issue a commemorative certificate to anyone working a HOSARC station on January 18 in celebration of their 14th anniversary. HOSARC stations using the call WB2JSM will operate SSB in the General phone bands of 40 and 20 meters, and CW in the Novice bands of 40 and 15 meters, from 1500 to 2100 UTC. QSL with a large SASE (44 cents or 1 IRC) to: HOSARC QSL Manager Arnie Schiffman, WB2YXB, 81-22 250th St., Bellrose, NY 11426.

• **Mission Trail Net 50th Anniversary** - January 20th marks the 50th anniversary of the Mission Trail Net, a traffic net based primarily in California. Originally a 160 meter operation, MTN meets on 3928 kHz every night of the year at 7 PM Pacific Time. All old-time Mission Trail Net members are invited to visit MTN sometime during the month of January. All traffic buffs are invited to check-in on 3928 kHz at 7 PM Pacific Time anytime during the month. Also, a Net history book is available free to all current MTN members and for \$6 postpaid to all others from K6ZH, 4855 39th Street, San Diego, CA 92116.

• **Butler County, Alabama Hamfest** - The Butler County ARC will hold its annual Hamfest on January 25th at the Greenville Recreation Center in Greenville from 8 AM until 2 PM. For more information, contact Jim Bell, K4TNS, Butler County ARC, 700 Court Square, Greenville, AL 36037.

• **Yonkers Electronics Auction** - This auction will take place on January 25th from 9 AM to 3 PM at Lemko Hall in Yonkers, New York. Admission \$3.00. Bring new or used equipment to auction off. For more information, contact the Yonkers ARC at 914-969-1053.

• **Southfield, MI High School ARC Swap & Shop** - The Southfield High School ARC will sponsor their 20th Annual Swap & Shop on January 25th at Southfield High School, Southfield, Michigan from 8 AM to 3 PM. Admission \$3.00. Reserved tables \$20.00 for two 8 ft. tables (paid in advance). Additional reserved tables \$10.00 each. Tables also available at the door. All profits go toward Electronic Scholarships and to support the activities of Southfield High School's Amateur Radio Club. For more information and/or reservations, write to Robert Younker, Southfield High School, 24675 Lahser, Southfield, MI 48034.

• **STARFEST '87** - STARFEST '87, which will concentrate on amateur radio, will be held on Saturday, January 31st in the Casa de Amistad, Fair Park, in Harlingen, Texas from 9 AM to 5 PM. For additional information, call Bob Tichenor at (512) 423-6407, Tuesday through Friday, 8 AM to 5 PM.

• **Wheaton Hamfest '87** - This event will be held at the Odeum Exposition Center, Villa Park, Illinois on February 1. For reserved flea market tables call 312-231-7497. Tickets: \$4.00 advanced with double prize stubs; \$5.00 at the door, single prize stub. For advanced tickets send SASE to WCRA, P.O. Box QSL, Wheaton, IL 60189. Enclose check payable to WCRA.

## DAYTON Hamvention Lodging - available at this time

Alexander Motel Fairborn  
Belton Inn  
Best Western Springfield  
Coach N Four Motel  
Command Motel Fairborn  
Cross Country Inn  
Crossroads of America  
Days Inn Dayton Mall  
Days Inn North  
Days Inn South  
Dayton Airport Inn  
Daytonian Hilton  
Econolodge  
Fairborn Motel

Hampton Inn (Englewood)  
Holiday Inn Wright State  
Holiday Inn Dayton Mall  
Holiday Inn Fairborn  
Holiday Inn North  
Holiday Inn South  
Holiday Inn Troy  
Knights Inn Franklin  
Knights Inn Dayton North  
Knights Inn Dayton South  
Knights Inn Vandalla  
L & K Motel (Brandt Pike)  
LaQuinta Inn South  
Marriott Hotel

Motel Capri  
Penny Pincher (L&K Troy)  
Ramada Inn Downtown  
Ramada Inn South  
Red Horse Inn  
Red Roof Inn South  
Rodeway Inn (Dayton)  
Rodeway Inn (Xenia)  
South Dayton Motel  
Traveler's Motel North  
Traveler's Motel South  
TraveLodge (North Dixie)  
York Motor Lodge Fairborn

# DAYTON Hamvention®

April 24, 25, 26, 1987

## Early Reservation Information

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

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

### Flea Market Tickets

A maximum of 3 spaces per person (non-transferable). Tickets (for 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; Awards chairman, Box 44, Dayton, OH 45401.

### License Exams

Novice thru Extra exams scheduled Saturday and Sunday by appointment only. Send current FCC form 610, copy of present license and check for \$4.25 (payable to ARRL/VEC) to: Mark Tessner, 2859 Homeway Dr., Beavercreek, OH 45385

### Slide Show

35 mm slide/tape presentation about the HAMVENTION is available for loan. Contact Dick Miller, 2853 La Cresta, Beavercreek, OH 45324

### 1987 Deadlines

Award Nominations: April 4

Lodging: April 4

License Exams: April 4

Advance Registration and banquet:

USA - April 11

Canada - April 4

Flea Market Space:

Orders will not be accepted **before** January 1

### Information

General Information: (513) 433-7720

or DARA, Box 44, Dayton, OH 45401

Flea Market Information: (513) 223-0923

Lodging Information: (513) 223-2612

(No Reservations By Phone)

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

### Lodging Reservation Form

Dayton Hamvention - April 24, 25, 26 1987  
 Reservation Deadline - April 4, 1987  
 MAIL TO - Housing, Dayton Hamvention,  
 1980 Kettering Tower, Dayton, OH 45423-4880

Arrival Date \_\_\_\_\_

Before 6 pm  After 6 pm

Departure Date \_\_\_\_\_

Room:  Single

Double (1 bed, 2 persons)

Double Double (2 beds, 2 persons)

Lodging Preference -

See list of Lodging on adjacent page.

1 \_\_\_\_\_ 2 \_\_\_\_\_

3 \_\_\_\_\_ 4 \_\_\_\_\_

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

### Advance Registration Form

	<u>How Many</u>		
Admission (valid all 3 days)	_____ @ \$8.00*	\$	_____
Grand Banquet	_____ @ \$15.00**	\$	_____
Women's Luncheon (Saturday)	_____ @ \$7.25	\$	_____
(Sunday)	_____ @ \$7.25	\$	_____
Flea Market (Max. 3 spaces) Admission ticket must be ordered with flea market tickets	_____ @ \$23.00	\$	_____
<b>Total</b>			\$ _____

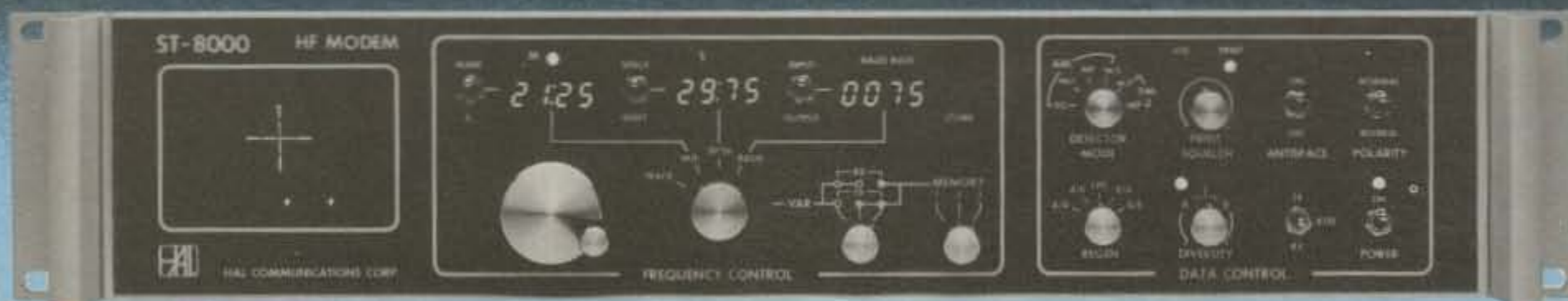
Make checks payable to - Dayton HAMVENTION.  
 Mail to - Dayton Hamvention, Box 2205, Dayton, OH 45401

\* \$10.00 at door

\*\* \$17.00 at door, if available

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

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



## ST-8000 HF Modem

**Real HF radio teleprinter signals exhibit heavy fading and distortion, requirements that cannot be measured by standard constant amplitude BER and distortion test procedures.** In designing the ST-8000, HAL has gone the extra step beyond traditional test and design. Our noise floor is at -65 dBm, not at -30 dBm as on other units, an extra 35 dB gain margin to handle fading. Filters in the ST-8000 are all of linear-phase design to give minimum pulse

distortion, not sharp-skirted filters with high phase distortion. All signal processing is done at the input tone frequency; heterodyning is NOT used. This avoids distortion due to frequency conversion or introduced by abnormally high or low filter Q's. Bandwidths of the input, Mark/Space channels, and post-detection filters are all computed and set for the baud rate you select, from 10 to 1200 baud. Other standard features of the ST-8000 include:

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

**Write or call for complete ST-8000 specifications.**



### HAL Communications Corp.

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

# KENWOOD

...pacesetter in Amateur radio

All New  
Compact HF!

## “DX-citing!”

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

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

#### • Covers All Amateur bands

General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.

#### • Direct keyboard entry of frequency

• All modes built-in  
USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

#### • Built-in automatic antenna tuner (optional)

Covers 80-10 meters.

#### • VS-1 voice synthesizer (optional)

#### • Superior receiver dynamic range

Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)

#### • 100% duty cycle transmitter

Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

#### • Adjustable dial torque

#### • 100 memory channels

Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.

#### • TU-8 CTCSS unit (optional)

Subtone is memorized when TU-8 is installed.

#### • Superb interference reduction

IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.

#### • MC-43S UP/DOWN mic. included

#### • Computer interface port

#### • 5 IF filter functions

#### • Dual SSB IF filtering

A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.

#### • VOX, full or semi break-in CW

#### • AMTOR compatible



#### Optional accessories:

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

#### Kenwood takes you from HF to OSCAR!



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

# KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

WORLDWIDE DISTRIBUTION



# HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

NEW ATLANTA STORE!  
EASY SERVICE FOR  
OUR EASTERN CUSTOMERS

## 7 STORE BUYING POWER

### ICOM IC-R71A



Superior Grade General Coverage Receiver

**SALE! CALL FOR PRICE**

### ICOM IC-3200A

DUAL BANDER

Covers Both 2 Meters & 70 cm



**LIMITED QUANTITY AT OLD PRICES**

### ICOM IC-1271A



1.2 GHz Transceiver: The First Full-featured 1240-1300 MHz Transceiver

**ARE YOU READY FOR 1.2 GHz OPERATION?**

### ICOM IC-28A/28H



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

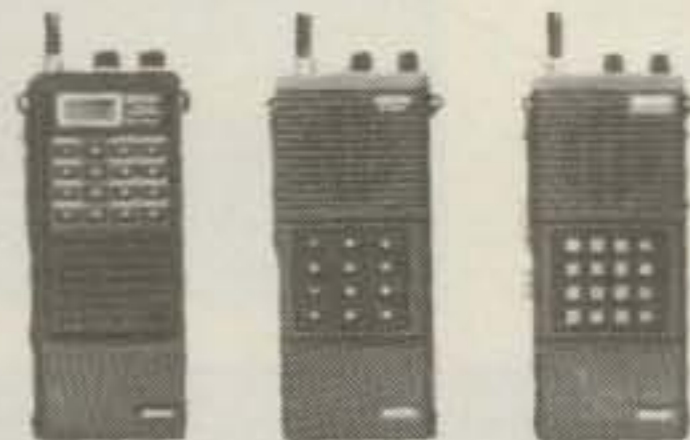
**LOW PRICE!**

NOW! RAPID DELIVERIES FROM OUR OUTLETS

**COAST TO COAST**

To Our Customers

### ICOM HAND-HELD VHF/UHF



IC-02AT IC-2AT IC-3AT  
IC-04AT IC-4AT IC-3AT

### ICOM IC-735



The Latest in ICOM's Long Line of HF Transceivers

**CALL FOR LOW, LOW PRICE**

### ICOM IC-R7000



25 MHz-1300 MHz

**IN STOCK FOR IMMEDIATE DELIVERY**

### ICOM

**NEW**

### U2-AT

MINI HAND-HELD

**GREAT PRICE!**



**Bob Ferrero W6RJ**  
President  
**Jim Rafferty N6RJ**  
VP So. Calif Div.  
Anaheim Mgr.

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

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

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

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

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

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

**VAN NUYS, CA 91401**  
6265 Sepulveda Blvd.  
(818) 988-2212  
Al, Mgr. K6YRA  
San Diego Fwy.  
at Victory Blvd.

**STORE HOURS**  
10 AM-5:30 PM  
CLOSED SUNDAYS



# CALL TOLL FREE (800) 854-6046

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



**You, too, can have a piece of the past and a link to the past by taking up one of amateur radio's most popular side-hobbies. It hasn't been that long and our "artifacts" are still available, so now is the perfect time to get in on the fun.**

## Collecting Old Radio Gear

BY NEIL D. FRIEDMAN\*, N3DF

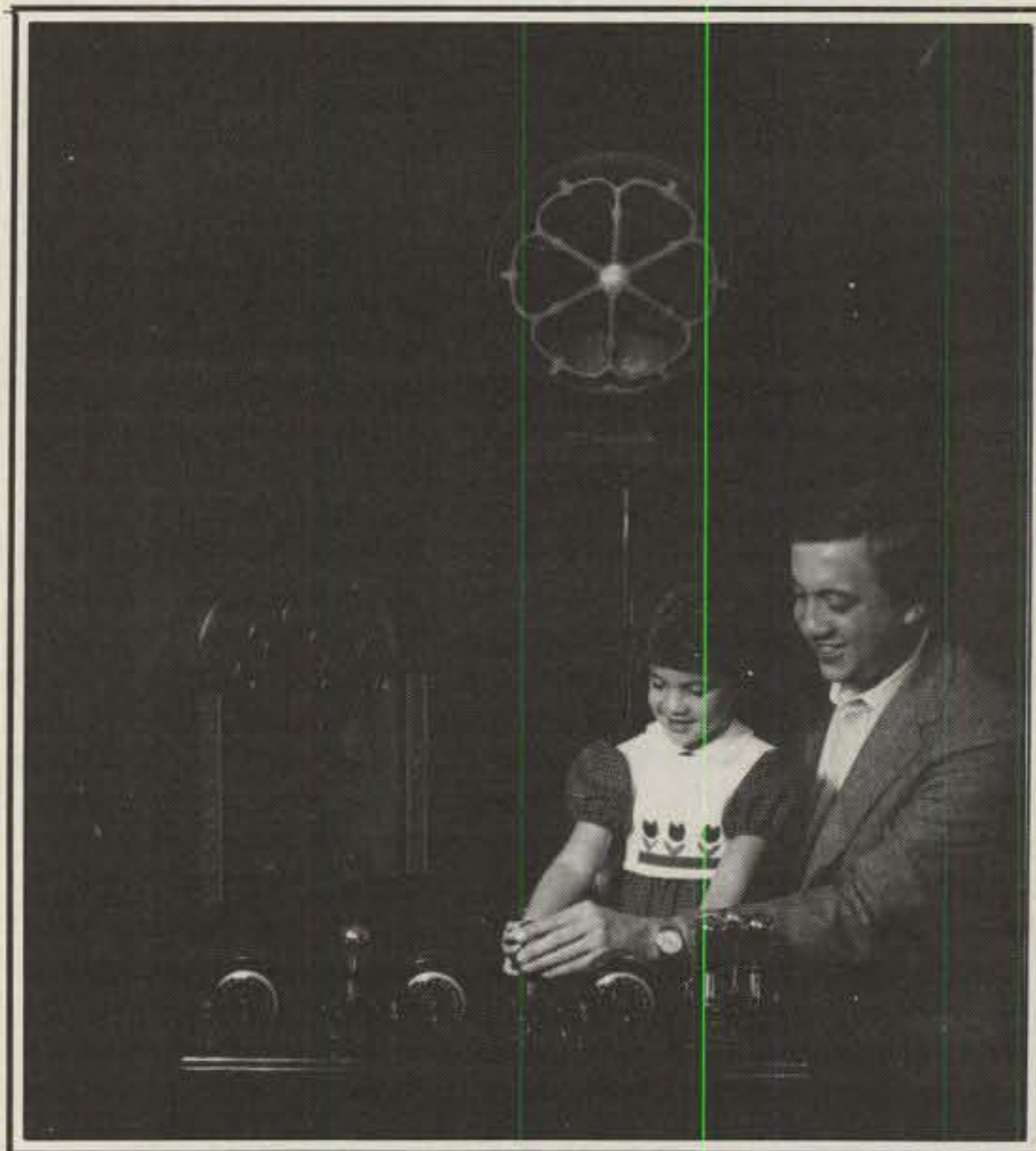
**C**an there be the slightest doubt? Radio is, and will surely always remain, one of civilization's greatest discoveries. Its early artifacts, however, are in peril.

The first wheels turned to dust and the first fires were extinguished in prehistoric times. But with diligent searching, materials from the first decades of radio can still be found almost anywhere. You can help save radio history from the trashbin (and its moral equivalent, the plague of interior decorators scavenging for "cute" planters). Preserve this equipment and earn the eternal gratitude of the millenia to come!

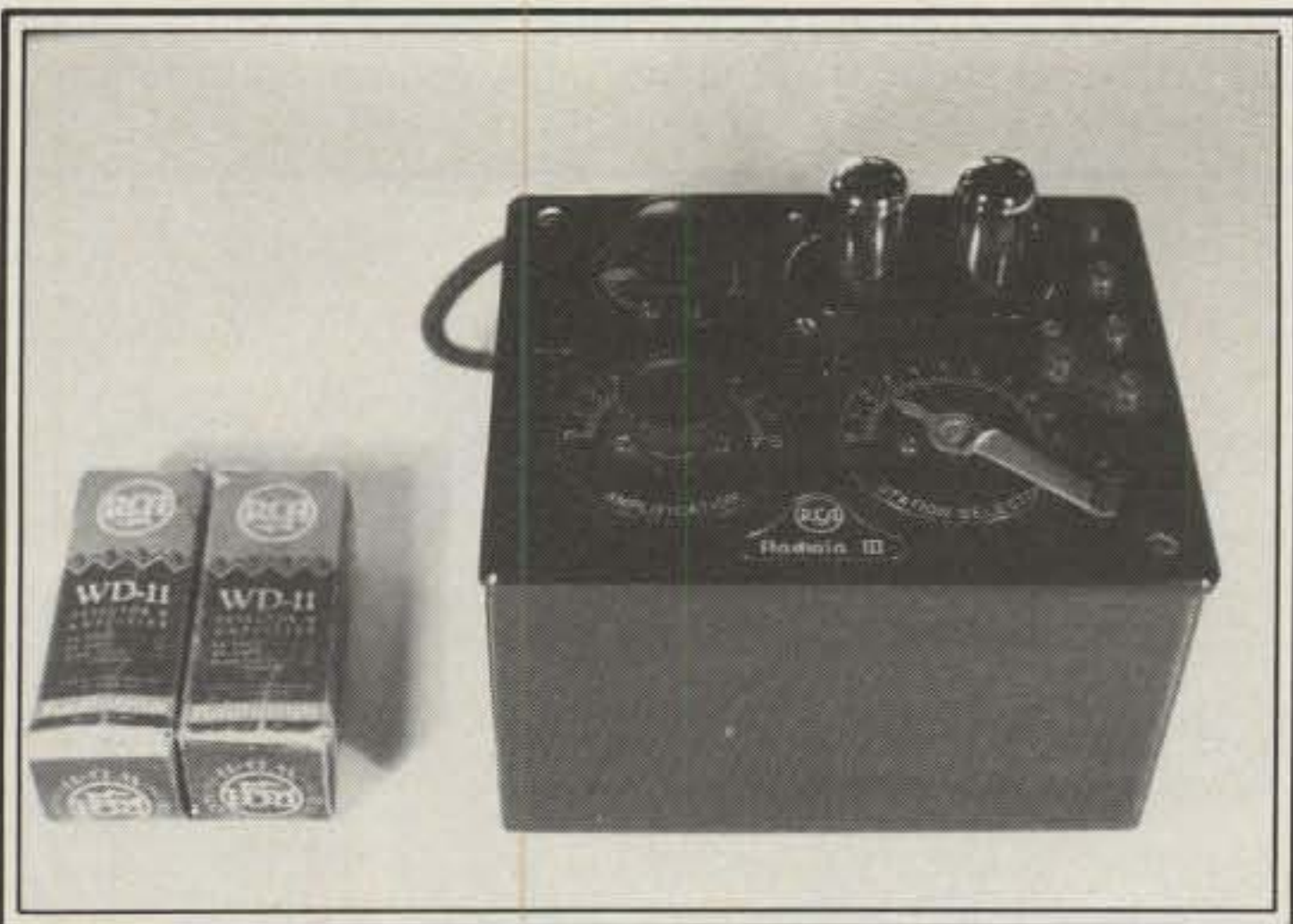
### What's to Collect?

Early receivers, made prior to about 1950, are the most commonly collected radio equipment. Hundreds of models were marketed in the United States alone; so many that a "complete" collection is a virtual impossibility. The scope of most collections is along one or more of the following lines: by manufacturer (Atwater Kent, RCA, Crosley); period of manufacture (pre-World War I, 1920s, 1930s); region of manufacture (New York, California); circuit (crystal, tuned radio frequency, regenerative, superheterodyne); special purpose (short wave, amateur, military); or style (console, breadboard, cathedral, art deco).

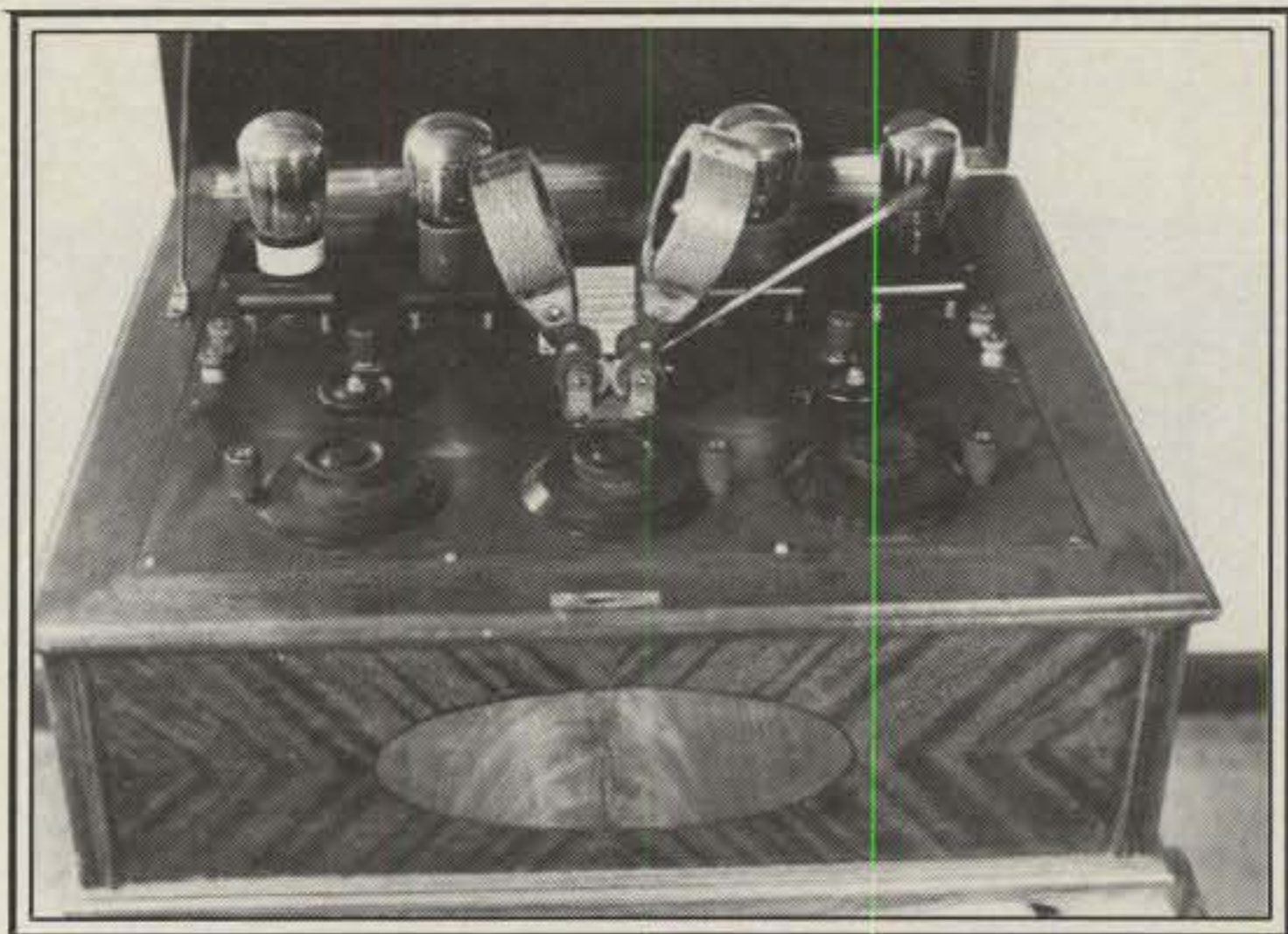
Vacuum tubes are rapidly vanishing, at least from receiving applications. From early DeForest Audions through metal and miniature types, they are widely collected. Even relatively common tubes from the 1920s, such as UX-201A's, are sought after to keep early radios playing.



*Beth Friedman helps dad Neil, N3DF, replace a UX-201A tube in his Atwater Kent "breadboard" receiver. A Hamilton Lloyd "cathedral" and Atwater Kent speaker are also pictured. Photo by Jerry Avey.*



*The regenerative RCA Radiola III's popularity and small size enabled many to survive six decades. A pair of good WD-11 tubes, however, may cost more than the radio. Photos by the author.*



*Plug-in coils determine tuning range on this A.J. Stevens, a 1925 British radio. Amplifier sections may be switched out to conserve battery life.*

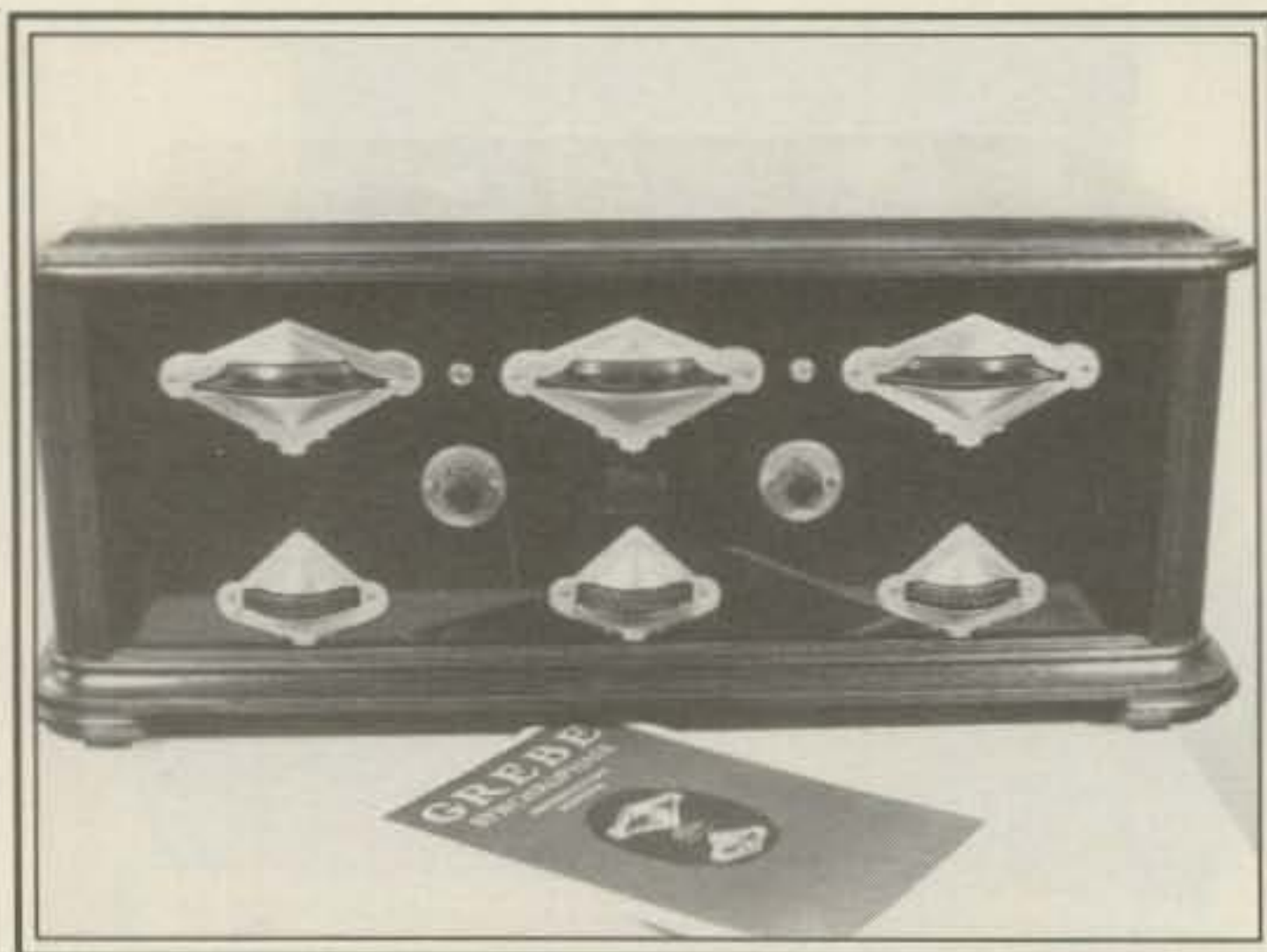
\*503 Kalmia Ave., Boulder, CO 80302



Tubes are collectible and are also required to operate old radios. Prices vary widely, depending upon whether the tube is unused, used, or a dud with an open filament.

Many collectors ultimately build a dual-purpose library of early radio books, magazines, and service manuals. These materials represent history and deserve preservation in their own right. They are also an excellent way to learn about the development of radio as a technical and social phenomenon.

Additional "wireless" collectibles include speakers, headphones, loop antennas, keys, transmitters and their components, battery eliminators, callbooks, government documents, advertising materials, early television receivers, and even ear-



Striking front-panel design and quality engineering have made the Grebe Synchronphase a classic among tuned radio frequency "three-dialers."



Radio literature, both old and new, is an invaluable source of knowledge for the beginning collector.

ly transistor radios. Many collections incorporate landline telegraph items such as keys, sounders, relays, call boxes, patch panels, and message blanks.

### What's To Do?

The initial challenge facing all collectors is procurement. Scrounging through attics, basements, garage sales, and general merchandise flea markets requires patience and some inventiveness, but is usually economical. Buying from antique dealers, other collectors, and specialized auctions is faster and surer, but also more expensive. Reading the articles and advertising in periodicals devoted to early radio (see below), particularly James Kreuzer's column in *Antique Radio Classified*, is a fast way to get a handle on going prices.

Should antique radios be restored? Some collectors attempt to restore every radio to factory-new operation and appearance. Others, finding history in the way sets have weathered the years, leave theirs "as found." Most take a middle course. They restore common units and "basket cases," sometimes using modern components or reproductions of early ones, while giving truly rare and important radios at most a mild cleaning.

Join with your fellow collectors. The Antique Wireless Association (Box 212, Penn Yan, NY 14527) publishes the quarterly *Old Timer's Bulletin*. It maintains a fabulous radio museum in



Many radio collections are rounded out with telegraph items. The call boxes shown here are operated like fire alarms to summon messengers.





# ALINCO ELECTRONICS INC.

**ALM-203T**  
List \$345.00



## 2m FM Handheld Transceiver

- 2 Band HT  
Band A 140-150 MHz  
Band B 150-160 MHz (Receive Only)
- 10 Channel Memory
- Built-In Sub Audible Tones
- Battery Save Function
- 3 Watts Output Standard; 5 Watts with 12 V adapter
- Don't decide on a handheld until you have seen Alinco's newest!

**ALR-206T** List \$358.00

- 140-149.995 MHz Covers MARS and CAP
- Programmable Band Scan
- Programmable Non-Standard Repeater Offset
- Unique Control Knob
- Completely Programmable From Microphone
- 25 Watt High - 5 Watt Low
- Built In Lithium Back Up Battery
- Up/Down Control On Microphone
- 10 Channel Memory
- Built In Sub Audible Control
- Many Features, See Your Dealer



## Linear Amps

List Prices From \$69.95 to \$156.00

- 2m, 1 1/4 m and 70 cm micro linear amplifiers
- 3 watts in provide 30 to 50 watts out to convert your HT to a high power mobile radio
- Each amp includes a heavy duty heat sink, protection circuit and a low pass filter for a clean signal
- Some models available with a 15 db gain GaAsFET receive preamp, others with a 10 db gain FET receive preamp and one with an RF meter.



## Power Supplies

Affordable performance is the final output of these workhorses. These high efficiency, high output, regulated supplies each comes with automatic current limit and shut down protection. Choose from 4.5 to 55 amps of output. List Prices From \$69 to \$333.



# ALINCO ELECTRONICS INC.

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

Marketing And Sales  
P.O. Box 20009  
Reno, NV 89515 • (702) 827-0133



# Yaesu's big gun. The FT-980.

DX and contest operation is no place for a lightweight.

That's why the FT-980 combines the latest in HF technology to give you the muscle to get you through.

To begin with, its front panel gives you unsurpassed operating flexibility.

Store your favorite frequencies and operating mode independently in each of the 12 memory channels.

Review the contents of any memory location without disturbing the QSO in progress with the checking function.

Quickly go from one programmed channel to another, or meet your buddy "five up" by simply touching a button.

And you'll be hard-pressed to find a cleaner transmitter. In fact, our conservatively designed final amplifier loafs at just a fraction of its rated output. And cuts distortion to new lows.

Then consider the receiver. A triple-conversion design with separate front ends for ham and general coverage reception. That way, ham-band operation is not compromised.

Also, cascaded IF filtering assures outstanding rejection of unwanted signals close to your operating frequency.

Even imperfect antennas are no problem for the FT-980. There's essentially no turn-down with an SWR of 2:1 and just 25% turn-down at 3:1.

Finally, if all this isn't enough, hook up the FT-980 to your personal computer for 21 advanced functions including mode, frequency and band shift. An assortment of interfaces and software are available.

So when you really want to flex your muscles, go with Yaesu's FT-980. The serious radio for the serious operator.

**YAESU**  
*Our 30th Anniversary.*

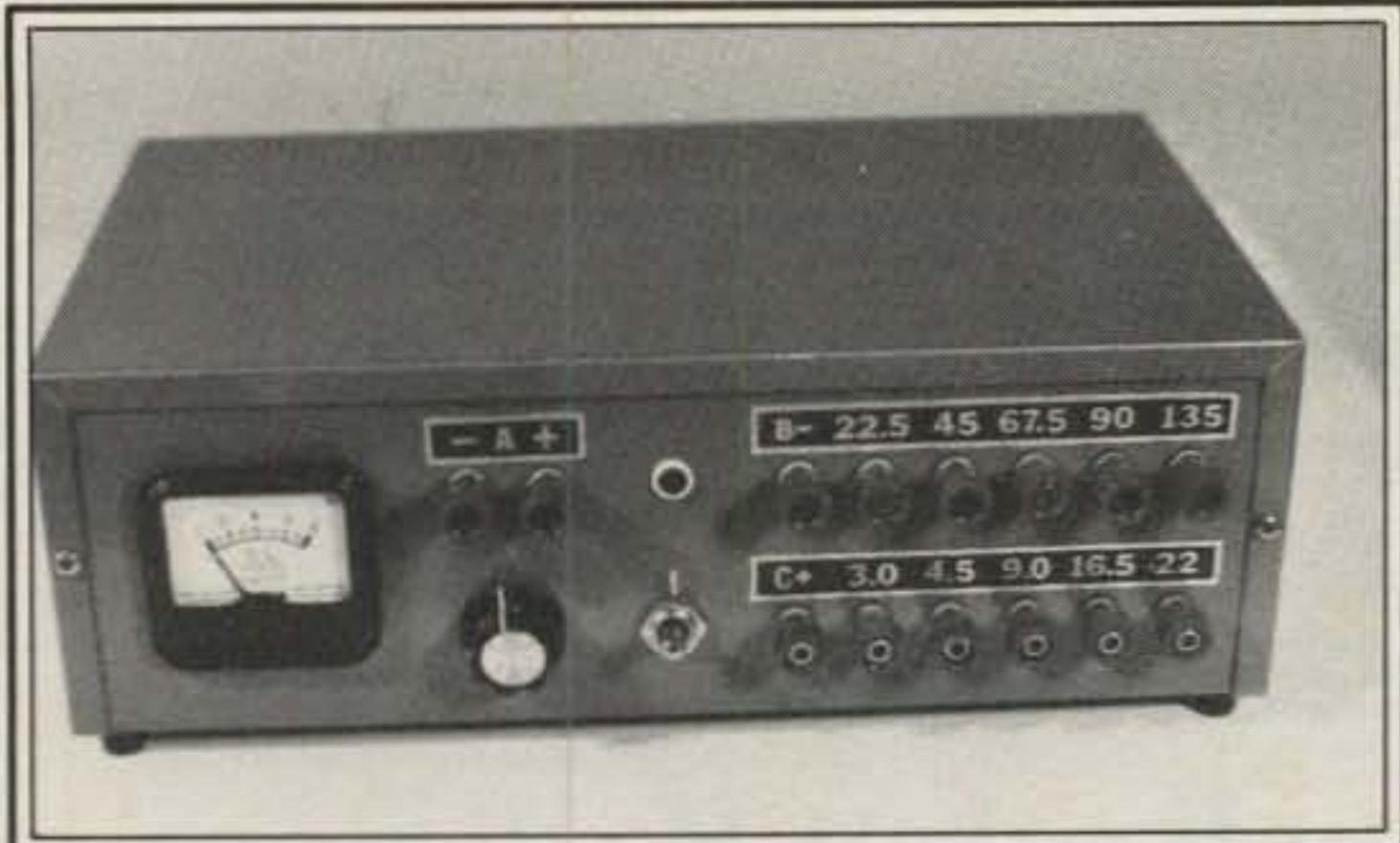
**Yaesu USA**

17210 Edwards Road, Cerritos, CA 90701  
(213) 404-2700

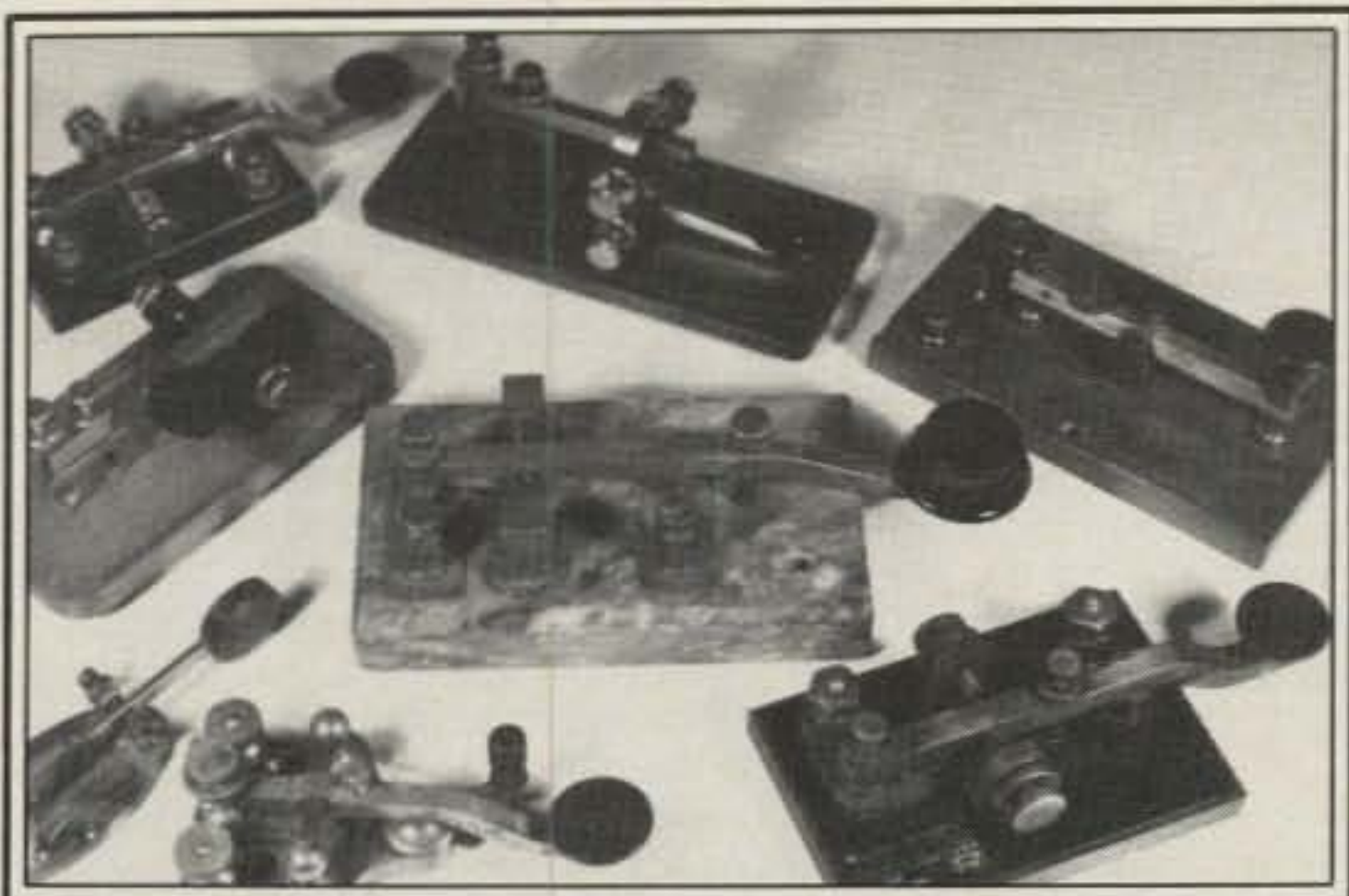
**Yaesu Cincinnati Service Center**

9070 Gold Park Drive, Hamilton, OH 45011  
(513) 874-3100

CIRCLE 4 ON READER SERVICE CARD



Power supplies now run 1920s battery radios. This one, built by Gary Schneider, offers virtually any needed voltage.



Keys, such as this mix of radio and telegraph instruments, stir the interest of most CW operators who also collect.

East Bloomfield, New York (near Rochester) and sponsors a national historical radio conference, flea market, and auction each fall in Canandaigua, New York (also near Rochester). Don't miss them. Various regional events are listed in the *Bulletin*.

### What's To Read

Today's collectors are very fortunate. The recent spurt of interest in early radios has been accompanied by the publication of a number of fine books, in several specialized areas, that can help the newcomer to the field quickly become knowledgeable.

General radio history: Hugh J. Aitken's *Syntony and Spark: The Origins of Radio* and *The Continuous Wave: Technology and American Radio, 1900-1932* (Princeton University Press). Vacuum tube history: Gerald F.J. Tyne's *Saga of the Vacuum Tube* (Howard W. Sams & Co.) and John W. Stokes' *70 Years of Radio Tubes and Valves* (Vestal Press).

Radio photographs and descriptions: *Vintage Radio*, *Radio Collector's Guide*, and *A Flick of the Switch* (edited and published by Morgan E. McMahon). Service data: Hugo Gernsback's *1930 Official Radio Service Manual* (reprinted by Vestal Press) and Clayton L. Hallmark's *How to Repair Old Time Radios* (TAB Books).

In addition to the *Old Timer's Bulletin*, periodicals devoted to early radio include *Antique Radio Gazette* (81 Steeplechase Drive, Devon, PA 19333); *Antique Radio Classified* (9511 Sunrise Boulevard, No. J-23, Cleveland, OH 44133); and *Radio Age* (636 Cambridge Road, Augusta, GA 30909).

Among the general-interest amateur radio magazines *CQ*, of course, is the most frequent publisher of historically-oriented articles.

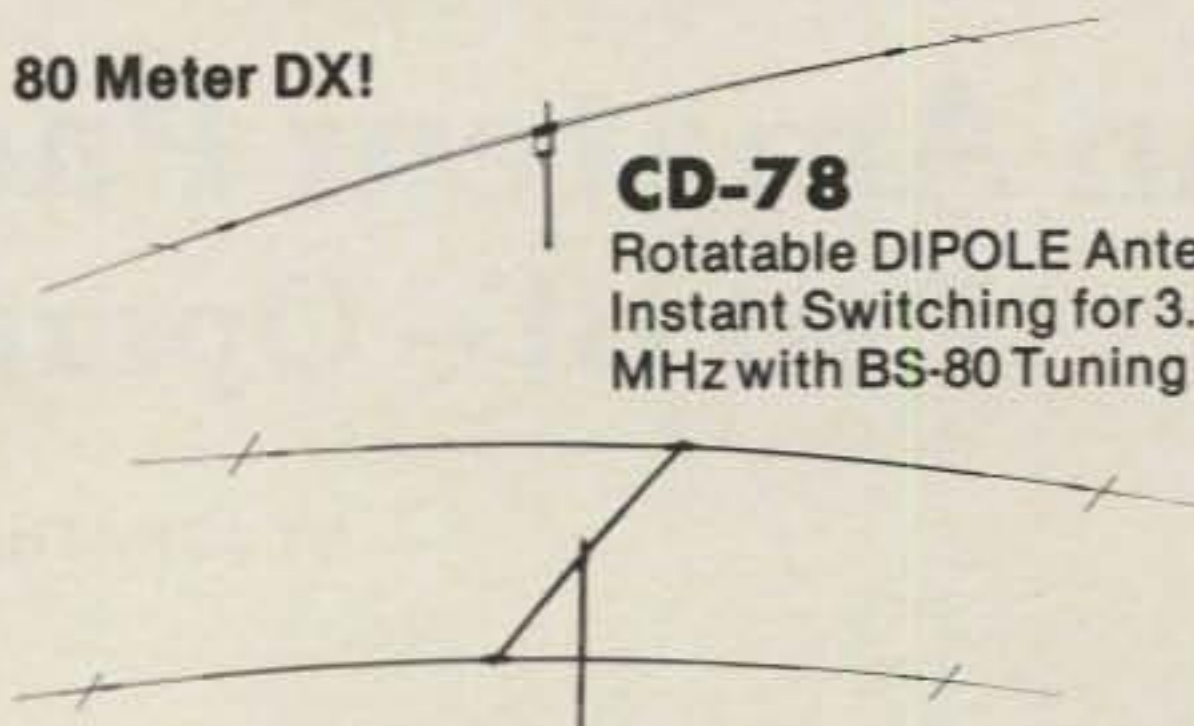


Say You Saw It In CQ



## Creative Design Co., Ltd.

### 80 Meter DX!



#### CD-78

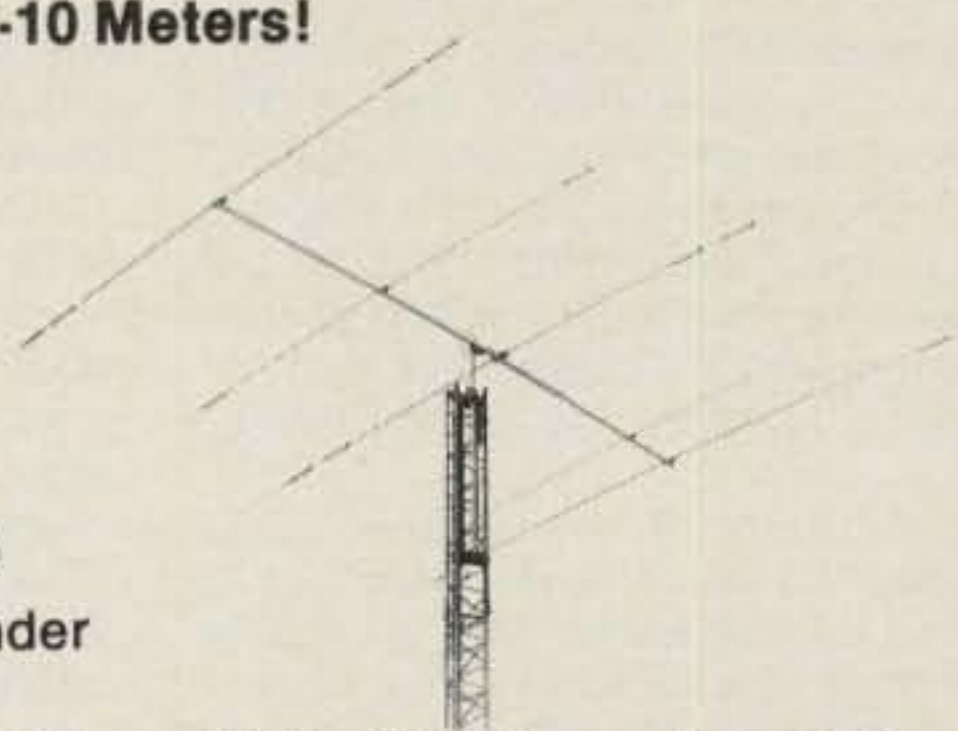
Rotatable DIPOLE Antenna  
Instant Switching for 3.5/3.8  
MHz with BS-80 Tuning Unit.

#### AFA75-1

2-Element Phased Arrays

Frequency MHz	3.8	Impedance	50 ohms
Front Gain dB Avg.	4-6	Element Length Max.	79 ft
F/B Ratio dB Avg.	18	Boom Length	30 ft
F/S Ratio dB	30	Weight	148 pounds
VSWR	MAX 1.8	Wind Survival Rate	80 mil/h
Power Capability			
CW/PEP KW 2/4			
CW: 50% Duty			

### For 20-15-10 Meters!



#### 318B

Tri Bander

Frequency MHz	14 21 28	Element Length Max	28 ft
Front Gain dB Avg.	7.5 9 9.5	Boom Length	21 ft
F/B Ratio dB Avg.	20 18 20	Mast Diameter	2"-2 1/2"
Power Capability		Weight	49 pounds
CW/PEP KW	1/2 1/2 1/2	Wind Survival Rate	90 mil/h
CW: 50% Duty		Rotational Radius	17.4 ft
Impedance	50 ohms		

#### RC5A-3

##### ANTENNA ROTATOR

Heavy Duty Worm Gear  
Drive for Positive  
Braking Action •  
Conservatively Rated  
at 25 sq. ft.



Indicator Control



Distributed Through Dealers By:  
**P.O. Box 8771, Calabasas,  
Calif. 91302**

Contact your Nearest Dealer

Dealer Inquiries Invited

CIRCLE 169 ON READER SERVICE CARD

*In Part III of this series KR3T takes us through getting a signal on the air. The language of packet might seem strange at first, but it will become easier, if not second nature, after you use it a while.*

## An Amateur Packet Radio Primer Part III – Operating Packet Radio

BY JONATHAN L. MAYO\*, KR3T

**T**he previous two articles in this four-article series on amateur packet radio covered preliminary information on the inner workings of packet radio. The first article provided an introduction to packet radio's capabilities and digital communications in general. Last month's article covered the Terminal Node Controller (TNC) and the other components of a packet station.

This article describes the particulars involved in operating packet radio. Getting a packet station on the air is only "half the battle" when first getting started in packet radio. Packet radio is a unique mode with its own operating characteristics. New users are usually somewhat apprehensive about operating packet radio because of its different terminology and operating practices. Packet radio is simply a means of very efficiently communicating information through a versatile radio channel. As long as you keep this in mind and do not become over-concerned about the new operating procedures, you will quickly pick them up while learning to enjoy the capabilities of packet.

Portions of the articles have been excerpted from my book *The Packet Radio Handbook* to be published by TAB Books, Inc. in January 1987. The book is featured in TAB's current trade catalog, and the cost is \$14.95. If all goes according to schedule, the book should be available shortly after you receive this issue. For more information, write to TAB at P.O. Box 40, Blue Ridge Summit, PA 17214.

This article starts off with a discussion of user interfaces. The user interface is the first obstacle you will encounter once you get your station operating. After the introduction to user interfaces, initial parameters that usually have to be set before operation can begin are covered. Then the processes of initiating connections, conducting QSOs, and disconnecting are discussed.

### The User Interface

The user interface includes the command set, terminal specifications (such as screen size, baud rates, and control codes), and structure and design considerations (such as menus, modes, and prompts). Most TNCs have their user interfaces divided into three different areas. These areas are known as **modes**,

and each mode serves a different purpose. The **command mode** is used when entering commands and changing parameters. The **conversation mode** is used while transmitting and receiving frames and features many editing functions for preparing your data. The **transparent mode** is also used while transmitting and receiving frames, but it does not have any editing functions; the TNC is "transparent" to the user. The transparent mode can be used to transmit and receive binary programs and other data which might trigger the converse mode's editing functions.

The user interface will be your "window" to the packet world, so you should spend some time learning about its features. There are two main classifications of user interfaces that can be made. The first is for universal TNCs, and the second is for specific TNCs.

A universal TNC is a TNC designed for use with a wide variety of terminal configurations (ie., they will work with most any terminal). Because of this, their user interfaces are rather generic in design. They do not exploit the features of any one type of terminal in an effort to ensure a wide degree of compatibility.

There is little or no menu utilization, and the displays are usually very simple. They feature full command sets and one to three different operating modes. The prompts usually consist of a single line, and displays are not formatted in any special manner.

On a specific TNC the user interface is adapted for use with a specific terminal (or computer). It will often take advantage of any special features that the terminal may have, such as graphics capability and function keys. Because the screen size and other variables are known, menus and complex displays are often utilized. A full command set is offered, but because of the structured design of the interface, certain commands may only be accessed in certain sections. For example, transmitter parameters may only be accessed when in the radio interface menu.

The command set includes all commands and other parameters that can be utilized. There are two types of commands—those which are executed immediately and shortly forgotten, and those which are altered and retained for future reference. For example, the connect command is executed and must be re-entered when you want to connect to another station. But the retry command is a parameter which is set by the user and is recalled each time a frame is sent.

The most popular concept in command sets is the TAPR (Tucson Amateur Packet Radio) command set. Keep in mind that there can be a specific TNC utilizing the TAPR or other command set just as there can be a universal TNC utilizing the TAPR or other command set. There are some other command sets that have been developed for use with particular TNCs (such as the WA8DED code for the TNC-1 and the GLB command set used in GLB TNCs).

The TAPR command set is the most prevalent in packet radio today and has been widely copied in the majority of TNCs. It is the standard in much the same way as the Hayes® command set has become the standard in the landline modem world. The major benefits of the TAPR command set are that it is easy to learn and use. It features a full English syntax along with optional abbreviations. For example, the command to connect to KR3T is "Connect KR3T," or it can be abbreviated to just "C KR3T." The TAPR command set has three modes: the command mode, the converse mode, and the transparent mode.

In the command mode most commands are followed by an argument. For example, in the "Connect KR3T" example, "Connect" is the command and "KR3T" is the argument. There are two types of arguments: toggle and response. A toggle argument switches between two different conditions. The toggle argument in the TAPR command set consists of "On" or "Off." The second type of argument, response, consists of a string of characters as in the "Connect KR3T" example in which "Connect" is the command and "KR3T" is the response string or argument. After typing a command and argument, a key (usually RETURN or ENTER) must be pressed. This lets the TNC know that the command is finished and ready to be processed. Should an error have been made when entering the command, the TNC will display an error indicator and redisplay the command prompt "CMD:".

### Initial Parameters

There are several commands that must be set to configure the TNC so that it will work properly with the rest of the station. These commands can be divided into three categories: terminal parameters, radio parameters, and operational parameters. Terminal parameters are those commands which must be set to the proper values necessary for communications with the terminal (such as baud rate

\*1817 Saratoga Court, Allentown, PA 18104

and parity). Radio parameters are those commands which must be set to the proper values necessary for interfacing with the radio (such as transmit key-up delay). Operational parameters are those commands which must be set to the proper values for specific operating conditions (such as the maximum number of retries).

Because of space constraints, specific commands and parameters are not given. They are covered adequately in the user's manuals that come with the TNCs. Just realize that these initial parameters may need to be set before you begin operating your packet station. Most TNCs are shipped with default values already assigned to the parameters which are probably usable in most situations. Commands included later in this article are generic TAPR; their function should be obvious. If not, do not be concerned. They will become clearer as you learn more about packet radio.

## Monitoring

One feature available on all TNCs that is very useful when first getting on the air as well as for regular operating is monitoring. Monitoring allows you to "monitor" activity on a channel by disassembling all frames received by your station that meet certain conditions that you specify. In other words, you can select what activity you want to monitor. The TAPR command for monitoring is MONITOR. It is usually a toggle command with ON selecting monitoring. However, other TNCs may implement a numeric response code for an argument which selects the type of monitoring desired. It is usually possible to selectively monitor only frames containing user information, control frames, digipeated frames, or frames with specified addresses.

## Beacons

Now is a good time to introduce the subject of beacons. A beacon is a frame sent as "un-numbered information." An unnumbered information frame is sent (broadcast) on the channel for all users to receive. It can be sent regardless of whether the TNC is connected to another station. Because there is no destination address, a user-selected dummy address is placed in the address field of the frame. The dummy address is usually BEACON; CQ is sometimes used.

In the TAPR command set, the text to be sent in a beacon is entered using the BTEXT command. Beacons can be sent periodically or only after activity is heard on the channel. The command to activate the sending of a beacon is BEACON. The argument for a beacon to be sent repeatedly every specified time period is EVERY # (# = number of time intervals). The argument for a beacon to be sent after a specified pause in activity is AFTER #. The TAPR command to set the dummy address used by the beacon is UNPROTO and can include up to eight digipeaters.

Unnumbered frames can also be broadcast manually by entering the converse mode with the CONVERSE command without having an established connection and inputting the text. This can be useful when wanting to transmit information to a number of users at a single time, such as in a round-table discussion. However, there is no guarantee that the frames will be received correctly by all stations, as there is no error checking. When the send frame character is entered, the frame will be broadcast using the address set by the UNPROTO command as the destination address.

Just because all TNCs have the capability to send beacons does not mean that they should be used by all users. Beacons should be reserved for information that is of importance to a large number of operators. They should always be kept as short as possible, and the time period between transmissions should be kept as large as possible.

Digipeaters are usually easily located by monitoring beacons. Look for a frame sent as unnumbered information to a general address such as "BEACON," which states that the station is available for use as a digipeater. Some digipeaters may not advertise their availability, so monitor the activity of other stations in your area.

## Connecting to Yourself

Once you have located a digipeater by monitoring or other means, you should try to connect to yourself through it. This will allow you to check your station and get used to the process of initiating a connect, transferring information, and disconnecting. The command to connect to another station through a digipeater is "CONNECT callsign VIA digipeater callsign(s)." Up to eight digipeaters can be used and are separated by commas. For example, suppose I want to connect to myself using KR3T-1 as a digipeater. I would type "CONNECT KR3T VIA KR3T-1" at the command prompt; the abbreviated form is "C KR3T V KR3T-1."

My TNC would transmit a connect request packet which would be received by KR3T-1 if it is in range and operating. KR3T-1 would see that its address is in the digipeater field and would resend the connect request. My station, KR3T, would receive the connect request and send an acknowledgement to KR3T which would be digipeated by KR3T-1. Once KR3T received the acknowledgement, I would be connected to myself and automatically put in the CONMODE (for CONnect MODE), usually converse.

Anything I send would be sent back to me by KR3T-1. Typing a CTRL-C would put me back in the command mode, where I could type DISCONNECT to end the connection. After the disconnect request is sent (via the same path as the connect request) and acknowledged, I would be disconnected from myself. More information on connecting through digipeaters is given in the next section.

## Connecting to Another Station

Now that you are sure the station is operating properly because you were able to connect to yourself, you can connect to another packet station and conduct a packet QSO. The first example will show how to connect to another station without the use of a digipeater, and the second will demonstrate the use of multiple digipeaters.

Make sure your station is properly set up (ie., correct frequency, your call entered, CONOK ON—for CONnect OK, and XMITOK ON—for transmit OK). Look for the CMD: prompt. If it is not visible, press the ENTER (RETURN) key, and if that doesn't work, type the COMMAND character (usually CTRL-C—used to return to the command mode). As a last resort, turn the TNC off and on again. Pick a station to connect to that is within range of your station, possibly one that you have recently monitored.

The following example will assume you are trying to connect to my station: KR3T.

Type "C KR3T" at the CMD: prompt which

means "send a connect request frame to KR3T." Then press the ENTER (RETURN) key. The transmitter should key-up briefly as the connect request is transmitted. There are three possible outcomes to a connect request.

The first is that you will "retry out." This means that your TNC retransmitted the connect request RETRY number of times without receiving a response. This indicates that the station you are attempting to connect is out of range or not operating properly. The retry message will look like "\*\*\*\* Retry count exceeded." You will then be unilaterally disconnected and returned to the CMD: prompt.

The second possible outcome is that you will receive a busy message from the station to which you tried to connect. This looks like "\*\*\*\* KR3T busy." This indicates that I am already connected to another station or that I have my CONOK command turned OFF.

The third possible response is that I will acknowledge your connect request, and we will be connected. We are each sent a "\*\*\*\* Connected to Call" message (you will see my call and I will see your call) and put in the converse mode by our TNCs, assuming that is what we have each set our CONMODE to. Now everything that we type on our terminals will be put into frames and sent to the other station. The TNCs will keep sending the frames until they receive an acknowledgement from the other station. If no acknowledgement is received and the frame has been retransmitted RETRY number of times, the sending station will retry out.

The frames received by each TNC will be disassembled, and the information portion (where the user's text is put) is sent to the terminal. It is possible to return to the command mode during a QSO and alter or check parameters and initiate commands by typing the COMMAND character (usually a CTRL-C). The CMD: prompt will then be displayed. When you are through and want to return to the QSO, type CONVERSE at the CMD: prompt, and the TNC will switch to the converse mode again.

When you are through with the QSO, either station may initiate a disconnect by returning to the command mode and typing DISCONNECT (abbreviated DISC or just D) at the CMD: prompt. A disconnect request will be sent to the other station, and if acknowledged, the stations will be disconnected. If the other TNC does not acknowledge the disconnect request, it will be retransmitted up to RETRY number of times. You will then be unilaterally disconnected. It is also possible for you to initiate a unilateral disconnect by typing the DISCONNECT command a second time at the CMD: prompt; however, unilateral disconnections are not usually good operating practice.

When you are disconnected from another station, the TNC will send a "\*\*\*\* Disconnected" message to your terminal. You are now able to connect to another station. Some TNCs allow a user to be connected to more than one station at a time. Each connection is assigned a logical channel (or stream), and the user may switch between QSOs by selecting the proper channel. The ability to connect to more than one station simultaneously is known as "multi-connect capability."

## Connecting Through Digipeaters

If the station you wish to connect to is out of the range of your station, digipeaters may be utilized to bridge the gap between the two stations. Most all versions of AX.25 allow for up to 8 digipeaters to be used. The addresses of all

digipeater to be used must be known beforehand. To initiate a connect through digipeaters, type "C Call V Call, Call, . . . , Call" (ie., C KR3T V AA3F, KR3T-1). The connect request will be received by AA3F, digipeated to KR3T-1, and then digipeated to KR3T. Packets from KR3T will be sent to KR3T-1, to AA3F, and finally to your station. The remainder of the QSO is identical to that of a direct connection.

In order to utilize digipeaters effectively, it is necessary to learn a little about how they work. Most TNCs are capable of performing digipeater functions. A digipeater is a simplex packet relay station which receives all frames and checks to see if its address is contained in the digipeater address field. If the digipeater finds its address and it is its turn to relay the

frame, the digipeater updates the digipeater address field to the next digipeater, if any, and then immediately retransmits the frame if the channel is clear.

Digipeater do not retain copies of digipeated frames in memory or look for an acknowledgement from the next station. The acknowledgement for the digipeated frame must come from the destination station and be digipeated back to the originating station. Thus, if a frame is lost while being digipeated, the originating station must retransmit the frame from the beginning. This type of acknowledgement is known as an "end to end acknowledgement."

Digipeater have many drawbacks associated with them. They are useful and beneficial to packet radio as long as they are used prop-

erly and responsibly. One user misusing digipeaters can cause heavy congestion on a channel. Each digipeater used increases the amount of channel time a frame consumes and the range of the transmission. The more times a frame is digipeated, the higher the chances are that it will be lost along the way due to a collision or interference. The probability of getting a frame to its destination error free on the first attempt is reduced geometrically as the number of digipeaters is increased.

Only use as many digipeaters as are absolutely necessary to maintain the link to the other station. Most active areas have several strong digipeaters that will allow you to reach most other local users in one or two "hops." However, do not use more than two or three digipeaters on a moderately congested channel, and try to avoid digipeaters at all if the channel is very busy.

There are special digipeaters which are capable of receiving on one frequency and transmitting on another. These digipeaters are known as "dual port digipeaters"; the ports are on different frequencies. The dual port digipeater may be used as a regular digipeater by receiving and transmitting frames on a single port. The advantage of a dual port digipeater lies in its ability to automatically route frames that are received on one port out the other. This is accomplished by a "routing algorithm" programmed into the digipeater that "knows" which frames are to be routed out which port.

The maximum of eight digipeaters was included in AX.25 to allow remote areas to communicate over long distances. However, due to the rapid growth of packet radio it is almost impossible to utilize anywhere near eight digipeaters anymore in a moderately active area. Digipeater are an admitted kludge to allow for rudimentary networking until the development of true networking systems. The use of digipeaters for long-range communications will drop off significantly once these networking systems are implemented.

### Conclusion

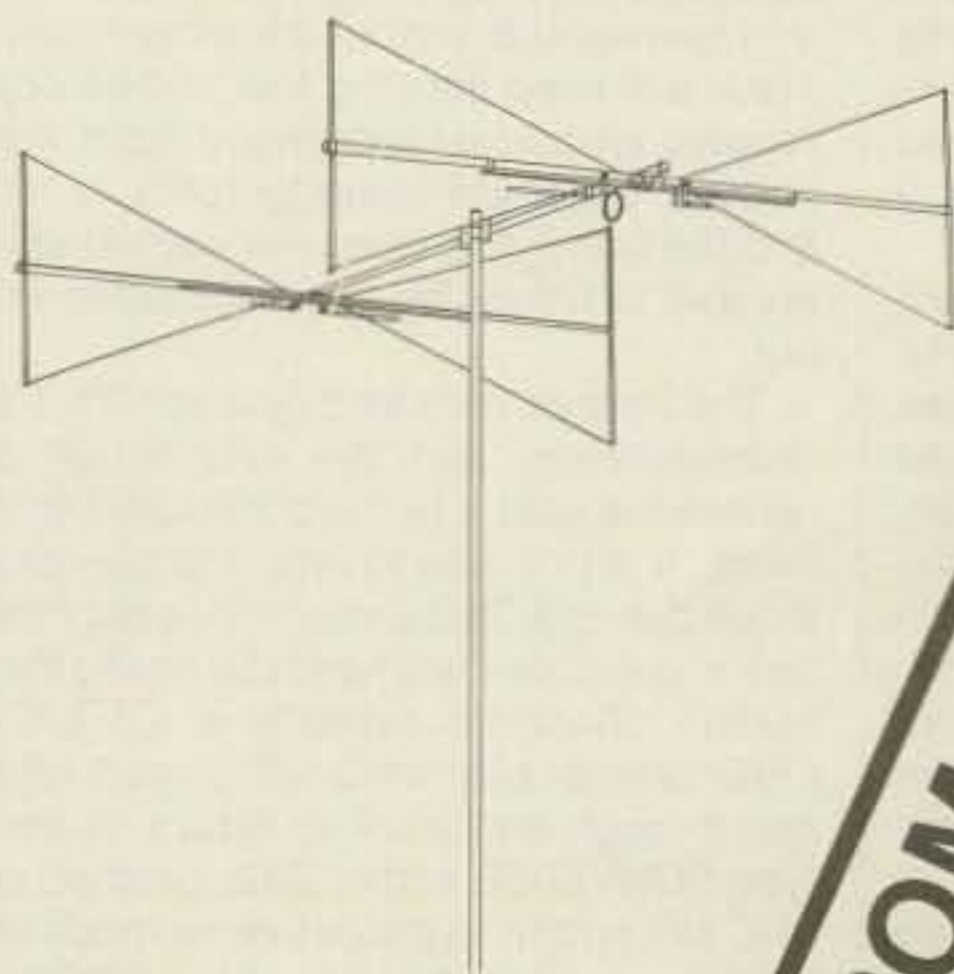
This article has run the full course from setting initial parameters to connecting any using digipeaters. It is my hope that having some prior knowledge of the techniques used in operating packet radio will take away some of the nervousness and concern from operating packet and replace it with understanding and excitement. If things don't seem to be going right at first, relax, sit down, and think about exactly what you are doing. Sketching out the steps you are taking and the paths you are using may be helpful in diagnosing your problem. Most new users quickly adapt to packet radio, and it rapidly becomes one of their favorite modes.

If you have any questions, comments, or suggestions regarding the article series, my packet book, or packet radio in general, please contact me. You can write to me at the address listed; however, if you would like a quicker response, leave me a message on CompuServe. My ID is 72276,2276. Also, while you're on CompuServe, visit the HamNet forum. HamNet is dedicated to most all aspects of amateur radio, including packet. To get to HamNet, use the "GO HAMNET" command. I have an online column dedicated to packet radio in the HamNet Online section (GO HAM-1) which I invite you to access. The column is called Packet Radio Online.

Next month is the final article in this series, and I'll discuss bulletin-board operation and the future of amateur packet radio.

## The HF4B "Butterfly"™

A Compact Beam  
for 20-15-12-10 Meters



- Unique design reduces size but **not** performance.
- No lossy traps; full element radiates on all bands.
- Retrofit kit for 17 meters coming soon.
- Turns with TV rotor
- Only 17 lbs.

**BUTTERNUT**

### Butternut Verticals

Butternut's HF verticals use highest-Q tuning circuits (not lossy traps!) to outperform all multiband designs of comparable size!

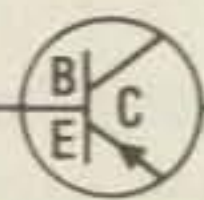
#### Model HF6V

- 80, 40, 30, 20 15 and 10 meters automatic bandswitching.
- Add-on kit for 17 and 12 meters available now.
- 26 ft. tall

#### Model HF2V

- Designed for the low-band DXer
- Automatic bandswitching on 80 and 40 meters
- Add-on units for 160 and 30 or 20 meters
- 32 feet tall - may be top loaded for additional bandwidth.

For more information see your dealer or write for a free brochure



**BUTTERNUT ELECTRONICS CO.**

405 East Market Lockhart, Texas 78644

Please send all reader inquiries directly.

**ege, inc.**

# DISCOUNTS FOR AMATEURS

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

## EGE VIRGINIA

Information & Service: (703) 643-1063  
Service Department: (703) 494-8750  
13646 Jefferson Davis Highway  
Woodbridge, Virginia 22191  
Store Hours: M-Th: 12 noon-6 pm  
F: 12 noon-8 pm  
Sat: 10 am-4 pm  
Order Hours: M-F 9 am-7 pm  
Sat 10 am-4 pm

## EGE NEW ENGLAND

8 Stiles Road  
Salem, New Hampshire 03079  
**New Hampshire Orders,\***  
Information & Service: (603) 898-3750  
**New England Orders: 800-237-0047**  
Store Hours:  
MTWSat: 10 am-4 pm  
ThF: 12 noon-8 pm  
Sun: Closed

\*Order and we'll credit you with \$1 for the call.

**LACOMBE**  
DISTRIBUTORS

Our Associate Store:  
Lacombe Distributors  
Davis & Jackson Road, P.O. Box 293  
Lacombe, Louisiana 70445  
Information & Service: (504) 882-5355

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

**Much More in stock!**  
**Send \$1 for our  
New Fall Buyer's  
Guide-Catalog.**

## More Helpers

- Marine radios by Icom
- Commercial Land Mobile by Yaesu
- Telephones by AT&T, Cobra, Southwestern Bell, & Panasonic
- CBs by Uniden, Midland, Cobra
- Radar Detectors by Uniden, Cobra and Whistler

## Extended Service Agreements Available

## Antennas

HF, VHF, SWL, scanner, marine, & commercial for Mobile or Base.

Cushcraft

Mini-Products • Larsen  
B&W • Van Gorden  
Butternut • KLM  
Mosley • Hustler  
Telex Hy-Gain

## Towers

Unarco-Rohn, Hy-Gain, Tri-Ex  
Ask for special quotes on package deals including cable, guys, connectors, turnbuckles, etc.

## Accessories

Phillystran  
Kenpro • Alliance  
B&W • Telex Hy-Gain  
Daiwa • MFJ  
Bencher • Amphenol  
Astron • Welz  
B+K Precision

## Amplifiers

Diawa • Ameritron  
Amp Supply • Vocom  
TE Systems  
Tokyo Hy-Power

## Computer Stuff

Packet Radio  
Hardware and Software  
for RTTY/Morse  
Hal • Kantronics  
Microlog • MFJ  
Ham Data Amateur Software.

## Shortwave

Sony  
Panasonic  
Yaesu  
Kenwood  
Icom

## Scanners

Uniden/Bearcat  
Regency

## More Radios

Encomm/Santec  
KDK  
Ten-Tec

# YAESU

## NEW FT-23/73

Mini handheld for 2m or 440 MHz. 2.5 W output. 10 memories. LCD display.



## FT-767GX

All-mode transceiver. Cat system.

## FT-757GX

HF XCVR/Gen. Coverage Receiver.

## FT-727G

Dual-band handheld for 2m/440 MHz

## SOFTWARE

GX Turbo and Catpack for the FT-757GX and Catpack for the FRG-9600 Receiver

# KENWOOD



## TS-440

HF XCVR with built-in Antenna Tuner.

## TS-940

HF XCVR/Gen. Coverage Receiver.

## TM-2530A / 50A / 70A

25/45/70-watt mobile 2m rigs.

## TM-201B

2m Mobile, 45-watts

## Handhelds

TR-2600A, TR3600, TH21AT, 31AT, 41AT. Call for quotes



# ICOM

## IC-735

Compact HF Transceiver

## IC-751A

HF XCVR/General Coverage Receiver.

## VHF/UHF

2m- 27A, 27H, 271A, 271H  
220 MHz- 37A  
440 MHz- 471A, 471H, 47A

## IC-02AT, 04AT

Small, light HTs for 2m or 440 MHz. 10 memories and scan functions.

## IC-A2 in stock

Aircraft handheld

## IC-2AT, 3AT, 4AT, 12AT

Handhelds for 2m, 220 MHz, 440 MHz, 1.2 GHz

**Package Quotes on  
Radios/Accessories  
& Antennas/Towers**

# MFJ TUNERS

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

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs—only 10 $\frac{3}{4}$ "Wx4 $\frac{1}{2}$ "Hx14 7/8"D.

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

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

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



MFJ989B

\$329<sup>95</sup>

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

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

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

## MFJ's Fastest Selling TUNER

MFJ-941D \$99.95



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

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

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

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

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

## MFJ's 1.5 KW VERSA TUNER III

MFJ-962B \$229.95



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

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10 $\frac{3}{4}$  x 4 $\frac{1}{2}$  x 14 $\frac{7}{8}$  inches. Flip stand for easy viewing. Requires 12V for light.

## MFJ's Best VERSA TUNER

MFJ-949C \$149.95



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

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

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

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

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

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

Order your convenience package now and enjoy.

## 2 KW COAX SWITCHES

MFJ-1702 \$19.95



MFJ-1702. \$19.95. 2 positions. 60 dB isolation at 450 MHz.

Less than .2 dB loss. SWR below 1:1.2.

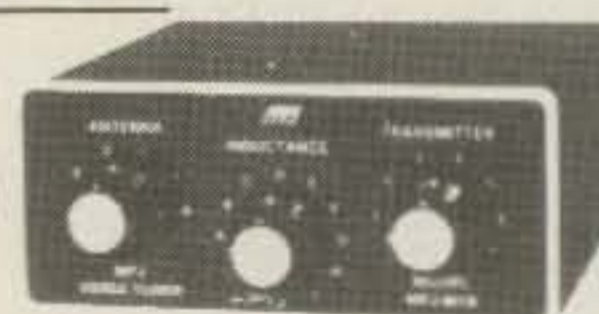
MFJ-1701, \$29.95.

6 positions. White markable surface for antenna positions.



## MFJ's Smallest VERSA TUNER

MFJ-901B \$59.95



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

## MFJ's Random Wire TUNER

MFJ-16010 \$39.95



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

## MFJ's Mobile TUNER

MFJ-945C \$79.95



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

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

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

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

# MFJ

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

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

800-647-1800

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





# AFFORDABLE PACKET RADIO FROM MFJ

MFJ's TAPR TNC 2 clone in a new cabinet with added features... for an incredible \$139.95!



MFJ-1270  
**\$139.95**

Join the exciting packet radio revolution and enjoy error-free communication... for an incredible \$139.95! MFJ brings together efficient manufacturing and TAPR's (Tucson Amateur Packet Radio) leading edge

technology to bring you top quality and affordable packet radio.

You get MFJ's highly acclaimed clone of the industry standard TAPR TNC 2. Its in a new cabinet and includes a TTL serial port and an easily replaceable lithium battery for memory back-up.

All you need is your rig, home computer with a RS-232 serial port and a terminal program. If you have a Commodore 64, 128, or VIC-20 you can use MFJ's optional Starter Pack to get on the air immediately.

You get interfacing cable, terminal software on tape or disk and complete instructions... everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), \$19.95 each.

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

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

You can also use the MFJ-1270 as an excellent but inexpensive digipeater. You can use 12 VDC for portable operation or 110 VAC for fixed station operation.

It features AX.25 Level 2 Version 2 software, hardware HDLC for full duplex, true Data Carrier Detect for HF, 16K RAM, simple operation plus more.

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

## Here are MFJ's latest and hottest products for improving your station's performance.

**MEMORY KEYS**  
MFJ-484B  
**\$139.95**



The MFJ-484B "GRANDMASTER" Memory Keyer is THE choice of CW contesters. Why? Because it's so easy to use it's second nature... you don't have to remember how to use complex commands... and it has all the features you'll ever need for easy CW.

Features like these... you can store up to twelve 25 character messages that you can combine and send at whatever speed you want, you can repeat any message continuously or pause between repeats, you can change or insert into a playing message by simply sending and much more.

The MFJ-484B is RF proof, sends 8-50 WPM and measures just 8x2x6 inches. It uses 12 to 15 VDC or 110 VAC with MFJ-1312, \$9.95.

### HF SWR/WATTMETER

MFJ-816  
**\$29.95**



Want minimum SWR to maximize your antenna performance?

The MFJ-816 is our smallest -4 1/2 x 2 1/4 x 3 inches-(and most affordable) SWR/Wattmeter that lets you read SWR, forward and reflected power (30/300 watt scales) from 1.8 to 30 MHz. Uses toroidal current pickup for uniform sensitivity.

### CROSS-NEEDLE SWR/WATT METER

MFJ-815 **\$59.95**

MFJ's cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance! SWR is automatically computed

—no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter. Needs 12-V. ±10% full scale accuracy. 6 1/2 x 3 1/4 x 4 1/2 inches



### 2 KW COAX SWITCHES

Instantly select any antenna or rig by turning a knob. Organizes coax cables and eliminates plugging and unplugging. Unused terminals are grounded to protect

your equipment for stray RF, static and lightning. 2 KW PEP, 1 KW CW. For 50 to 75 ohm. Negligible loss, SWR, and crosstalk gives high performance. SO 239s. Convenient desk or wall mounting.

MFJ-1702, \$19.95. 2 positions. Cast aluminum cavity construction gives excellent performance up to 500 MHz with better than 60 dB isolation at 450 MHz. Heavy duty, low loss switch has less than 20 milliohm contact resistance, less than 0.2 dB loss and SWR below 1:1.2. 2 x 2 1/2 x 1 inches.

MFJ-1701, \$29.95. 6 positions. White markable surface for recording ant. positions. 8 1/2 x 1 1/2 x 3 in.

MFJ-1702  
**\$19.95**



**\$29.95** MFJ-1701



### ANTENNA CURRENT PROBE

MFJ-206 **\$79.95**

This new breakthrough MFJ Antenna Current Probe lets you monitor RF antenna currents—no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- Indicate transmission line radiation due to high SWR, poor shielding or antenna unbalance.
- Detect re-radiation from rain gutters and guy wires that can distort antenna field patterns.
- Detect RF radiation from ground leads, power cords or building wiring that can cause RFI
- Determine if ground system is effective.
- Pinpoint RF leakage in shielded enclosures
- Locate the best place for your mobile antenna
- Use as tuned field strength meter.

Monitors RF current by sensing magnetic field. Uses an electrostatically shielded ferrite core, FET RF amplifier, op-amp meter circuit for excellent sensitivity, selectivity. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strength meter. 4 x 2 x 2 inches.



### MFJ's Best VERSA TUNER

MFJ-949C  
**\$149.95**



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

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale.

Run up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Tune out SWR on dipoles, vees, long wires, verticals, whips, beams/quads. 10x3x7 in.

### RF PRESELECTOR

MFJ-1040  
**\$99.95**



Is your transceiver or receiver "hearing" all it could? Adding a MFJ-1040 RF preselector can make "lost" signals readable while reducing troublesome images and out-of-band signals. It adds 20 dB of low noise gain with a strong, sharp tuning front end and covers all HF amateur and shortwave bands through lower VHF from 1.8 to 54 MHz.

A built-in 20 dB attenuator prevents receiver overload. It has automatic bypass for transmitting, works with 2 antennas and 2 receivers, is 8x2x6 inches and uses 9-18 VDC or 110 VAC with optional MFJ-1312, \$9.95

### MOBILE ANTENNA MATCHER

MFJ-910 **\$19.95**

Lower your SWR and Get more power into your mobile whip for solid signals and more QSOs. Your solid state rig puts out more power and generates less heat. For 10-80 meter whips. Easy plug-in installation. Complete instructions. Fits anywhere, 2 1/2 x 2 1/2 in.



ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).

- One year unconditional guarantee • Made in USA
- Add \$5.00 each shipping/handling • Call or write for free catalog, over 100 products.

# MFJ

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

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

**800-647-1800**

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



ORDER TOLL FREE:

# 1-800-233-2482

MINNESOTA, ALASKA or DX CALL: 218-765-3254  
or 612-255-0855

- We Ship Worldwide
- Helpful, Personal Service
- We Specialize In Antennas & Towers. Call Us For Your Needs.

## ANTENNAS hy-gain

From 3 elements on 2 meters to 3 elements on 40; we have a complete inventory of Hy-Gain products including the new OSCAR ANTENNAS.

Excellent manufacturer customer service and product back-up. Call for your needs!

## KLM

Whether you need a 3 element 80 meter yagi or 44 elements on 1296, we can supply you with a KLM system to meet your HF, VHF, UHF or OSCAR needs.



Our choice for HF mobile systems. Hustler also has an impressive HF vertical line.

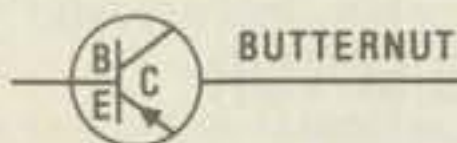


## Larsen Antennas

Our choice for VHF and UHF mobile antennas. Choice of mounts, versatility, and a proven track record. From 144 to 1296 MHz.

## cushcraft

One of today's best values in antennas. Call us for all your Cushcraft antenna needs, HF to UHF.



Our No. 1 selling line of HF verticals. Accessories and other antennas in stock at big savings.

HF6V / HF2V.....\$112.00 / 109.00  
TBR-160 / RMK II.....46.95 / 41.95  
HF4B / 2MCV-5.....189.00 / 49.95  
SC-3000 Scanner Antennas.....54.95



Call for prices!

## ALPHA DELTA

New antennas plus lightning protection for your antenna system.

DX-A Twin Sloper.....\$46.95  
DX-D / DX-80.....79.95 / 64.95

COAXIAL SWITCHES, BALUNS,  
COAX-SEAL, INSULATORS,  
NYLON SUPPORT ROPE,  
PRE-ASSEMBLED DIPOLES,  
X-PANDA-FIVE



## TEN-TEC

Model 561  
Corsair II —

200W HF broadband transceiver. All 9 HF bands, QSK, built-in keyer, excellent selectivity.

Accessories include:

Model 260 Power Supply Model 214 Microphone  
Model 263G Remote VFO  
Model 425 TITAN LINEAR AMPLIFIER

### OTHER TEN-TEC PRODUCTS:

Model 579 Century/22 — 50W CW Transceiver  
Model 2510 Satellite Station  
Model 229A 2KW Antenna Tuner  
Model TT-920 VHF Aviation Transceiver

### COMING SOON...

The PARAGON! A full-featured HF transceiver that competes with the most expensive imports.



## MIRAGE

VHF & UHF AMPLIFIERS



12 Volt DC supplies from 4 to 50 amps. Metered and variable voltage models in stock.



## MFJ

Tuners, meters, accessories, PACKET!!



## AMERITRON

HF linear amplifiers and remote coaxial switches

SANTEC • KDK • WELZ • ALLIANCE  
BENCHER • B&W • VGE • ANDREW HELIAX

### Comments:

*We've assembled, tested, and put a Cushcraft 4218XL antenna on the air. We used 2 of them to bounce a signal off the moon. We're impressed. This one works!*

*We wish you the happiest of holidays and many fine QSO's in 1987.*

Ralph, KØIR      George, ADØS

## WIRE & CABLE

### BELDEN COAX

9913 low loss.....\$0.42/ft.  
RG-213/U (8267).....0.40  
RG-8/U (8237).....0.32  
RG-8/U (8214).....0.35  
RG-8X (9258).....0.19  
RG-11A/U (8261).....0.37  
RG-58A/U (8259).....0.13  
RG-59/U (8241).....0.14  
450 ohm ladder line.....0.10

### COPPERWELD ANTENNA WIRE

Solid: 12 ga.....0.12  
14 ga.....0.10  
Stranded: 14 ga.....0.10

### ROTOR CABLE

Standard (6-22, 2-18).....0.19  
Hvy Dty (6-18, 2-16).....0.35  
Others in stock!

### AMPHENOL CONNECTORS

PL-259's in plated, silver, and teflon varieties. Adaptors, tees, angles & jacks. "N" and "BNC" type connectors

COAX AVAILABLE IN PRECUT LENGTHS WITH CONNECTORS ATTACHED.

## ROTORS

Call for current prices on these popular models.

TELEX	KENPRO	
CD 45 II	KR-400	KR-600RC
HAM IV	KR-400RC	KR-5400A
T2X	KR-500	KR-5600A
HDR-300	KR-600	

## TOWERS

### ROHN

#### FREE STANDING:

HBX40 / HDBX40.....\$198.00 / 249.00  
HBX48 / HDBX48.....265.00 / 325.00  
HBX56 / BX64.....335.00 / 370.00

#### GUYED TOWERS:

25G / 45G.....\$48.00 / 109.00  
TB3 Bearing.....49.95

Full line of Rohn accessories. Freight additional.

#### FOLD-OVER TOWERS:

FK2548 / FK2558.....\$869.00 / 929.00  
FK2568 / FK4544.....979.00 / 1179.00  
FK4554 / FK4564.....1279.00 / 1369.00

Fold-overs shipped FREIGHT PREPAID. Prices 10% higher in western states.

### HY-GAIN

Our choice in a crank-up, self-supporting tower. The HG-37SS, HG-52SS, HG-54HD, and HG-70HD represent "top drawer" quality. CALL for your needs!

### PHILLYSTRAN!

Electrically transparent guy systems in stock! Call!



## rf enterprises

Route No. 7  
St. Cloud, Minnesota 56301



VISA/MASTERCARD

Prices subject to change without notice. Minnesota residents add 6% tax.

Shipping additional except as noted.



# The 31st Annual CQ World-Wide WPX Contest

**SSB: March 28–29, 1987**

**CW: May 30–31, 1987**

**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.

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

address, whichever is greater. The antennas must be physically connected by wires to the transmitter.

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

**VI. Points:** Contacts between stations:

**1. North America Only**

A) Contacts outside of North America count 3 points on 28, 21, 14 MHz, and 6 points on 7, 3.5, 1.8 MHz.

B) Contacts with other North American countries count 2 points on 28, 21, 14 MHz, and 4 points on 7, 3.5, 1.8 MHz.

C) Contacts within own country count 0 points but are permitted for prefix multiplier credit.

**2. Europe, Asia, Africa, Oceania, S. America**

A) Contacts outside of own continent count 3 points on 28, 21, 14 MHz, and 6 points on 7, 3.5, 1.8 MHz.

B) Contacts with other countries on own continent count 1 point on 28, 21, 14 MHz, and 2 points on 7, 3.5, 1.8 MHz.

C) Contacts within own country count 0 points but are permitted for prefix multiplier credit.

**VII. Multiplier:** The multiplier is determined by the number of different prefixes worked. A "PREFIX" is counted only once during the entire contest regardless of how many times the same prefix is worked.

1. A "PREFIX" is considered to be the three letter/number combination which forms the first part of an amateur radio call (N1, NI1, K2, AZ1, AH2, IT9, JW0, JA1, Y23, HG7, AL7, etc.). **A station operating from a call area different than that indicated by its call sign is required to sign portable. The portable prefix must reflect the DXCC country of operation. The portable prefix would then be the multiplier.** Example: N8BJQ/6 would count as prefix N6, while W8IMZ/LX would count as LX0.

2. 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 - WD8QDQ  
U.S.A. - Bob Epstein, K8IA  
CANADA - Ed Sleight, K4SB  
CARIB./C.A. - Arturo Gigante, Jr., HI8GB  
EUROPE - Bernie Welch, W8IMZ  
\*JAPAN - Palm Garden Radio Club  
SO. AMERICA - Ron Moorefield, W8ILC  
OCEANIA - Down Under DX'ers  
AFRICA - Southeastern DX Club  
WORLD QRPp - Dayton A.R.A.

##### **Single Operator, Single Band**

WORLD - John N. Reichert, N4RV  
U.S.A. - 7 MHz - William Diggins, WA8LXJ  
\*CANADA - Gene Krehbiel, VE7KB  
EUROPE - Myron E. Crofoot, WB4VQO  
JAPAN - Ken Ruddock, K6HNZ  
\*JAPAN - 28 MHz - Joe Arcure, W3HNC & Toshi Kusano, JA1ELY (Terry Appleton, W4GSM Memorial Award)  
\*WORLD - 21 MHz - Lee Wical, KH6BZF  
WORLD - 7 MHz - William Diggins, WA8LXJ  
U.S.A. - 14 MHz - Doug Zwiebel, KR2Q

##### **Multi-Operator, Single Xmtr.**

WORLD - Mike Badolato, W5MYA

##### **Multi-Operator, Multi-Xmtr.**

WORLD - Henry Thel, VE7WJ  
U.S.A. - Bert Curwen, KL7IRT

##### **Contest Expedition**

WORLD - Kansas City DX Club

• • •

##### **CW**

##### **Single Operator, All Band**

WORLD - Terry Baxter, N6CW  
U.S.A. - Steve Bolia, N8BJQ  
\*JAPAN - Palm Gardens Contest Club  
OCEANIA - Tom Morton, KT6V  
WORLD - QRP/p - QRP A.R.C.I.

##### **Single Operator, Single Band**

WORLD - Pedro Piza, Jr., NP4A  
(Pedro Piza, Sr., KP4ES Memorial)  
U.S.A. - Kansas City DX Club  
U.S.A. - 7 MHz - Dennis Younker, NE6I  
ASIA - Bruce Frahm, K0BJ  
WORLD - 3.5 MHz - Lance Johnson Eng.  
U.S.A. - 14 MHz - Gene Walsh, N2AA  
OCEANIA - 3.5 MHz - K0SCM

##### **Multi-Operator, Single Xmtr.**

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

##### **Multi-Operator, Multi-Xmtr.**

NORTH AMERICA - Dick Weber, K5IU

##### **Contest Expedition**

WORLD - Ed Roller, K4IA

##### **Club (SSB & CW)**

WORLD - CQ Magazine  
U.S.A. - Northern Ohio A.R.S.

*\*Donor is responsible for this trophy.*

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

**XII. Club Competition:** A trophy will be

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

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

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

3. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated. Computer logs must be checked for typing accuracy.

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

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

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

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

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

**XIV. Disqualification:** Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSO's or multipliers will be deemed sufficient cause for disqualification. 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, 1987** for the SSB section and **July 10, 1987** for the CW section. **Indicate SSB or CW on the envelope.** From isolated areas the deadlines can be more flexible.

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, via CQ Magazine, 76 North Broadway, Hicksville, NY 11801 U.S.A.*

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



**The Super Converter 8001 Features:**

- Listening to 810-912 MHz Band on a UHF Scanner and /or Other Monitor Receivers
- Easy Connections to Your Receiver
- 9 Volts Battery Operation Power Source and Power On Indicator by LED Display
- External Power Jack Size: 79(W) x 30(H) x 100(D) mm

**Warranty**

- 180 Days From Date of Purchase

**Unit Cost**

- \$59.94 plus \$4.00 Shipping and Handling Charge

**EASY LISTENING**

- FOR 810 TO 912 MHz BAND SUPER CONVERTER 8001
- FOR YOUR UHF SCANNING RECEIVER AND OTHERS

A super-converter 8001 has been certified by FCC part 15 regulation.

**HOW TO ORDER**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

Zip: \_\_\_\_\_ Phone ( ) \_\_\_\_\_

Make Check or Money Order payable to GRE AMERICA, INC.

Mail to: GRE AMERICA, INC.  
425 Harbor Blvd., Belmont, CA 94002

Unit Cost @ \$59.94 x \_\_\_\_\_ = \_\_\_\_\_

CA. Residents Add 6.5% Tax \_\_\_\_\_

Shipping & Handling @ \$4.00/ \_\_\_\_\_

Unit x \_\_\_\_\_ = \_\_\_\_\_

Qty. \_\_\_\_\_ Total \_\_\_\_\_

**PAYMENT METHOD** TOTAL ▶ \_\_\_\_\_

Check  Money Order

Mastercard  Visa

Card No. \_\_\_\_\_

Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_

**PHONE ORDER: 800-233-5973  
or 415-591-1400**

CIRCLE 54 ON READER SERVICE CARD

**AMPLIFIER PARTS**



2700 pf screen bypass cap

JOHNSON 124-0110-001 SOCKET  
Identical to Eimac SK-600A  
\$ 35 ea or 2/ \$ 65



1100 pf screen bypass cap

JOHNSON 124-0115-001 SOCKET  
Identical to Eimac SK-620A  
\$ 35 ea or 2/ \$ 65



JOHNSON 124-0111-001 CHIMNEY  
Identical to Eimac SK-606  
\$ 12 each or 3 for \$ 30

**POWER TUBES**  
WE GUARANTEE WITH RECORDED SERIAL NUMBER  
BRAND NEW

7580W / 4CX250R	\$ 75
8122	\$100
3-500 Z	\$ 85
8168 / 4CX1000A	\$225
8877 / 3CX1500A7 (4 kv plate)	\$450
3CPX1500A7 (10 kv plate)	\$600
8171 / 4CX10,000D	\$1100
8281 / 4CX15,000A	\$1400

**Shipping Instructions:**

Enclose \$2.50 for UPS  
We accept Personal Checks (allow 2 weeks)  
VISA, MASTERCARD, AMERICAN EXPRESS.  
Add \$2 for COD UPS or \$3 for COD Parcel Post US Mail.

**SURPLUS SALES OF NEBRASKA**

2412 CHANDLER RD.  
BELLEVUE, NE 68005

402-733-9190 24 hours

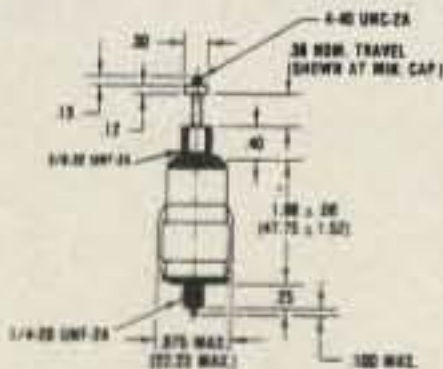
Surplus Sales will purchase your excess Vacuum Capacitors & Relays, RF Connectors and NEW Tubes. Write for our quote.

**GAS VARIABLE CAPACITOR JENNINGS CHV1 - 45**

\$48.00 EACH 2 or more units \$42.00 EACH  
High Q Low Inductance  
EXCELLENT FOR VHF/UHF APPLICATIONS

Includes a drive mechanism

Capacitance 1.5 - 45 pf  
Voltage 5 kv max test  
Voltage 3 kv max wv  
Current 18 amps max



CIRCLE 13 ON READER SERVICE CARD

Say You Saw It in CQ

COMMERCIAL - AVIONICS - SOLID STATE - DIPOLE - LONG WIRE - MILITARY - MARINE

**"THE AMERICAN ORIGINAL"**

MADE IN AMERICA BY AMERICANS

**MAXCOM**

**AUTOMATIC ANTENNA MATCHER**

FOR ALL S.S.B. RADIOS

"ONE ANTENNA 100 KHZ. TO 200 MHZ."

MAXCOM has made Global Communications Simple!!!

**TEN MODELS:**

150 WATTS TO 10,000 WATTS  
\$299. TO \$1,999.

**VSWR 1.5:1  
OR LESS**

**FIVE YEAR  
GUARANTY  
ON  
MOST MODELS**

**SOLD BY SERIOUS, PRACTICAL RADIO DEALERS YOU REALLY NEED**

**"THE ONLY ANTENNA SYSTEM YOU REALLY NEED"**



Absolutely no tuning with a MAXCOM system.  
Simply connect, dial your frequency and talk...  
That's it, just TALK.

OVER 3000 MAXCOM STATIONS WORLD WIDE  
MAXCOM, INC. BOX 502, FT. LAUD., FL. 33302

305-527-5172 © 1986 Maxcom, Inc.

THE BOTTOM LINE: "MAXCOM WORKS"

CIRCLE 55 ON READER SERVICE CARD

*You don't have to be a genius to use some basic physics via your C-64 to work on antenna designs. WA0YJX takes us through some pretty impressive calculations, the easy way.*

# Calculating Wind Stress On Towers and Guy Wires

## A Program For The Commodore C-64

BY GEORGE E. BLACK\*, WA0YJX

Last winter a severe ice storm brought down my telescoping steel mast which was supporting three inverted-Vee antennas. I decided I needed to know more about the stress which results from wind loading of the antenna and support structures before replacing my antenna system rather than just going out and buying something, hoping that it would be sufficient. The mathematical gymnastics required got me down. The accompanying computer program is the result of my efforts to simplify the calculation process. While written for the Commodore C-64, it should not be too hard to convert for use with other computers.

### Wind Loading

The first information you need to know is the maximum wind speed expected. The formula for wind pressure on flat surfaces is:

$$P = 0.004 V^2 \quad (1)$$

where  $V$  is the wind velocity in miles per hour, and pressure, or  $P$ , is given in pounds per square foot.

For the United States the map shown in fig. 1, which is available in most tower literature as well as from Electronics Industries Association (EIA) Standard RS-222-B, December 1972, shows a wind loading of 30, 40, 50 pounds per square foot, for zones A, B, and C, respectively. These figures are for towers less than 300 feet high. Putting these numbers into equation (1) gives wind velocities of 86.6, 100, and 112 miles per hour. As I live in west central Missouri, which is in zone A, the usual rating would be 86.6 miles per hour. But after losing my antennas once, I want to be very conservative on my rat-

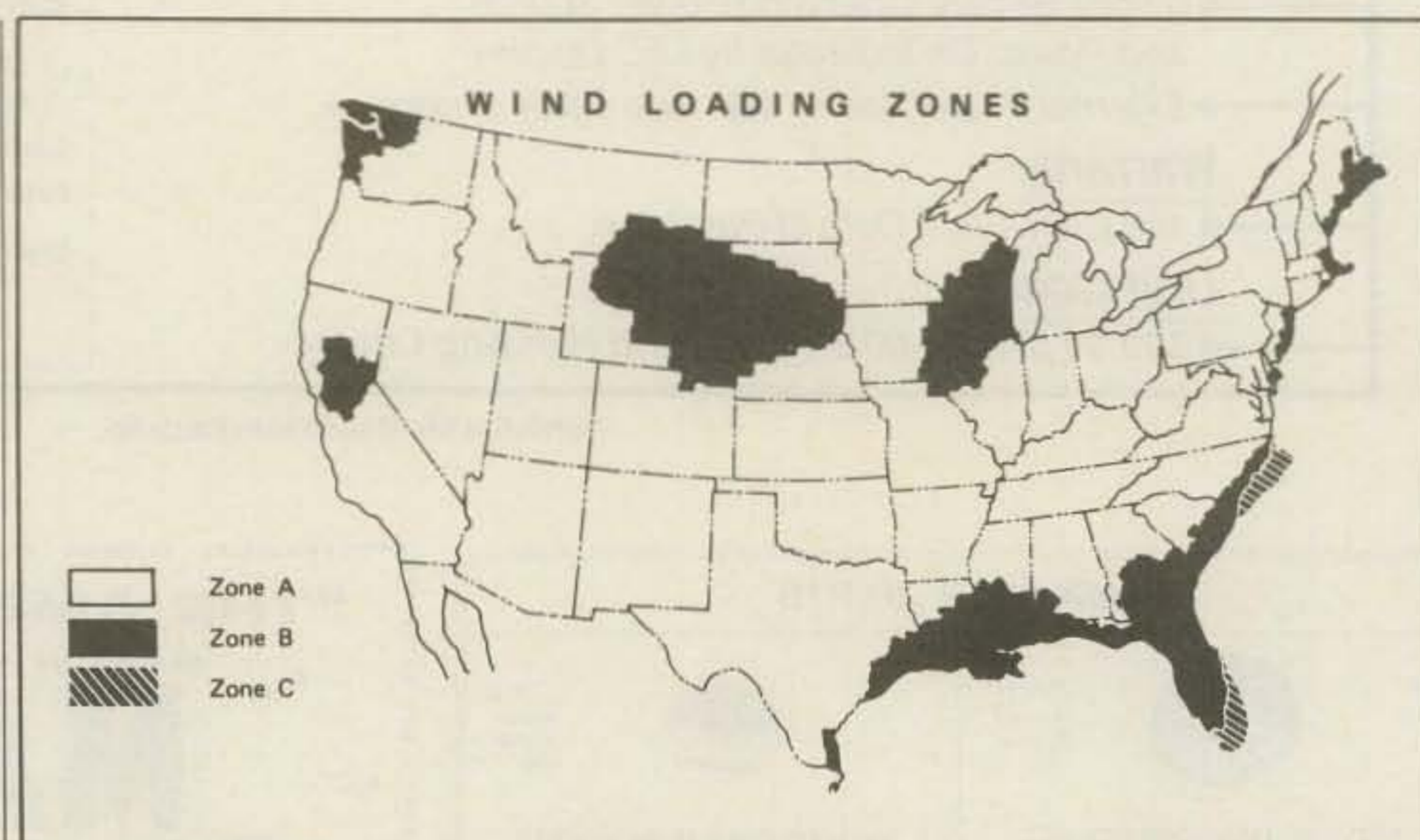


Fig. 1—Wind-loading zones for the continental United States.

ings, so I will design for 100 miles per hour to allow for those strong gusts that sometimes are generated around buildings.

### Projected Area

The next thing needed is the projected areas of the tower or mast and antenna. This is defined as the area of a shadow cast by the structure. I know that for a cylindrical surface the pressure exerted by wind is only 66 percent of the force exerted on a flat surface, but remember, I'm being conservative, so I'll proceed as if dealing with a flat surface. A utility pole or a steel mast may be thought of as a very tall, skinny trapezoid. The formula for calculating the area of a trapezoid is:

$$A = ((B_1 + B_2) \times H) / 2 \quad (2)$$

where  $B_1$  is the diameter of the mast at the

top,  $B_2$  is the diameter at the base, and  $H$  is the height.

After cutting out the damaged portions of my mast, the height was reduced to 44.5 feet, or 534 inches. The top diameter is  $1\frac{1}{4}$  inches, with the diameter at the base being  $2\frac{1}{4}$  inches. Using these figures in equation (2), we get 934.5 square inches, or about 6.5 square feet.

Use the manufacturer's area rating for your commercial antenna. Calculating the projected area of my three wire antennas plus coax gives approximately 4 square feet of antenna supported by the mast.

Remember, if there is a coating of ice, the projected area is increased accordingly. For instance, a wire that is normally .125 inches in diameter will be .625 inches in diameter with a .25 inch layer of ice surrounding it. Fortunately, in this part of the country, in winter, when you

\*325 E. Main, Adrian, MO 64720

```

10 REM-CALCULATE STRESS ON GUY WIRES AND TOWER (C) 1986 GEORGE E. BLACK WA0YJX-
12 POKES3280,11:POKES3281,11:POKE646,15:PRINTCHR$(147):PI=3.14159265
14 PRINT"      GUY WIRE STRESS CALCULATION"
16 PRINT"      DO YOU WISH HARD COPY (Y/N)":B=0
18 PRINT"      N"CHR$(157)CHR$(157)CHR$(157);:INPUTZ$:IFZ$="Y"THEN B=1
20 REM-CALCULATE PRESSURE IN POUNDS PER SQUARE FOOT
22 PRINT:PRINTCHR$(147)"MAX. WIND SPEED EXPECTED >MPH":INPUTV:P=.004*V^2
24 PRINTCHR$(145)SPC(1)V
26 REM-CALCULATE FORCE ON TOWER
28 PRINT"PROJECTED AREA OF TOWER >SQ FT":INPUTA1:F=INT(P*A1/.1+.5)*.1
30 PRINTCHR$(145)SPC(1)A1
32 REM-CALCULATE FORCE ON ANTENNA
34 PRINT"PROJECTED AREA OF ANTENNA >SQ FT":INPUTA2:F1=INT(P*A2/.1+.5)*.1
36 PRINTCHR$(145)SPC(1)A2
38 REM-CALCULATE MOMENT OF TOWER
40 PRINT"HEIGHT OF TOWER >FT":INPUTH:M1=F#H*.5:M2=F1#H:PRINTCHR$(145)SPC(1)H
42 REM-CALCULATE MOMENT OF ANTENNA
44 PRINT"HEIGHT OF ANTENNA ABOVE TOWER APEX >FT":INPUTH1:PRINTCHR$(145)SPC(1)H1
46 REM-CALCULATE TOTAL MOMENT OF TOWER PLUS ANTENNA IN FT/LB. OF TORQUE
48 IFH1>0THENM2=M2+F1*(H+H1)
50 MT=M1+M2
52 PRINT"DIST. OF GUY ANCHOR FROM TOWER BASE >FT":INPUTD:PRINTCHR$(145)SPC(1)D
54 IFH<=0ORD<=0THEN22
56 DG=INT((ATN(H/D)*180/PI)/.1+.5)*.1:REM-CALCULATES ANGLE OF WIRE TO GROUND
58 FT=MT/H:FWZ=FT/(SIN((90-DG)*PI/180)):REM-CALCULATES TENSION APPLIED TO WIRE
60 TW=.5*FT/(COS(DG*PI/180)):REM-CALCULATES WORST CASE TENSION FOR EACH WIRE
62 MT=INT(MT/1+.5)*.1:M2=INT(M2/H/1+.5)*.1
64 FVZ=FT/(TAN((90-DG)*PI/180)):REM-CALCULATES VERTICAL LOAD ON TOWER
66 FMVZ=(TW*2)/(TAN((90-DG)*PI/180)):REM-CALCULATES WORST CASE VERTICAL LOAD
68 GL=INT(SQR(H^2+D^2)/.1+.5)*.1:REM-CALCULATES LENGTH OF GUY WIRE
70 FORA=1TO39:PRINT"=";:NEXT:PRINT""
72 PRINT"LENGTH OF GUY WIRE          "GL"FT"
74 PRINT"ANGLE OF GUY WIRE TO GROUND  "DG"DEG"
76 PRINT"MAX. TENSION ON GUY WIRE    "FWZ"LB"
78 PRINT"MIN. ADDED VERT. LOAD ON TOWER"FMVZ"LB"
80 PRINT"MAX. ADDED VERT. LOAD ON TOWER"FMVZ"LB"
82 PRINT"OVERTURNING MOMENT ON BASE OF"
84 PRINT"  UNGUYED TOWER      (IN FT/LB)"TAB(30)MT
86 PRINT"HORIZ. FORCE AT APEX OF TOWER "INT(FT)"LB"
88 IFB=1THENPRINT:PRINT"PRESS P TO PRINT      ANY KEY TO EXIT";:GOTO92
90 PRINT:PRINT"PRESS R TO RUN AGAIN ANY KEY TO EXIT";:GOTO92
92 GETZ$:IFZ$=""THEN92
94 IFZ$="R"THEN12
96 IFZ$="P"THEN100
98 IFZ$<>"P"ORZ$<>"R"THENPRINTCHR$(145)CHR$(145)CHR$(145):END
100 OPEN3,3:OPEN4,4:PRINTCHR$(19);:PRINT#4:FORJ=0TO879:GET#3,A$:PRINT#4,A$;
102 NEXT:PRINT#4:CLOSE4:CLOSE3:END
READY.

```

*The program used in the calculations.*

have the icing conditions you seldom if ever will have the maximum winds.

### Height

Next you need to know the height of the tower or mast and then the height of the

antenna above the apex of the tower or mast.

The distance of the guy anchor from the tower base finishes the information needed to complete the calculations.

Again, to be conservative I am design-



**FACTORY AUTHORIZED DEALER  
PLEASE CALL OR WRITE FOR THE  
LATEST AND GREATEST FROM ICOM**

### ICOM

IC-735 HF Xcvr./Gen. Cov. Rcvr.....	\$849.00
IC-745 HF Xcvr./Gen. Cov. Rcvr.....	889.00
IC-751A HF Xcvr./Gen. Cov. Rcvr.....	1399.00
IC-R7000 General Coverage Receiver.....	939.00
AH-7000 Omnidirectional Ant. For IC-R7000...	89.95
IC-PS30 12 VDC, 30 Amp. Sys. Pwr. Supply...	263.12
IC-PS55 12 VDC, Power Supply For IC-735...	175.12
IC-SP7 Base Station External Speaker.....	49.00
IC-SM5 Desk Microphone.....	44.95
IC-SM6 Desk Microphone.....	44.95
IC-SM8 Desk Microphone, Dual Cables.....	78.50
IC-27A 2-Meter, FM, 25 Watt Xcvr.....	364.00
IC-28A 2-Meter, FM, 25 Watt Xcvr.....	364.00
IC-28H 2-Meter, FM, 45 Watt Xcvr.....	389.00
IC-37A 220-MHz, FM, 25 Watt Xcvr.....	424.00
IC-3200A 2-Mtr./70-cm, FM, 25 Watt Xcvr....	519.00
IC-2AT 2-Mtr., FM, Handheld W/Touch-Tone...	249.50
IC-02AT 2-Mtr., FM, Handheld With T-T....	329.50
IC-BP3 8.4 VDC, 250 mah., Ni-Cad Batt. Pack...	37.50
IC-BP4 Battery Case.....	15.25
IC-BP5 10.8 VDC, 425 mah., Ni-Cad Batt. Pack...	58.50
IC-BP7 13.2 VDC, 425 mah., Ni-Cad Batt. Pack...	74.25
IC-BP8 8.4 VDC, 800 mah., Ni-Cad Batt. Pack...	74.25
BC-35 Drop-In Rapid Charger; IC-BP2, 5, 7, 8...	74.95
IC-CP1 Mobile Charging Cord.....	13.00
IC-DC1 DC Converter.....	23.25
IC-HM9 Speaker/Microphone.....	47.00
LC-5 Leatherette Case, IC-2AT W/IC-BP5....	20.50
LC-7 Leatherette Case, IC-2AT W/IC-BP3....	20.50
LC-11 Leatherette Case, IC-02AT W/IC-BP3....	20.50
LC-12 Leatherette Case, IC-02AT W/IC-BP5....	20.50
LC-14 Leatherette Case, IC-02AT W/IC-BP8....	20.50
HS-10 Headset For Handhelds.....	23.25
HS-10SA VOX Unit For HS-10.....	23.25
HS-10SB PTT Unit For HS-10.....	23.25

### BIRD

Model 43 Wattmeter With QC-UHF(F).....	\$172.00
Model 4431 Wattmeter With QC-UHF(F).....	290.00
CC-1 Wattmeter Carrying Case.....	30.00
Model 8135 RF Coaxial Termination.....	160.00
Elements, Table 1, 25 to 1000 MHz.....	48.00
Elements, Table 1, 50H through 1000H.....	59.00
Elements, Table 1, 2500H & 5000H.....	85.00

### BECKMAN

310 3 1/2-Digit Handheld Multimeter.....	\$130.50
4410 4 1/2-Digit Handheld Multimeter.....	215.10
DM25L 3 1/2-Digit Handheld Multimeter.....	85.45
DM73 3 1/2-Digit Probe Size Multimeter.....	55.00

### BELDEN

New 9913 Low Loss VHF/UHF Coax Cable, RG-8/U Type. Accepts Standard Amphenol PL-259 And Type N Conn. 9 1/2-AWG, Solid, Bare Copper, Center Conductor. 84% Velocity Factor. 100% Shield Coverage. 50 Ohm. Semi-Solid, Polyethylene, Center Insulation..... \$44/FT.

### ASTRON

RS-7A 13.8 VDC, 7 Amp Int., 5 Amp Cont. ....	\$46.30
RS-12A 13.8 VDC, 12 Amp Int., 9 Amp Cont. ...	64.60
RS-20A 13.8 VDC, 20 Amp Int., 16 Amp Cont. ...	82.90
RS-35A 13.8 VDC, 35 Amp Int., 25 Amp Cont. ...	125.60
RS-12M Same As RS-12A, With Meter.....	80.46
RS-20M Same As RS-20A, With Meter.....	98.76
RS-35M Same As RS-35A, With Meter.....	141.46
VS-20M Same As RS-20M, Adj. Volt/Curr. ....	117.06
VS-35M Same As RS-35M, Adj. Volt/Curr. ....	159.76
VS-50M 13.8 VDC, 50A Int., 37A Cont., Adj....	226.86

UPS/Insurance Charges Are Additional.  
MC, VISA, C.O.D. Orders Are Accepted.

*LaRue Electronics*

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

CIRCLE 77 ON READER SERVICE CARD

January 1987 • CQ • 29

ing as if the entire force is being applied to a single set of guy wires at the apex of the tower or mast, and selecting guy wire tensile strength to exceed that force. Actually, in practice there may be one or more additional sets of guys below the apex to share the load.

If you wish to design for a self-supporting tower, assume an arbitrary figure for the distance from the guy anchor to the tower base. Entering a 0 for this or for the height of the tower will return you to the start again to prevent a division by 0 error. The overturning moment will be the same calculated whether calculated with or without guy wires.

### Putting It All Together

Shown in fig. 2 is a sample printout of a run using the figures above.

The length of the guy wire, of course,

does not include any length needed for wrapping and securing the ends.

I have already determined that my mast presents 6.5 square feet of area, and the antenna and coax add another 4 square feet. In my case the antenna is not above the apex of the mast. (However, if the antenna is located above the apex of the tower or mast, it has a moment or torque of its own which must be added to that of the tower. This is done automatically in the program.) Without going into the physics involved, this, coupled with the wind pressure, results in a horizontal force applied at the apex of the mast of 290 pounds. This translates to an overturning moment on the base of an unguyed mast of a whopping 12,905 foot/pounds of torque.

This shows why a self-supporting tower requires such a large mass of con-

```

MAX. WIND SPEED EXPECTED >MPH
? 100
PROJECTED AREA OF TOWER >SQ FT
? 6.5
PROJECTED AREA OF ANTENNA >SQ FT
? 4
HEIGHT OF TOWER >FT
? 44.5
HEIGHT OF ANTENNA ABOVE TOWER APEX >FT
? 0
DIST. OF GUY ANCHOR FROM TOWER BASE >FT
? 35
=====
LENGTH OF GUY WIRE                56.6 FT
ANGLE OF GUY WIRE TO GROUND        51.8 DEG
MAX. TENSION ON GUY WIRE           468 LB
MIN. ADDED VERT. LOAD ON TOWER     368-LB
MAX. ADDED VERT. LOAD ON TOWER     737 LB
OVERTURNING MOMENT ON BASE OF
UNGUYED TOWER (IN FT/LB)           12905
HORIZ. FORCE AT APEX OF TOWER       290 LB

```

Fig. 2— A sample printout of a run using the author's figures.

crete combined with soil resistance to remain standing.

The tension on the guy wire is equal to 468 pounds. It must be remembered that this is force that is transferred to the wire. It is not taking into account the forces applied directly to the guy wire by the wind. Six strands of #18 galvanized guy wire has a breaking strain of approximately 650 pounds. This should be adequate for my needs, giving a 38 percent safety margin. If the wind is blowing from the same direction as one of the guy wires, an additional 368 pounds of vertical force is applied to the mast. In a worst-case situation where the wind is blowing from a direction directly between two guy wires, you might think that the guy-wire tension would be divided equally between them, and the vertical load would remain the same. Unfortunately, it doesn't work this way. It can be shown mathematically that the tension on each wire is still 468 pounds and *each* wire contributes 368 pounds of vertical force for a total of 736 pounds of vertical force applied to the mast. Of course, the third wire is not under tension because of the wind and does not contribute to the load. Using guy wires requires a lot more real estate to erect your tower or mast, but it is much less expensive to build to accommodate vertical loads than it is to withstand large overturning moments.

If you find any of the values obtained unacceptable, just press **R** to run again, then press **RETURN** for each entry you *do not* wish to change. The previous entry will reappear. Through the use of a very simple screen dump, the program gives you the choice of printing out a hard copy of the results of the calculations.

I have used **PRINT** and **CHR\$** commands to avoid the use of Commodore's graphics characters for screen formatting in the program listing. It makes things a little easier to decipher when trying to type a program into the computer.

If for some reason you do not wish to type in the program yourself, send me a blank disk and \$3.00 and I will send you a verified copy of the program.



### THE MULTIPLE RECEIVER SOLUTION



#### 4 Channel Signal-to-Noise Voter

- Expandable to 32 Channel by Just Adding Cards
- Continuous Voting
- LED Indicators of COR and Voted Signals
- Built-in Calibrator
- Remote Voted Indicators Pinned Out
- 4 1/2 x 6 Double Sided Gold Plated 44 Pin Card
- Remote Disable Inputs
- MORE

Built, tested and calibrated with manual

**\$350.00**

#### NEW PRODUCT

Telephone interface now available  
For more information call or write:

**HALL ELECTRONICS**  
Voter Department  
815 E. Hudson Street  
Columbus, Ohio 43211  
(614) 261-8871

CIRCLE 42 ON READER SERVICE CARD

### AUTHORIZED KENWOOD I-COM RADIO DEALER



H. L. HEASTER, INC., 203 Buckhannon Pike, Clarksburg, W. Va. 26301 Clarksburg Phone (304) 624-5485 or W. Va. Toll-Free 1-800-352-3177

HAROLD HEASTER, KA8OHX, 91 Ridgefield Place, Ormond Beach, Fl. 32074 Florida Phone (904) 673-4066

**NEW NATION-WIDE TOLL-FREE TELEPHONE 1-800-84-RADIO**  
**1-800-84-72346**

Call us for a quotation, WE WILL SAVE YOU MONEY!

CIRCLE 79 ON READER SERVICE CARD

### Wheaton Community Radio Amateurs



### ODEUM EXPOSITION CENTER Villa Park, Illinois

**Sunday, February 1, 1987**  
**(Doors open 8:00 A.M.)**

- 400 Flea Market Tables • 85 Commercial Booths • All-in-one Building
- Acres of Parking • Reserved Flea Market Tables
- Special Computer Section • Tech Programs • Easy Access for Sellers (No Stairs)

**TICKETS: \$4.00 in advance • \$5.00 at door**

Send S.A.S.E. to: Wheaton Com. Radio Amateurs  
P.O. Box QSL, Wheaton, IL 60189

General Info: (312) 629-8006, Talk in on 146.01/61 Mhz.





## the tempo S-15

...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

...the kind of hand held most people want...simple, rugged, reliable, easy to use. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry.

**Consider these features before you decide on any hand held:**

- 5 watt output (1 watt low power switchable)
- 10 MHz frequency coverage: 140-150 MHz (For export only: B version 150-160 MHz, C version 160-170 MHz)
- Electrically tuned stages. Receiving sensitivity and output power are constant over entire operating range.
- Three channel memory. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).
- A new "easy remove" battery pack
- One hour quick charge battery supplied (450 ma/HR)
- Plug for direct 13.8 volt operation
- Speaker/microphone connector
- BNC antenna connector and flex antenna
- Extremely small and light weight (only 17 ounces).
- Ample space for programmable encoder.
- Fully synthesized
- Extremely easy to operate
- Its low price includes a rubber antenna, standard charger, 450 ma/HR battery (quick charge type) and instruction manual.

**OPTIONAL ACCESSORIES:** 1 hour quick charger (ACH 15) • 16 button touch tone pad (S 15T) • DC cord • Solid state power amplifier (S-30 & S-80) • Holster (CC 15) • Speaker/mike (HM 15)

**now available!**



...the proven Tempo CS-15, plus three new commercial model Tempo synthesized radios

The CS-15 is a fine quality radio with 5 watt output, 10 MHz receiver coverage, is fully synthesized, and is 10 channel internally programmable. It's also sturdy, compact and affordable.

**The new Tempo FMH-15S, FMH-44S & FMT-25S (mobile)**

...all feature 16 channels, CPU controlled EPROM PLL, CTCSS encode/decode programmable per channel, priority scan to Channel 1, and time-out-timer.

**FMH-15S...** 138-174 MHz (10 MHz) frequency coverage  
1 watt (low)/5 watts (high) RF power output

**FMH-44S...** 400-512 MHz (20 MHz) frequency coverage  
1 watt (low)/4 watts (high) RF power output

**FMT-25S...** 138-174 MHz (10 MHz) frequency coverage  
25 watts RF power output

Available at  
your local Tempo  
dealer or from...



# Henry Radio

CIRCLE 92 ON READER SERVICE CARD

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

**TOLL FREE ORDER NUMBER: (800) 421-6631**

For all states except California.  
Calif. residents please call collect on our regular numbers.

## Kenwood's MC-55 Mobile Microphone

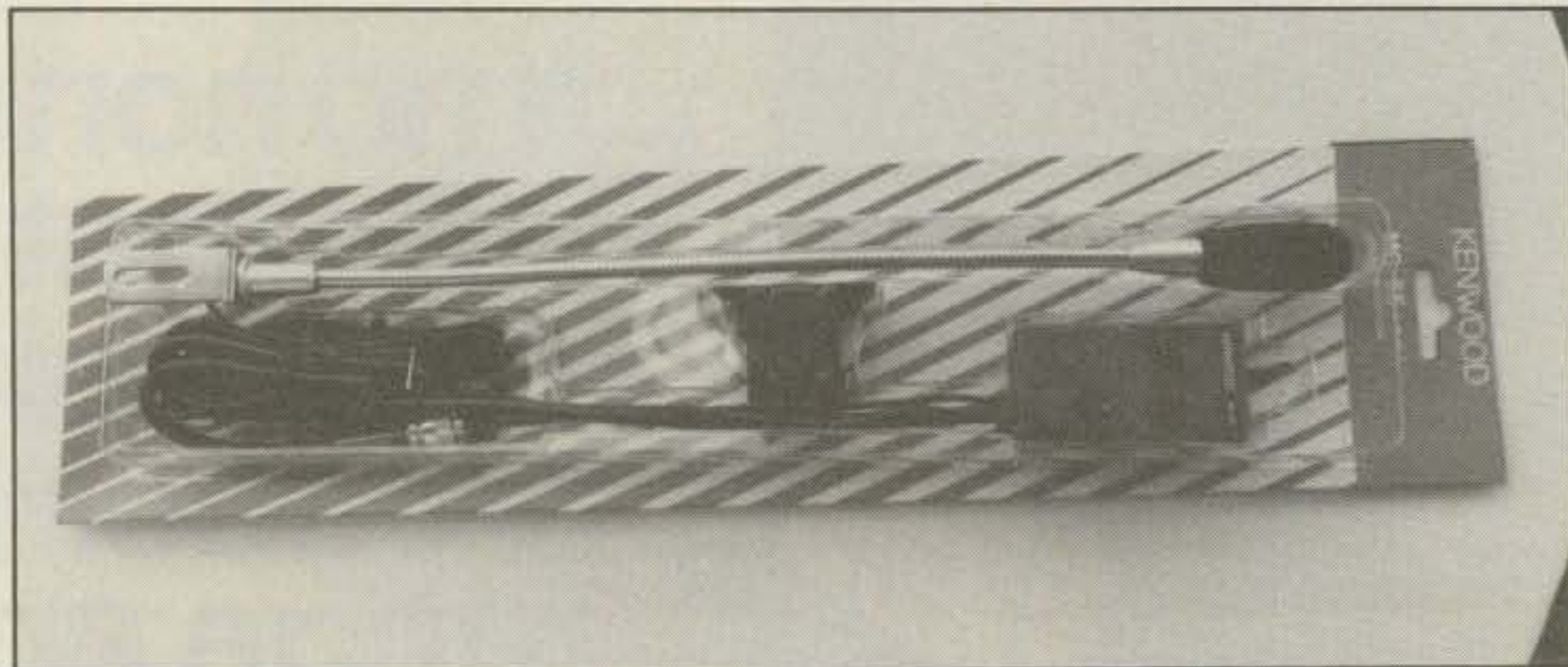
**R**iding around at times in those London taxis which are radio equipped, I often admired the microphones they used. These microphones were mounted at the end of a long gooseneck which, in turn, was fastened someplace around the dome light. Perhaps it's a law there that hand-held microphones can't be used. In any case, I admired the idea as being eminently practicable.

It therefore very much caught my interest when I came across the Kenwood MC-55 mobile microphone, a "sleeper" which one seldom sees advertised, but which any Kenwood distributor can supply. Anyway, I purchased two of the units and found various uses for them in both mobile and fixed station applications.

### General

As one can see from the photograph

\*c/o CQ magazine



The MC-55 as it appears in its sales packaging.

showing the MC-55 in its sales package, it consists primarily of a microphone mounted at the end of a long gooseneck. The overall length (microphone tip to end of its mounting bracket) is about 16 inches. However, there is more to the MC-55 than simply a gooseneck mounted microphone.

Fig. 1 shows the various components that make up the MC-55. The microphone itself is a unidirectional electret condenser type complete with foam plastic windscreen. There is a built-in preamplifier in the microphone housing. A separate control box provides manual PTT, LED indi-

- ① Microphone
- ② Windscreen
- ③ Gooseneck
- ④ Microphone bracket
- ⑤ Microphone cable
- ⑥ Control box
- ⑦ Standby switch
- ⑧ Transmission/reception indicator
- ⑨ Up/down (tuning) switch
- ⑩ Microphone level control
- ⑪ Power switch
- ⑫ Power cable (red)
- ⑬ Output cable
- ⑭ Microphone plug
- ⑮ Shift lever bracket
- ⑯ Shift lever clamp bracket
- ⑰ Retaining screws (4φ × 8mm, 4φ × 14mm, 2 each)
- ⑱ Self stripping U element connector (Scotchlok<sup>®</sup>)

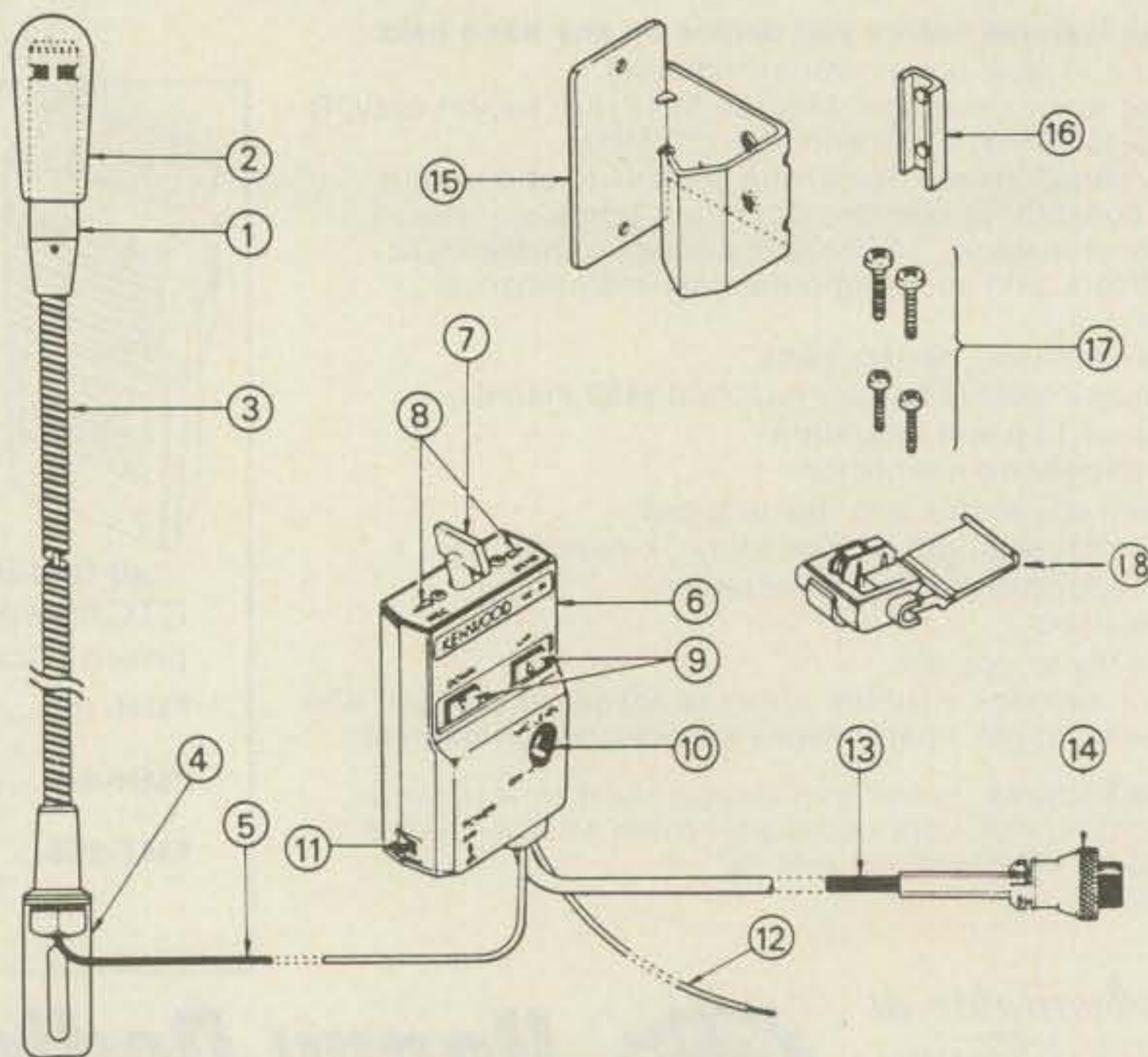


Fig. 1—The MC-55 is quite complete with mounting accessories.

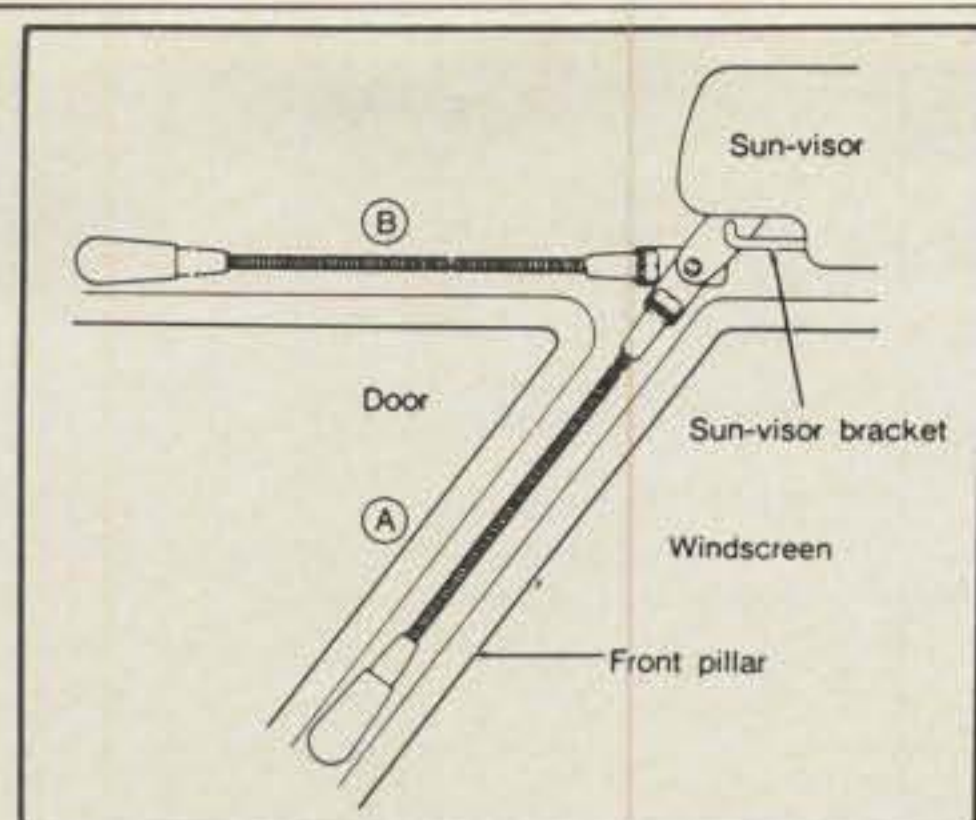


Fig. 2—A side sun-visor mount or front type of mount, as shown in fig. 3, makes for a nifty mobile setup.

cators in the receive/transmit mode setting, up/down tuning pushbuttons for transceivers which can be remotely controlled, output level control, and an automatic time-out circuit. The latter is designed to return the transceiver to the receive mode after a few minutes if the operator forgets or cannot use the manual PTT (because of traffic conditions) after having gone into the transmit mode. The rest of the MC-55 package consists of various brackets, screws, wires, etc., so one can get the microphone and control box mounted and hooked up to 6–12 VDC for power. The package is very complete.

It is suggested that the control box be mounted on an automobile's shift lever below the shift knob, but various other mounting positions are certainly possible. The bracket on the end of the microphone gooseneck is designed to be mounted at the hold-down screw of the sun-visor on the driver's side of an auto-

mobile. Fig. 2 illustrates the idea. But again, a little imagination can be used, and it could well be that in some automobiles a better mounting position can be found. The objective of the mounting exercise is to allow the microphone to be placed a few inches away from the operator's lips during operation while still not allowing it to become any sort of impediment. Fig. 3 illustrates the ideal setup.

### Electrical

Fig. 4 shows the schematic of the MC-55. All of the components are mounted in the control unit except for the preamplifier stage, Q1, which is contained in the microphone head. Transistors Q2, Q3, and Q4 are all switching transistors for the receive mode LED, transmit mode LED, and PTT line, respectively. IC1 is a timer IC which is arranged to time-out a transmit status after 5 minutes. For example, if the PTT switch is in the receive position, a green LED next to the PTT switch lights. If the PTT switch is set to transmit, a red LED lights. If one forgets after 5 minutes to manually switch to the receive mode, the red LED goes out, the green LED lights, and the PTT line goes to receive. One then has to manually recycle the PTT lever switch to receive and then to transmit to get back to the transmit mode.

### Practical Results

As it was mentioned before, two MC-55 units were purchased and used in various ways, mentioned and not mentioned by Kenwood, but in every case the MC-55 came out to be an excellent performer. One MC-55 was used in a straightforward mobile installation together with a

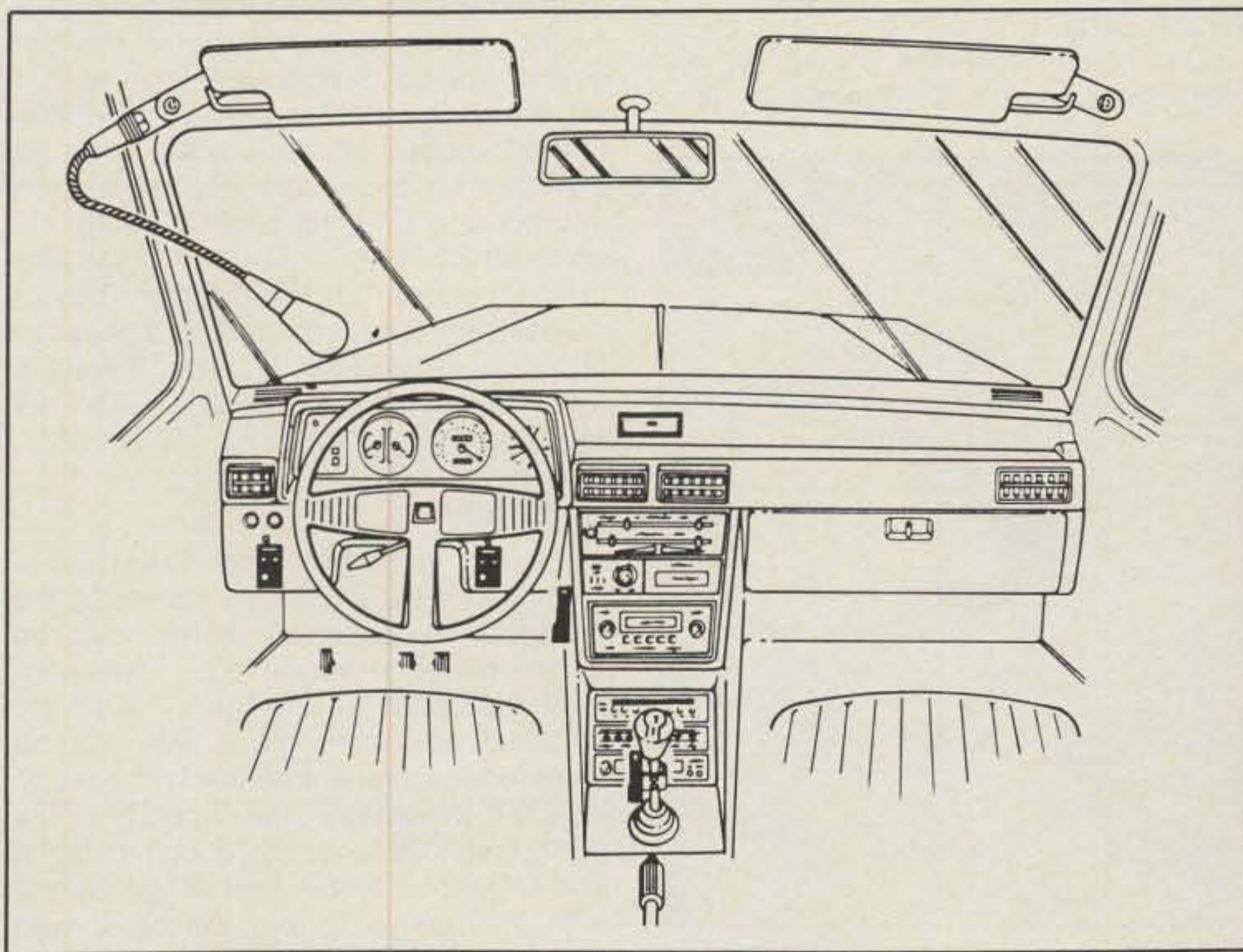


Fig. 3—A front type of mount for the MC-55.

## WE DO IT WITHOUT TRAPS!

### DJ2UT Multiband System (USA, JA, European Pats. Pending)

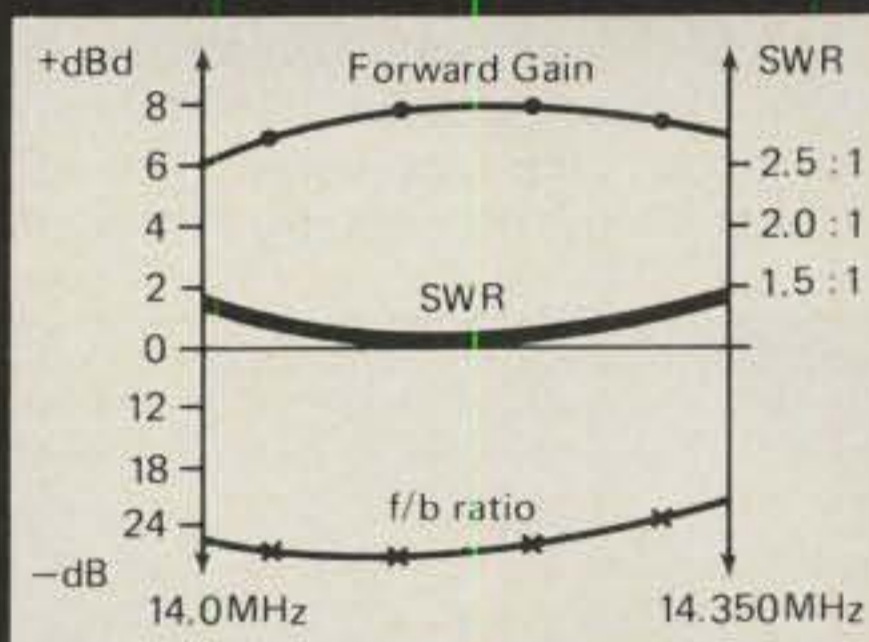
- 3- to 7-band models.
- Basic triband (10, 15, 20m) versions.
- Add-on kits for WARC (12, 16, 30m) bands and 40 m.
- 8-, 15-, and 20-foot boomlengths.
- Monoband gain and f/b ratio with low SWR, regardless of weather conditions.
- Handles full legal power with ease.
- High mechanical strength—precision German craftsmanship.
- Proven in over 50 countries.

Quality, High-Performance Antenna Systems From The German Black Forest.

#### Our Philosophy:

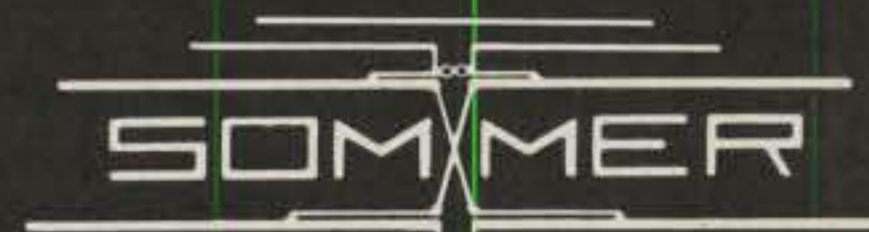
It is well known that typical multiband antenna systems constitute significant compromises in overall performance. Shortened element length necessitated by the introduction of L/C trap loading severely limits both the gain and f/b ratio of a conventional triband system. Additionally, L/C traps are prone to significant power losses (heating) at high power levels, and invariably suffer from both short- and long-term effects of changing climate.

Through nearly a decade of experimentation, DJ2UT has developed a completely new approach to the multiband antenna. His system differs from conventional designs in one very important respect—the traps have been completely eliminated. This is in sharp contrast to other manufacturers' approaches, such as "linear loading" the element instead of using coil-type traps. We at Sommer believe that a trap is still a trap—no matter how it is configured. True "monoband" performance from a multiband design can only be achieved by total elimination of the traps. This is our philosophy, and we believe it shall be yours, too, once you experience a Sommer antenna.



20-meter performance curve for the XP707 beam.

For a free, illustrated brochure please contact:



H.J. Theiler Corp.  
P.O. Box 5369  
Spartanburg, SC 29304  
(803) 576-5566

CIRCLE 44 ON READER SERVICE CARD

January 1987 • CQ • 33

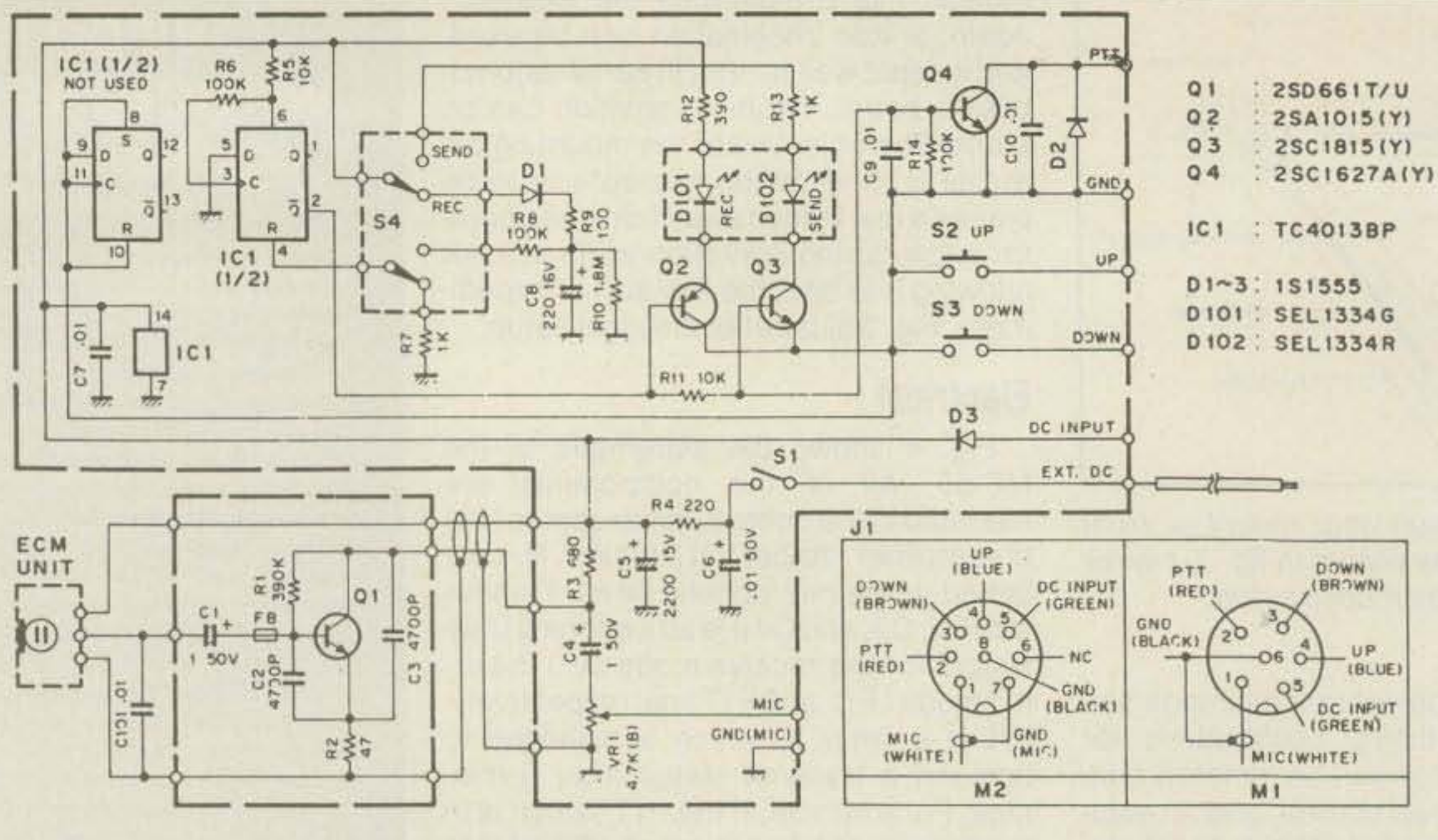


Fig. 4—The electronics in the MC-55. IC1, a timer IC, and Q1, the microphone preamplifier, constitute the main components. Both six and eight-pin plug versions of the MC-55 are available.

TS-440S transceiver. When the microphone head was properly positioned for close-talking, excellent audio reports were received (especially after the minor modification mentioned later). VOX operation is possible, but manual PTT seemed to be more comfortable and was easily possible when a comfortable mounting position was found for the MC-55's control unit. The large PTT switch grip on the MC-55's control box was easy to find and manipulate. However, the red/green LEDs to indicate the transmit/receive modes served hardly any purpose at all, as one had to keep one's eyes on the roadway. An audible "beep" is really needed to distinguish the transfer from transmit to receive modes and vice-versa. The LED transistor switching circuitry in the MC-

55's control unit could easily control solid-state "beepers" instead of, or in addition to, the LEDs to achieve the desired result. The control unit does have enough room inside of it for the addition of a very miniature "beeper."

The second MC-55 found most of its parts going into a base-station microphone console as shown in one of the photographs. In this case, a Kenwood MC-80 microphone console was modified to permit much more comfortable operation by exchanging the long gooseneck MC-55 microphone for the quite short original MC-80 gooseneck microphone. Also, the MC-55 microphone is unidirectional and picks up less background noise, while the original MC-80 microphone is an omni-directional type.

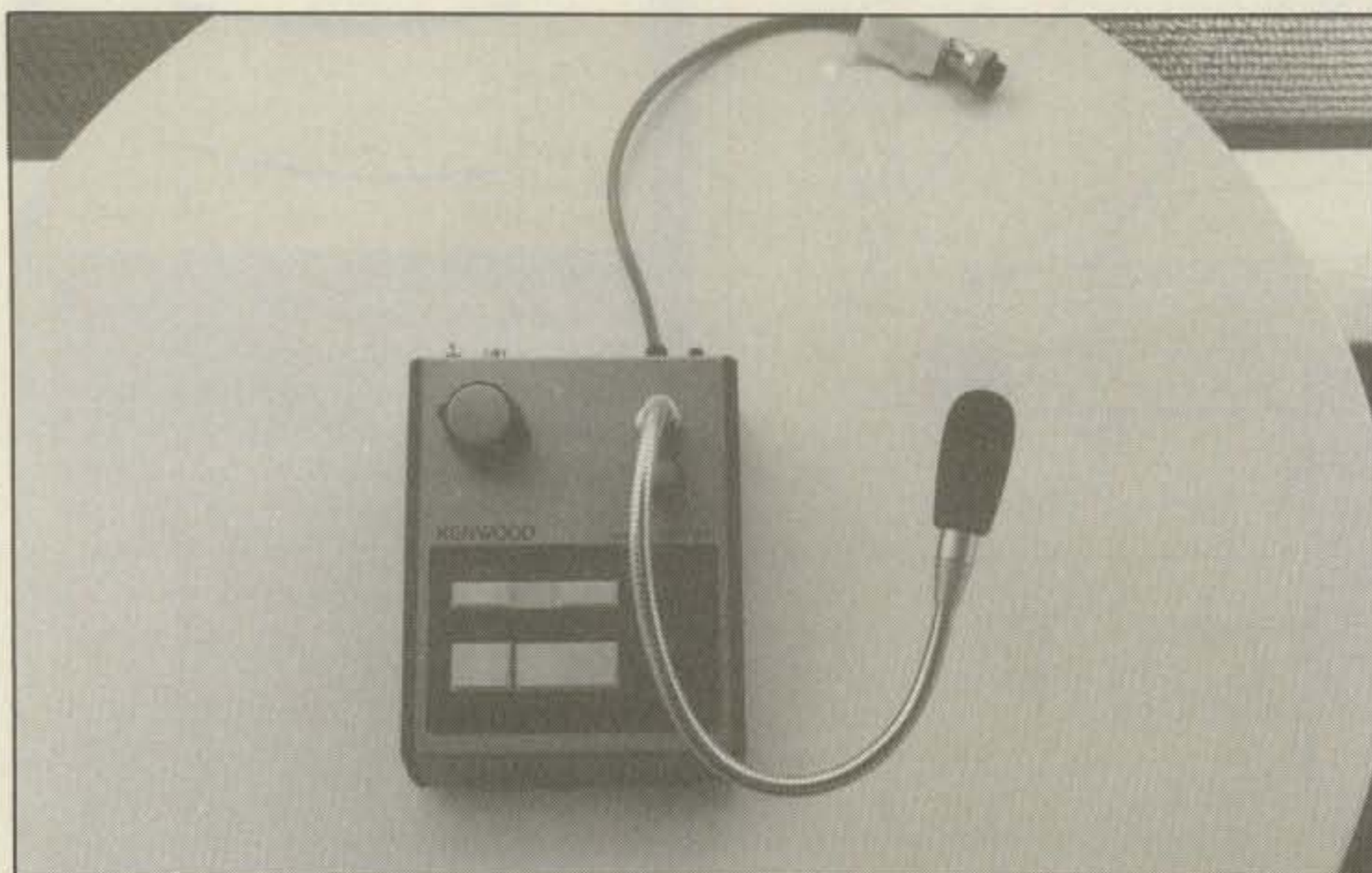
The increased microphone directivity is advantageous when some form of speech processing is being used in a transceiver. Although this modification is a rather specific one, the main point is that the MC-55 can be used as an excellent basis for a home-brew, custom-designed base-station microphone console which can incorporate a variety of features (see my "CCC" article in a previous issue of CQ).

### A Simple Modification

Kenwood, in its most expensive base-station microphone console, the MC-85, uses exactly the same microphone head as in the MC-55. However, in the MC-85 a switch is provided to effect a low-frequency roll-off of about -12 dB at 300 Hz. Although it sounds like a bit of sophisticated touch, all the switch does is change a coupling capacitor value in the microphone amplifier chain. Exactly the same effect can be obtained by changing C4 in fig. 4 from 1 mF to 0.18 mF. The increased low-frequency roll-off makes the MC-55 sound a touch "sharper," and it's a permanent change I made in both of my MC-55s.

### Summary

As was mentioned before, the MC-55 is a bit of a "sleeper" item considering the multitude of accessory items produced by the major amateur radio equipment manufacturers. In any case, it's a very versatile accessory item that can be used for its original intended purpose or adapted to various other uses to make operating SSB a bit more comfortable. The MC-55 comes in two versions, one with an 8-pin plug and the other with a 6-pin plug. Both versions retail for \$49.95 each.



A Kenwood MC-80 microphone console but modified to use the Kenwood MC-55 microphone head.

# MADISON WINTER SIZZLERS

**New rigs and old favorites, plus the best essential accessories for the amateur.**

3621 FANNIN ST  
HOUSTON, TX 77004-3913

CALL FOR ORDERS  
1-713-520-7300 OR  
1-713-520-0550

ALL ITEMS ARE GUARANTEED OR SALES PRICE REFUNDED



IC28A	List 429	Your Cost 369.00
<b>ANTENNAS</b>		
Isopole 144 MHz		44.95
AOP-1, Complete Oscar Antenna		149.95
Butternut HF6V, 80-10 vertical		125.00
HF2V, 80 & 40 vertical		119.00
HF4B		189.00
Hustler G7-144		119.95
Hustler 6BTV		139.00
KLM HF World Class Series Antennas	Call Don	
Alpha Delta Twin Sloper		49.00
Coax Seal		2.00/roll
B&W Dipoles		Less 10%
KLM KT-34A		399.00
W2AU, W2DU		Now Available
Cushcraft AP-8, 8 band verticle includes 3 WARC bands		CALL
Cushcraft 124-WB 4 element boomer		33.00
NEW KLM 1, 2-44LBX		129.00
1296 Power Divider		Soon
Orion CD-78 + BS 80 75/80 rotatable dipole		299.00

#### OTHER ANTENNAS

Diamond D-130 Discorne 25-1300 MHz	79.00
Larsen Kuldock	17.00
Larsen 440 HW 1/2 wave Kuldock	25.00
Larsen 2M 1/2 wave telescope ant	25.00
Avanti AP151 3G on glass Antenna	36.00
Anteco 2M, 5/8, Mag. Mount, Comp	25.00
Avanti APR450-5G on glass	39.00
Orion 2M 1/2 wave Handy Antenna	19.00
Van Gordon SLA-1 160-80-40 Sloper	44.00
Valor AB-5 Mobile	79.95
Stoner DA100 D Active Rx Antenna	190.00
DC Tenna Hitch 3/8-24 Thread Fits 3/4" trailer hitches	29.95

#### KEYS

Bencher & Vibroplex	Less 10%
Bencher is now improved. Screws & springs, all stainless steel and extra hand polishing	
Nye ESK-001 Keyer	58.00

#### TUBES

Collins & Drake Replacement tubes	Stock
GE 6146B	11.95
3-500Z	109.95
GE Industrial Tubes	Call
GE 12BY7A	7.00
GE 6JS6C	12.95
GE 8950	14.00
12JB6 Sylvania	6.00
Hard to find Tubes 50-90% off list	
6JB6A	9.95
6JE6C/6LQ6	9.95

#### BOOKS

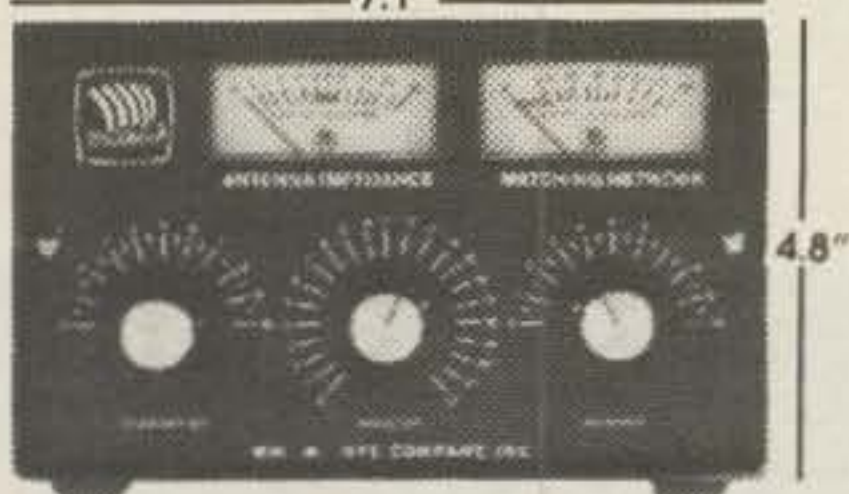
We stock SAMS, TAB, ARRL, RSGB, Ameco Radio	
Pubs	Call
New 1987 Radio Database Book - International SW plus reviews	12.95

#### PARTS

24 Pin Solderless dip sockets	25/each
150MFD/400V DC	1.95
1.5 Amp/400V full wave bridge rectifier	1.95
2.5A/1000PIV Epoxy diode	29 each or 19.00/100
0015/10KV or 001/20KV	1.95 each
3N201	.95
4 inch ferrite rod	1.95
365pF cap	1.95
Sanyo AAA, AA Nicads w/tabs	2.00
2, 4, 5, 6, 8 pin mic plugs	3.00
1/8, 1/4, watt carbon resistors	.05 each
Meters 0-3000 VDC 2 1/2" Square 0-1 Amp DC	9.95
Drake-Collins mike plug	2.00
Miniature toggles, 5A/125VAC	1.50 each
Thousands of panel meters	3.95 up CALL
MICA Cap .0004/3KV	5.00 others CALL
Close out on rigs & accessories. All the time	Call
We may have what you're looking for	
Diodes 3A/1000 PIV	29
Duracell 9 Volt Battery - 2 Pak MN1604	3.49
DC Fan 3 1/2" Sq. x 1"	9.95

#### EQUIPMENT

Kenwood TH205AT	Trade in your old H7
Kenwood TS940S, contesters delight	Call
Kenwood TS 440	Call for trade
Icom R7000 25-2000 MHz	949.00
Icom IC3200A	519.00
Santec ST20T Handi Talkie	289.00
Icom IC735	879.00
Ten-Tec 2510 (Easy OSCAR)	439.00
KDK FM 240	279.00
Mirage Amps	15% OFF
Tokyo Hy-Power HL1K AMP, No. 4CX250B	699.00



NYE MB102 Tuner 189.00

#### ACCESSORIES

B&W VIEWSTAR ANTENNA TUNER	89.95
Heil HC3/HC4/HC5	Stock
Heil BM10 Boom Mike headset	CALL
CSI Private Patch III	469.95
Triplet 3360 VOM (same as FLUKE 77)	69.00
Darwa NS660A 30/300/3000 watts	135.00
Alinco ELH 230D- Excellent buy	88.00
Nye MB5-A (for the big boys!)	529.00
Shure 444D	54.95
Ameco PT-2	84.95
New Tokyo HC 200A	115.00
Miller C514T Low pass filter	43.50
B & K Test Equipment VOM, oscilloscopes, generators, etc	CALL
Tripp 25A/12VDC Supply (16A continuous)	99.00
Nel-Tech Labs Digital Voice Keyer DVK 100	335.00
Astatic SilverEagle & Base	66.00

#### BELDEN

9913 low loss, solid center, foil/braid shield	51c/ft
8214 RG8 Foam	45c/ft
8237 RG8	39c/ft
8267 RG213	55c/ft
8000 14 Ga stranded copper ant. wire	13c/ft
8448 8 conductor 2-16 Ga 5-18 Ga	33c/ft
9405 Heavy duty 2-16 Ga 5-18 Ga	56c/ft
9258 RG8x	20c/ft
9269 RG-62A/U	16c/ft
8403 Mic Cable, 3 condctr & shield	45c/ft
100 feet 8214 w/ends installed	54.00
8669 7/16" tinned copper braid	1.00/ft

#### AMPHENOL

831SP-PL259 Silverplate	1.25
UG176 reducer RG8X	.30
831J Double Female UHF	2.00
82-61 N Male	3.00
82-97 N Female Bulkhead	3.00
82-63 Inline Female N	4.00
82-98 N elbow	9.00
31-212 BNC-RG59	1.50
31-216 UG201 A/U N Male-BNC Female	2.30
31-2 BNC-RG58	1.50
34025 N Male, RG58	3.00
34125 N Female UHF male	9.00
3128 BNC Female-PL259	3.00
Fox N-Male Connector (Fits 9913)	4.50

#### PACKET POWER

AEA PK-232	299.00
Kantronics KPC 2400	299.00
Kantronics 2400	139.00
Kantronics Packet II	149.00
MFJ 1270	125.00
AEA PM-1	149.00
New AEA UDC-232 Firmware, No modem, List 279.00	249.00
New Kantronics KAM	299.00

#### SERVICES

Alignment, any late model rig	50.00
Flat fee Collins rebuild	Call

#### USED EQUIPMENT

All equipment, used, clean, with 90 day warranty and 30 day trial. Six months full trade against new equipment. Sale price refunded if not satisfied.

KWM 380/2CW	2,200.00
ETO/ALPHA 77, Clean	3,800.00
ICOM IC 745	650.00
TenTec 505 Argonaut	195.00
YAesu FT 101E	395.00
YAesu FT 901 DM/CW	600.00
Kenwood TS-830S/CW	650.00
TS-430S/acc	650.00
TS-520S	395.00
Drake TR4cw, clean	300.00

#### 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.

#### DON'S CORNER

Contest best DX 10, 24 MHz is still on. Winner next month. Expert hy-gain rotor repair — John Jarvis, WN5P 1-713-482-2000

# BIRO

## STOCK ITEMS CALL

Power Range	Frequency Bands (MHz)					
	2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
300 watts	100H	100A	100B	100C	100D	100E
500 watts	250H	250A	250B	250C	250D	250E
1000 watts	500H	500A	500B	500C	500D	500E
2500 watts	1000H	1000A	1000B	1000C	1000D	1000E
5000 watts	5000H					

# MADISON

## Electronics Supply

3621 FANNIN  
HOUSTON TEXAS 77004

1-713-520-7300 OR 1-713-520-0550

New ICOM Call on the IC-μ2AT, IC-38A, IC-03AT

**Now that winter is here, do you find yourself hanging around the workbench looking for a good project? KG5B presents a nice project that will turn into a handy piece of test equipment.**

## Build The Little Dipper

### A Low-Cost Dip Or Peak Meter

BY CORNELIO C. NOUEL\*, KG5B

If you do any building, troubleshooting, or simple measurements in your shack or shop, then a dip-meter is a very useful thing to have around.

There have been many excellent articles on dip-meters, and I assume that most amateurs reading these lines are familiar with the theory involved. Also, current handbooks treat the subject rather thoroughly.

The particular unit shown here operates on the same conventional principles, but in this one the galvanometer-type indicator has been entirely eliminated and substituted with an LED driven by a Darlington amplifier biased in class "C." This keeps the cost down considerably, while at the same time permitting a very compact design.

#### Circuit Description

The circuit diagram is shown in fig. 1. The little dipper consists of two basic circuits, the oscillator and the detector. The oscillator is a very popular circuit that has been around for many years. It uses an FET in a Colpits configuration. The energy circulating in the oscillator tank is coupled through C4 to the detector circuit, where a small diode (D2) rectifies it, feeding a DC voltage to the Darlington pair (Q2, Q3) controlled by the sensitivity control (R3). Any small variations in the bias of the amplifier will cause large variations of current through the LED indicator in the **DIP** mode; however, in the **PEAK** mode the current produces a corresponding voltage drop through R5 and the action of the LED is reversed.

\*4966 Paseo del Rey Dr., Brownsville, TX 78521



*The completed "little dipper."*

The circuit shown will work practically on any frequency from LF to VHF if the appropriate components are used. However, the one shown in the photographs was built only for the HF bands. See coil table, Table I.

#### Construction

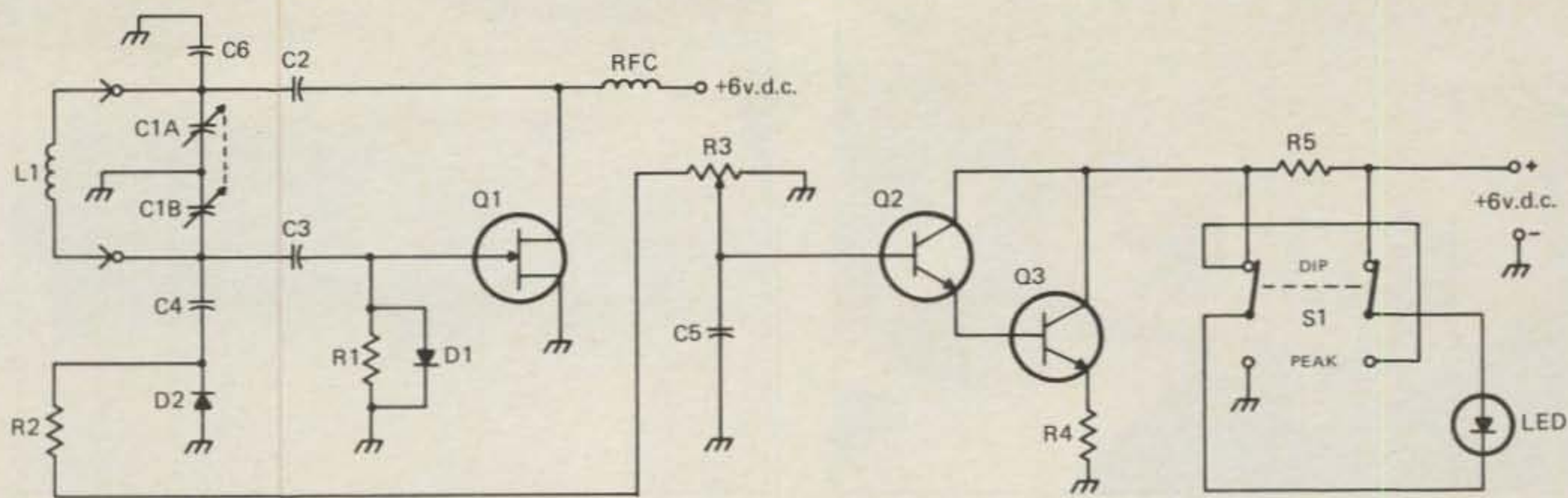
My little dipper was built on a 4" x 2 1/8" x 1 1/8" aluminum chassis-box (Radio Shack 270-239). The variable capacitor, C1, is a dual 100 pF per section (ETCO, cat. #SV 409). If you have better quality components, use them by all means, since the performance will in general be better, especially if you want to cover the VHF bands.

I mounted the capacitor to the front shell by means of 4-40 by 1/2 inch screws and 3/8 inch spacers, leaving enough space for the lugs of the coil socket.

BAND MHz	2-4	4-8	8-16	16-32
No. of turns	84	39	14.5	7
Wire size	26	22	22	18
Winding length-(inches)	1 1/2	1 1/16	3/8	3/8
Coil form dia (inches)	1.25	1.25	1.25	1.25

*Table I—Coil data for the little dipper.*

The printed circuit board, fig. 2(A) and (B), holds most of the components, except the sensitivity control, the switch, and the LED. The location of these items can be appreciated from the photographs. The PC board itself is held fast by



### Parts List

L1—See coil data.  
 C1A,1B—Dual capacitor 100 pF per section (ETCO SV409 or similar)  
 C2,C3—100 pF mica, mylar, etc., low voltage  
 C4—10 pF mica, mylar, etc., low voltage  
 C5—.01 uF ceramic, low voltage  
 C6—5 pF mica, mylar, etc., low voltage  
 D1,D2—1N914 silicon diode or similar  
 R1—100 K ohms ¼ watt  
 R2—220 K ohms ¼ watt  
 R3—500 K ohms potentiometer

R4—10 ohms ¼ watt  
 R5—270 ohms ¼ watt  
 Q1—MPF 102 FET  
 Q2—Any general-purpose NPN transistor with a Beta (Hfe) of 40 or so (2N3904 or similar)  
 Q3—Any general-purpose NPN transistor capable of 20 mA collector current or more, Beta 40 or so (2N3904, 2N2222 or similar)  
 RFC—1 mH miniature ferrite core choke (value not critical)

LED—Panel mounting LED Radio Shack 276-068 or similar.  
 SW1—Sub-miniature DPDT slide switch or similar  
 Miscellaneous—6 volt AC adapter (Radio Shack 273-1454A)  
 Coaxial DC power jack (RS 274-1565)  
 Calibrated Dial knob (RS 274-413)  
 Dual phono jack (RS 274-332)

Fig. 1—Schematic of the little dipper.

the leads to the bottom lugs of the variable capacitor and by a ground strap to the rotor lug. A PC board layout drawing is provided for those who may wish to duplicate it. In general, construction is not very critical, but leads should be kept short to avoid undesirable resonances, especially at the higher frequencies.

One of the problems you may run into when building this kind of project is trying to find suitable coil forms and sockets. I solved the problem by using discarded 35 mm film plastic containers. Other types of plastic containers such as drug-store prescription pill containers can also do the job.

The socket was made from an RCA-type dual phono jack (Radio Shack 274-332 or similar). The outer metal ring contacts and bushing inserts were removed and discarded. A small piece of PC board material, or similar, with foil removed was used to make a top wafer to hold the contacts in place. The original bottom mounting wafer was used as a template to mark the appropriate holes, including two  $\frac{3}{16}$  inch holes for the coil pins. The template should also be used to mark the position of the pins on the coils; these are  $\frac{3}{4}$  or  $\frac{1}{2}$  inch #6-32 standard screws. They will hold a solder lug inside the coil and are fastened on the outside of the coil form by a standard metal or nylon nut. The plastic material of these forms is heat sensitive so the solder lugs should be attached to the coil winding ends before installing the

6-32 screws. The socket contacts are a snug fit for these size screws.

To mount the modified socket a  $\frac{15}{16}$  inch hole should be prepared at the end of the chassis nearest to the capacitor and the socket installed with two 6-32 screws and with the lugs pointing towards the corresponding capacitor lugs. Use flexible wire to connect the above lugs. Also, when installing the socket, place two plastic or metal washers to separate the

two socket wafers and allow some play to the contacts when inserting the coil pins. I have found the above arrangement quite satisfactory both mechanically and electrically. See figs. 3, 4, and coil data.

The dipper can be operated with any DC voltage from about 4.5 to 12 volts. A 9 volt battery can be used, perhaps attaching it to the back of the box, but an extra switch would be needed to disconnect it from the instrument when not in use. The

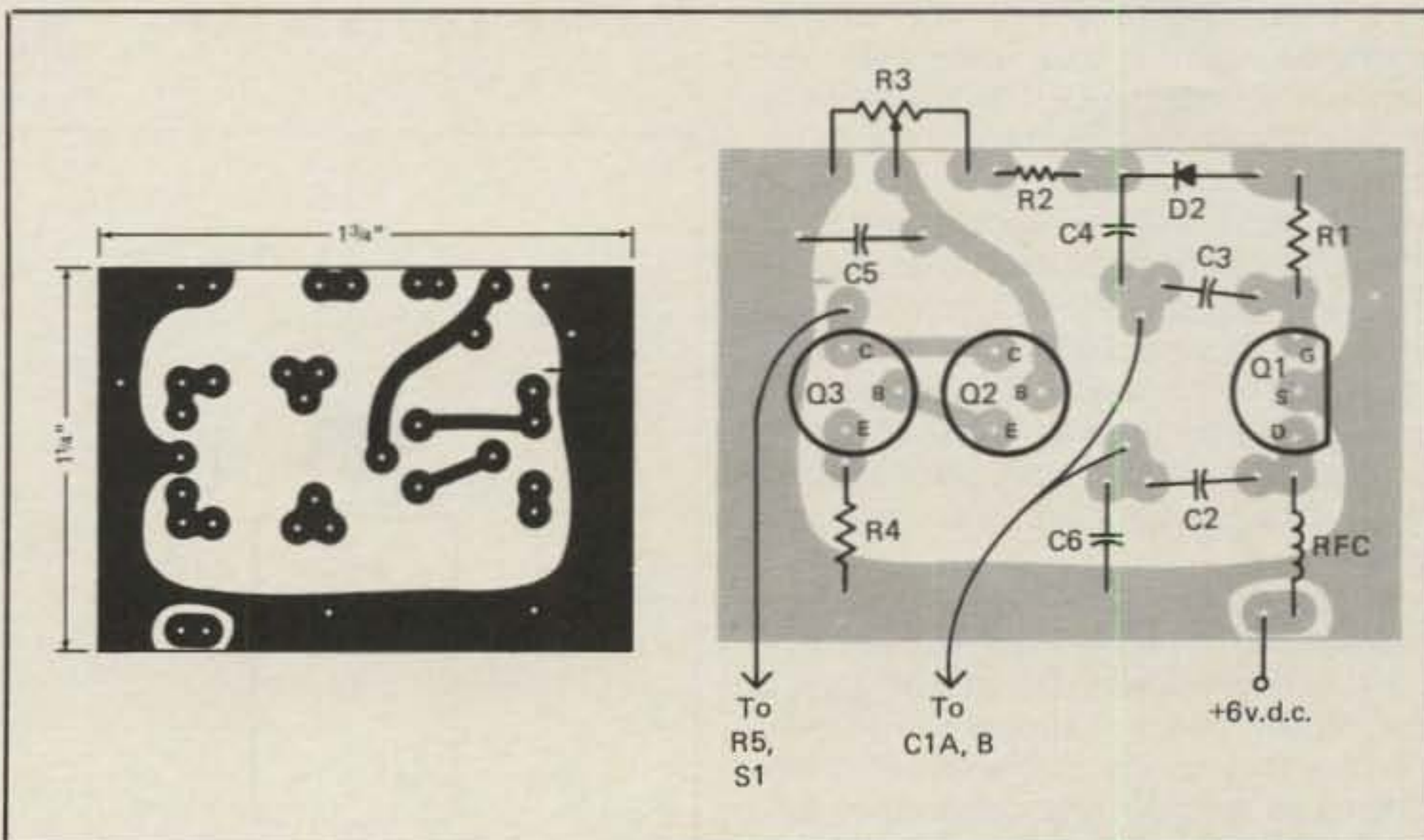
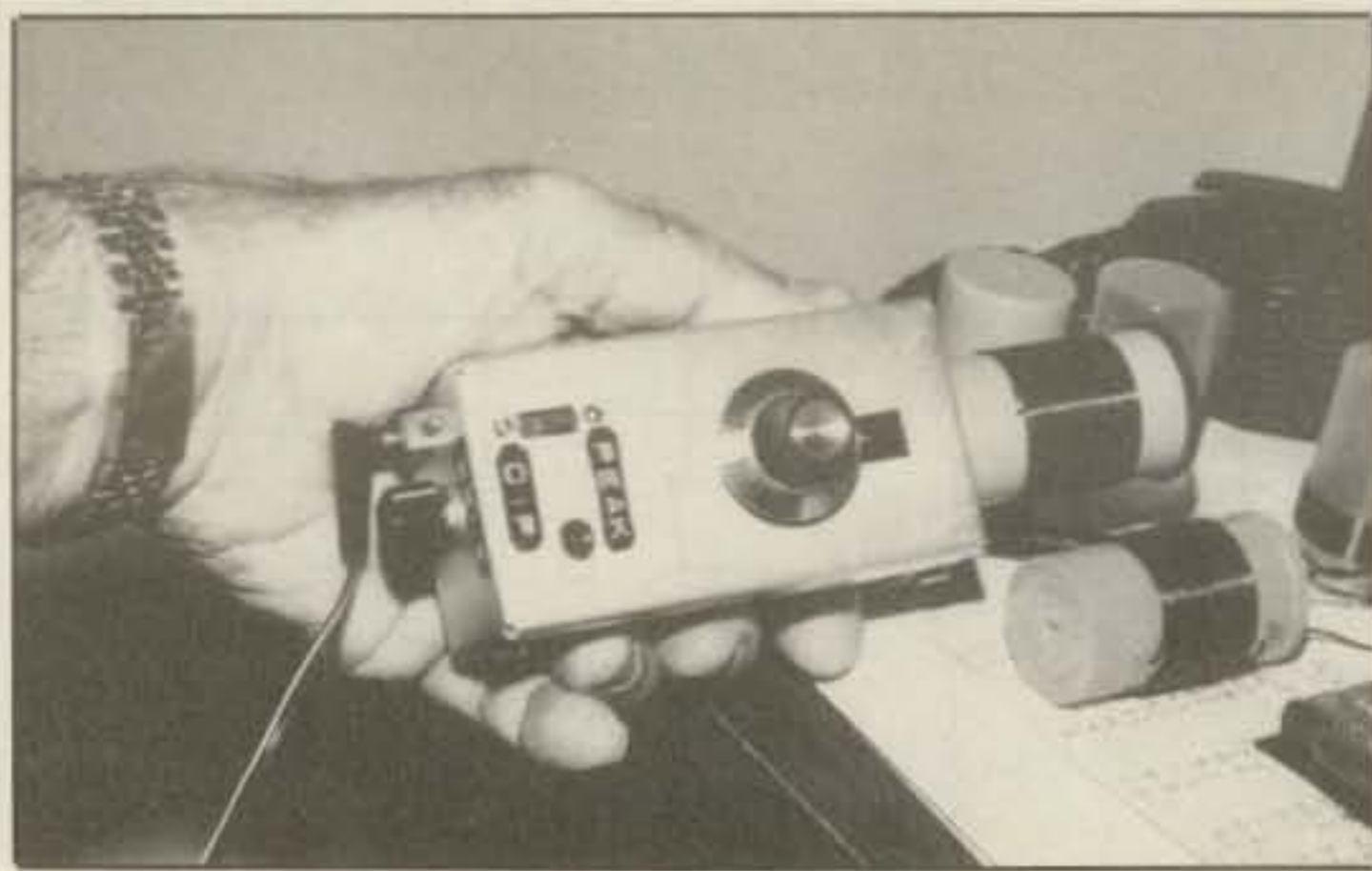
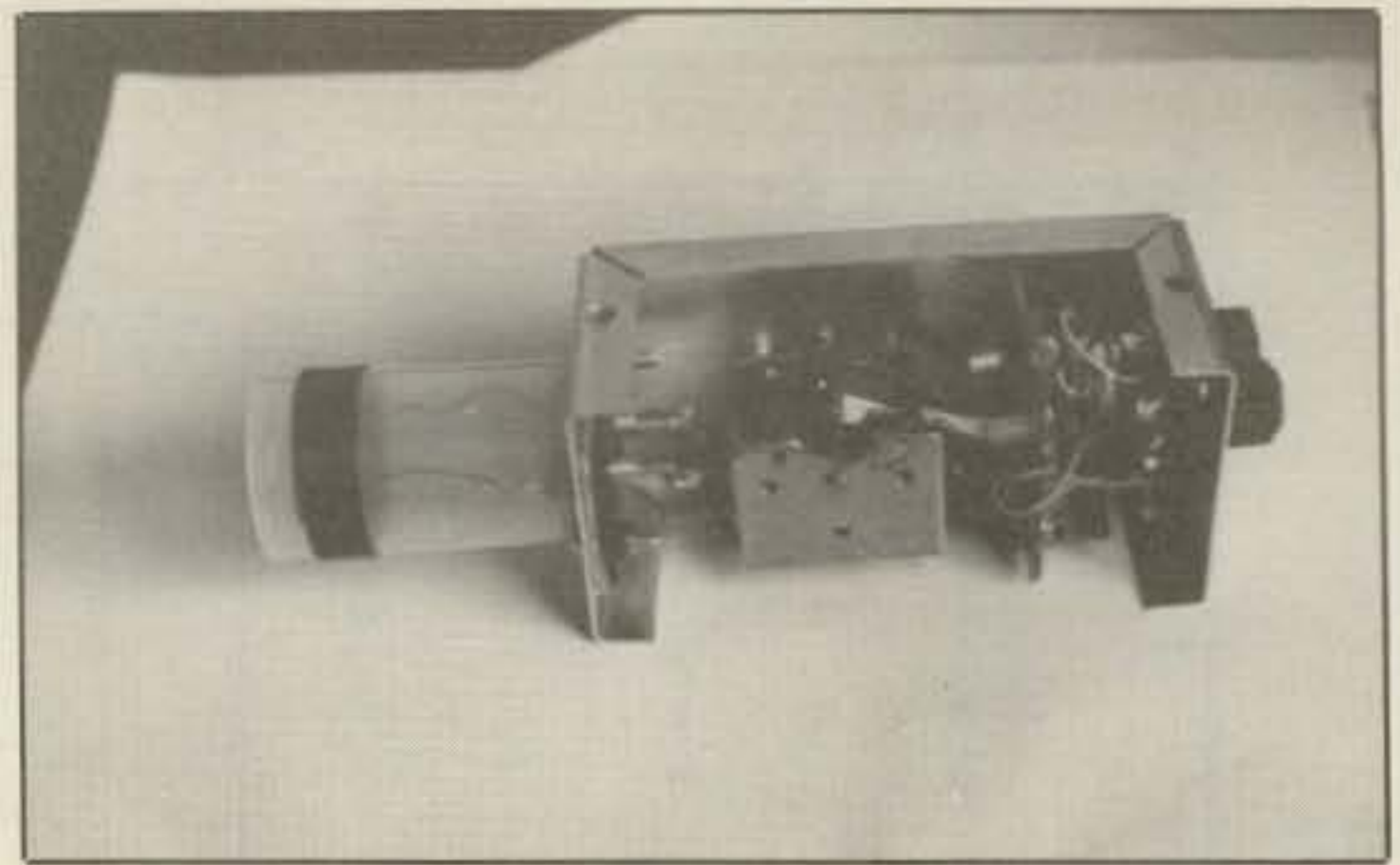


Fig. 2—(A) PC board layout (foil side). Scale is 1:1. (B) Location of components on the board. D1 mounts on the foil side, from the bottom R1 pad to the foil ground.



Compactness is the key word for the little dipper.



Inside view of the dipper.

average current drawn by the dip-meter is between 5 and 15 mA, with the higher value when in the peak mode. I prefer to use an AC adapter already available; that gives 6 volts. However, for portable operation a battery would be more suitable.

### Calibration and Use

To calibrate the dipper I installed a graduated skirted knob and ran a series of check points on graph paper for each coil. I used a general coverage receiver. However, sometimes if extra accuracy is required I will check the frequency with the receiver instead of using the chart while doing a measurement.

The main use for a dip-meter is to find the resonant frequency of a tuned circuit. The little dipper is used in the conventional way, except that the sensitivity control should be adjusted so the LED shows about half brightness when in the **DIP** mode. Then the meter coil is located near the coil being measured and the capacitor rotated until the LED shows a marked decrease in brightness. When in the **PEAK** mode, the LED is adjusted so it is just extinguished. The sensitivity control now works backwards, and when the resonance is found, the LED will light up instead of dimming. The choice is up to the individual, since the performance is equally good in either mode. Because of the non-linearity of the Darlington amplifier, the indications are quite obvious and the meter is very sensitive. Slight readjustments of the sensitivity or brightness control may be required when changing coils or when making large knob excursions, but changes are gradual in any case.


Other uses for dip-meters are quite numerous and have been treated extensively in the references at the end of this article. Nevertheless, I should like to mention that they can be used within their limitations as simple signal generators, as a source to drive an impedance bridge, to estimate the relative effectiveness of shielding, to determine the approximate

velocity factor or electrical length of a transmission line, to determine the approximate resonant frequency of an antenna, as an aid to neutralize an amplifier, to measure inductance and capacitance, and so on.

A word of caution may be in order here. When using the meter near circuits which may have high voltages present, make sure that all voltages have been removed first. **PLAY IT SAFE** and turn off everything first.

I have been using this little meter for some time now and am very satisfied with its performance, and I hope you will be, too.

### References

- ARRL Handbook, 1976, 1981.
- "Calculating Component Values," by Jim Bartlett, *QST*, November 1978.
- "A 1980 Dipper," by Fred Brown, *QST*, March 1980.
- "A New Look At Dip Meters," by Hank Olson, *Ham Radio*, August 1981.
- "Hints and Kinks," by Hal Vitrey, *QST*, September 1981.
- "A Bandswitching Grid-Dip Meter," by Fred Brown, *CQ*, February 1966. 

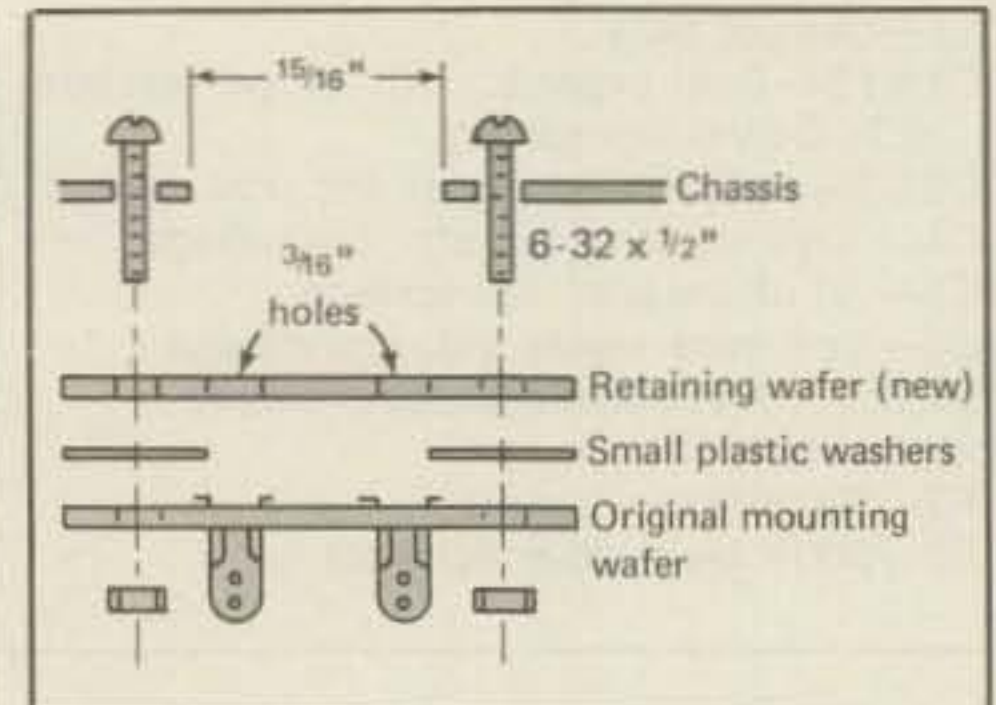


Fig. 3— Little dipper coil socket assembly.

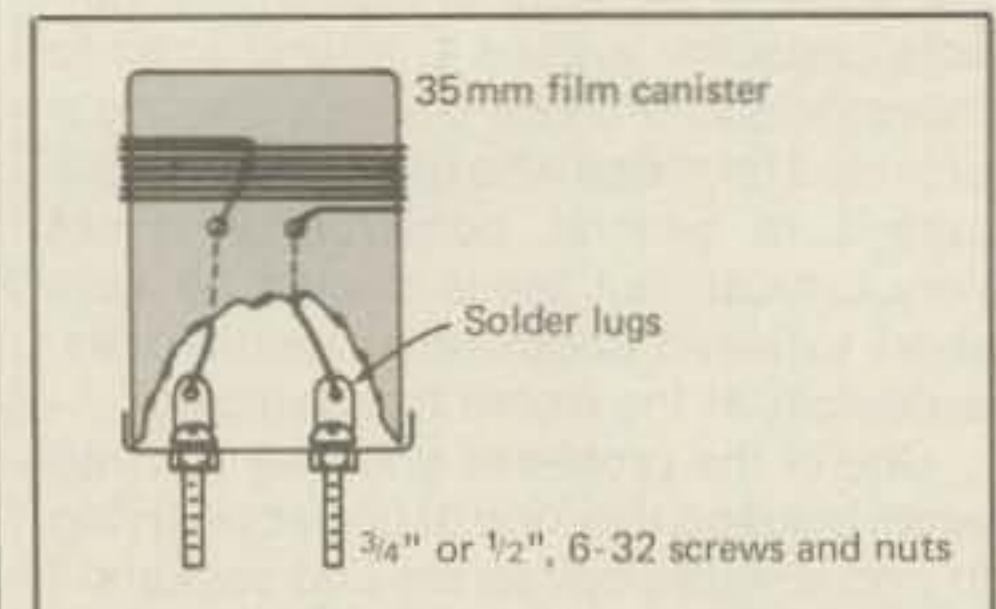


Fig. 4— Details of plug-in coil for the little dipper.

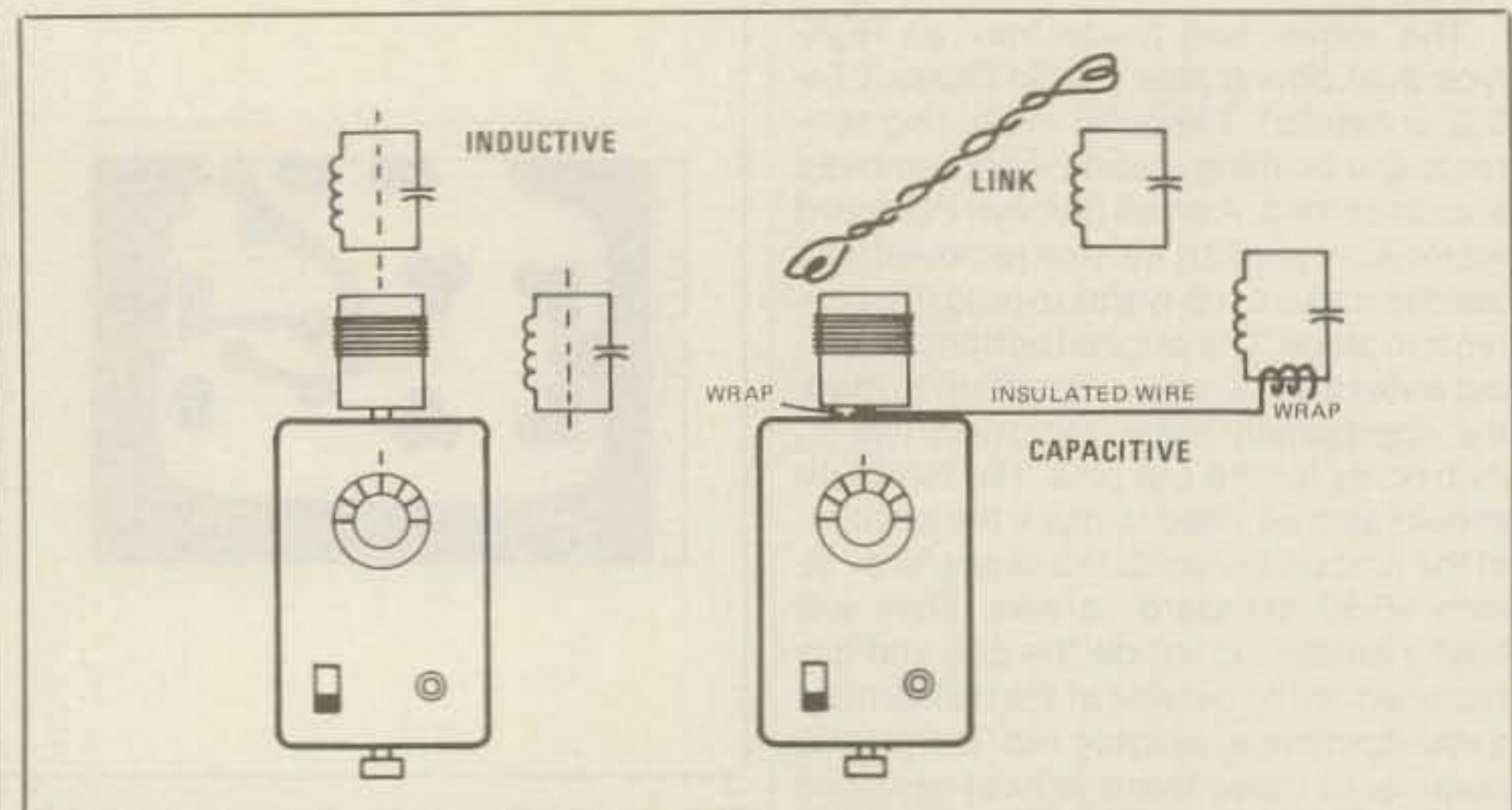
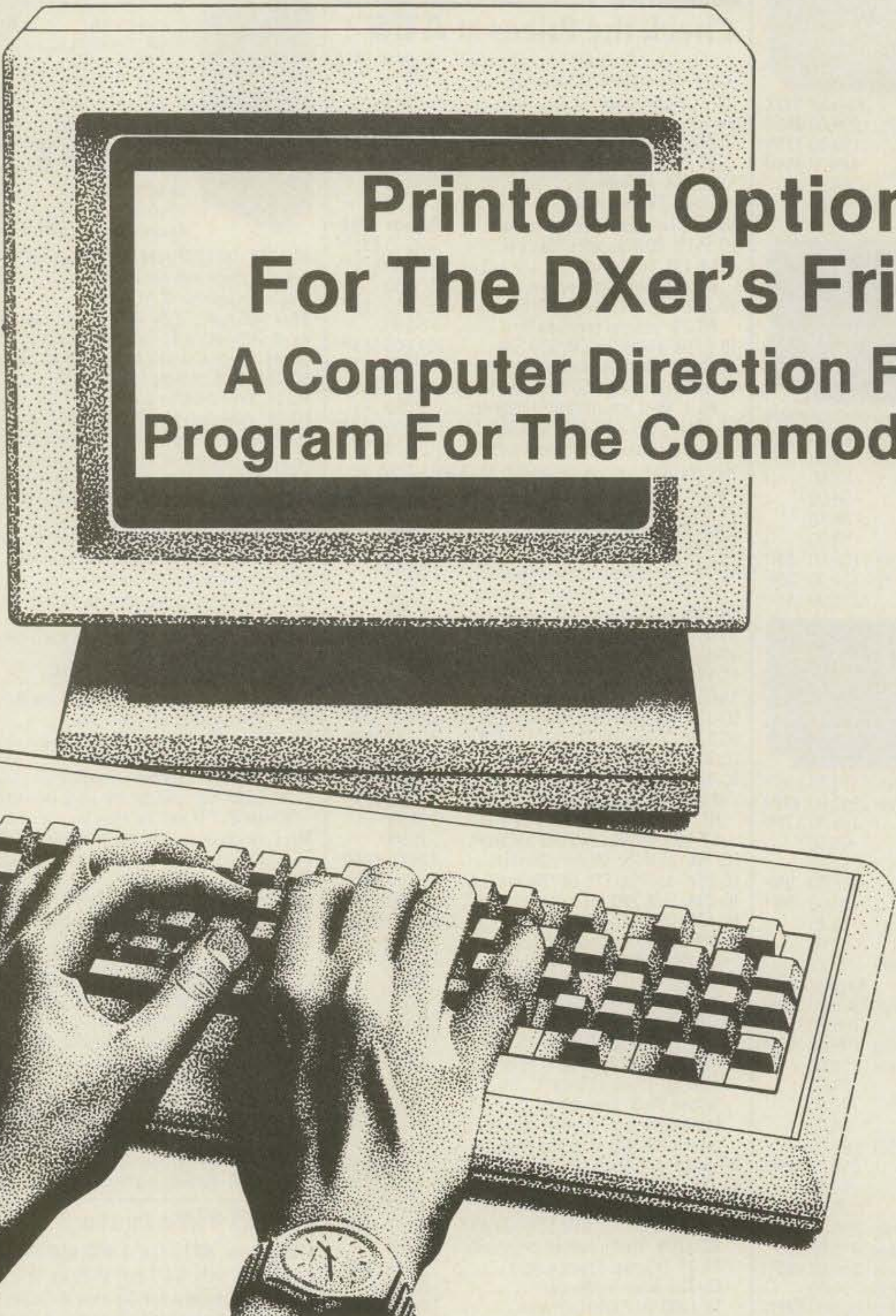


Fig. 5— Three ways to couple the dipper.





**A good idea gets better. N0CAO shows us how to add a printout option to an earlier CQ article.**



## **Printout Option For The DXer's Friend A Computer Direction Finder Program For The Commodore C-64**

**BY FRED A. SONTAG, P.E., N0CAO**

In April 1986 (page 38) *CQ* published WA0YJX's "DXer's Friend." It's a very handy program, and it occurred to me that the program could be further enhanced if a printout option for the data was incorporated. One could keep a permanent record of the beam headings and

*\*Lake Farm, Rt. 1, Box 86, Tebbetts, MO 65080*

distances and also be an "Elmer" for a friend who has no computer. Print out the headings for his QTH and perhaps he gets the rare one. At least you can share in his success!

The accompanying short program, when added to the Direction Finder program, will provide you with a printout option. I have also added input of your QTH and the DX QTH. You may use this space for other notes. Remember, though, not to use more than two screen lines. This

extra feature for notes should help to keep the paperwork separated when you print out headings for others.

I have used the CHR\$ statement in line 1000 to simplify the printout of the listing, avoiding the graphic character.

It is easy to add the PRINTOUT OPTION to the DIRECTION FINDING program. Load your previously typed WA0YJX program from disk or cassette, but do not run the program. Then type in the PRINTOUT OPTION. All program

```

2 REM *** PRINTOUT OPTION *** (C) 1986 FRED A.SONTAG,N0CA0
3 REM *** ADDED TO ** DIRECTION FINDER ** (C) 1985 GEORGE E.BLACK,WA0YJX
4 REM
5 REM
441 PRINT:PRINT:PRINT"***** DO YOU WANT PRINTOUT ***** (Y/N)
442 GETPS:IFPS=""THEN442
443 IFPS="Y"THENGOTO800
800 PRINT:INPUT" ENTER HIS QTH.";D$
810 PRINT:INPUT" ENTER YOUR QTH.";E$
820 OPEN4,4:PRINT#4
830 PRINT#4:PRINT#4,"YOUR QTH=";E$
840 PRINT#4:PRINT#4,"YOUR LATITUDE=";A
850 PRINT#4:PRINT#4,"YOUR LONGITUDE=";L1:PRINT#4
860 PRINT#4:PRINT#4,"HIS QTH=";D$
870 PRINT#4:PRINT#4,"HIS LATITUDE=";B
880 PRINT#4:PRINT#4,"HIS LONGITUDE=";L2:PRINT#4
890 PRINT#4:PRINT#4,"THE SHORT PATH BEARING IS";INT(C/.01+.5)*.01;" DEG.
900 IFC<180THENDX=C+180
910 IFC>180THENDX=C-180
920 PRINT#4:PRINT#4,"THE LONG PATH BEARING IS";INT(DX/.01+.5)*.01;" DEG."
930 D=(SIN(A*PI/180)*(SIN(B*PI/180)))+(COS(A*PI/180)*COS(B*PI/180)*COS(L*PI/180))
940 D1=(-ATN(D/SQR(-D*D+1))+PI/2)*180/PI
950 D2=D1*60:D3=D2*1.150779:D4=D2*1.852
960 PRINT#4:PRINT#4:PRINT#4,"SHORT PATH DISTANCE IS"
970 PRINT#4:PRINT#4,INT(D2/.01+.5)*.01;" NAUTICAL MILES"
980 PRINT#4:PRINT#4,INT(D3/.01+.5)*.01;" STATUTE MILES"
990 PRINT#4:PRINT#4,INT(D4/.01+.5)*.01;" KILOMETERS"
1000 CLOSE4:PRINTCHR$(147):GOSUB450
READY.

```

Printout option program for "The DXer's Friend."

lines have new numbers, so there will be no conflict with the existing program in memory. When you've finished typing, SAVE the revised program under a new name of your choice. Alternatively, if you have a "Merge" utility, just type in the

Printout Option and merge it with the original program.

Table I is an illustration of a sample printout, with a further reminder not to use more than two screen lines per QTH input.

```

YOUR QTH=KANSAS CITY-MO *** USE ALSO FOR NOTES MAX. 2 SCREEN LINES ***
YOUR LATITUDE= 39
YOUR LONGITUDE= 95

HIS QTH=EDINBURGH-SCOTLAND- *** DON'T USE MORE THAN 2 SCREEN LINES ***
HIS LATITUDE= 56
HIS LONGITUDE= 4

THE SHORT PATH BEARING IS 40.68 DEG.
THE LONG PATH BEARING IS 220.68 DEG.

SHORT PATH DISTANCE IS
3543.58 NAUTICAL MILES
4077.87 STATUTE MILES
6562.7 KILOMETERS

```

Table I—Sample printout of the N0CA0 printout option.

# COMB

Authorized Liquidator



## COMMODORE® VICMODEM™

- Use with the Commodore® C64™, the SX-64 or the VIC-20 Computer.
- Bell 103 Compatible.
- Full Duplex; 300 Baud.
- Manual Dial Direct Connecting.
- FCC Registered.

This Modem is **LOW liquidation priced** because it was closed out by Commodore®. Add it to your computer for access to timely financial information, news and reference libraries...as near as your phone! An affordable introduction to phone/computer services; and you can communicate with computer users who also own modems!

Use with data cassette (included), or with terminal program software, available at computer stores.

**90-Day Limited Factory Warranty.**

Mfr. List Price . . . . . **\$59.00**

Liquidation  
Priced At Only . . . . . **\$19**

Item H-1962-7041-072

Shipping, handling: \$4.00 each

Commodore is a registered trademark of Commodore Electronics, Ltd.

Credit card customers can order by phone,  
24 hours a day,  
7 days a week.



**Toll-Free: 1-800-328-0609**

Sales outside the 48 contiguous states are subject to special conditions. Please call or write to inquire.

SEND TO: Item H-1962

**C.O.M.B. Direct Marketing Corp.**  
1405 Xenium Lane N/Minneapolis, MN 55441-4494

Send      Modem(s) Item H-1962-7041-072 at \$19 each plus \$4 each for ship, handling. (Minnesota residents add 6% sales tax. Sorry, no C.O.D. orders.)

My check or money order is enclosed. (No delays in processing orders paid by Check.)

Charge:  VISA®  MasterCard®  American Express®

Acct. No. \_\_\_\_\_ Exp. \_\_\_\_\_

PLEASE PRINT CLEARLY

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ ZIP \_\_\_\_\_

Phone (     ) \_\_\_\_\_

Sign Here \_\_\_\_\_

# COMB COMB COMB

## AEASOFT Morse University

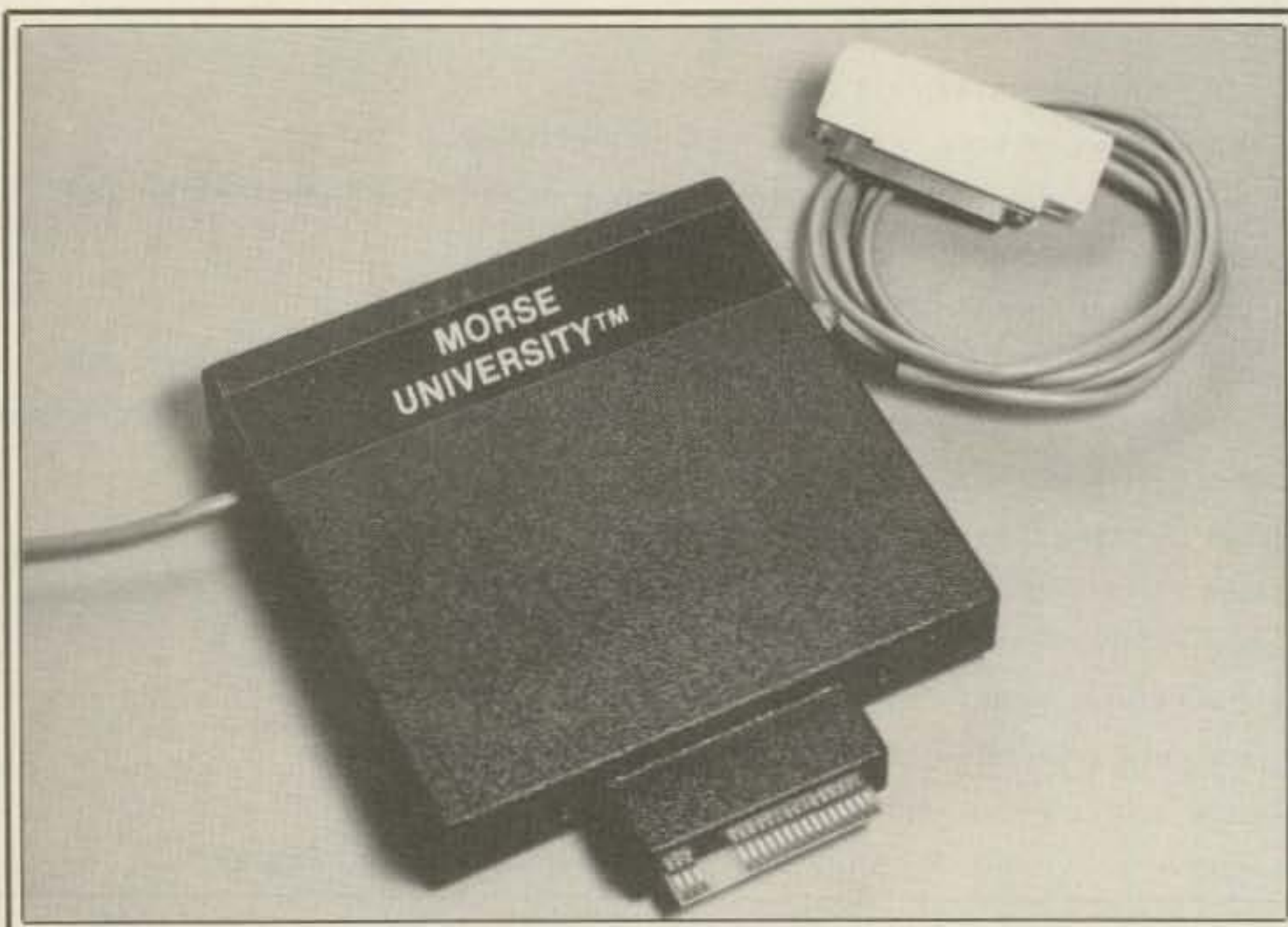
BY LEW McCOY\*, W1ICP

**T**his review is about one of AEA's teaching units—"Morse University"—or even more to the point, Morse code educational software. Morse University is a software (firmware) package in EPROM designed to be used with the Commodore 64 computer. Although not exactly new on the market, it does bear reviewing, reminding the reader of what is available.

It should be pointed out that the Commodore 64 has come down in price (less than \$150) to where it is a real buy for the amateur. I noted prices at flea markets last year and the C-64 was available used from \$75 to \$100. Additionally, the C-64 has much software and hardware available for amateur usage. While the C-64 is not completely noise free as far as generating interference to amateur reception, it certainly is better than most. Also, it apparently is a fact of life that amateur radio manufacturers will continue to support hardware and software for the C-64. There are just too many of the computers around to ignore.

The AEA Morse University firmware package is plugged into the cartridge port of the computer, and one then enters a whole new world of code instruction and learning. The program consists of several computer routines for code learning that have been available from AEA, plus several new programs. There is a **LEARNING** routine which emulates AEA's BT-1 Basic Morse Trainer. Also, there is a **PROFICIENCY** routine that will increase your code proficiency once you have learned the Morse characters. To improve your fist, there is a **SENDING ANALYSES** routine which analyzes your character formation and spacing. Also, there is a **RECEIVING GAME** which helps you recognize Morse characters under pressure. Last, the **MORSE KEYBOARD** routine enables you to compose your own code practice sessions.

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



AEA's Morse University designed for the C-64 computer.

If you are using a color TV set for a video monitor for the C-64 display, there is a color select menu in the AEA unit. Of course, if you are using a monochrome display, it can be set for the most pleasing shades. Likewise, one can select the most desired tone pitch by using the + key to raise the pitch or the - key to lower the pitch.

When you first turn on the computer, the screen comes up with the following display.

SELECT:

- L. LEARNING
- P. PROFICIENCY
- A. SENDING ANALYSIS
- R. RECEIVING GAME
- K. MORSE KEYBOARD
- T. SELECT TONE
- C. SELECT COLOR
- B. BACK TO BASIC

I have already mentioned the **COLOR** and **TONE** selections. Let's discuss LEARN-

ING. Character elements (dots and dashes) are sent at 20 wpm with a three-second interval between character or letter groups. This is the ideal method of learning Morse code because one learns to identify the sound of the letter rather than trying to count and separate dots and dashes. Also, by learning code in this manner, it eliminates the speed plateaus on which so many newcomers get hung up. For example, many beginners learn the letter "F" as "dot dot dash dot," but with this system the letter becomes one cohesive sound—"dididahdit."

### The LEARNING Routine

Of course, the first thing a beginner must learn is the alphabet, and the course does this a letter at a time. You learn the letter "F" first, then the letter "K," and of course, at each session the letters you have learned are added to the session. As AEA points out, and I certainly agree, two 20 minute sessions per day

will get you up to flawless 20 wpm code in four weeks. I also might add from my own experience that learning the code in this manner makes working with code a joy rather than a chore.

When you bring up the LEARNING SCREEN, the menu shows 61 lessons, 7 of which are German, Spanish, and Swedish letters. One doesn't need to learn these last seven, but they are there for those who do. In addition to the regular alphabet and numerals, all the punctuation signs are included plus some ending signals such as "SK." At the bottom of the listing are:

- W. NEW CHAR WT 1/n
- G. GROUP SIZE
- S. CHAR SPEED > 20
- D. DELAY

By pressing the "W" key it permits you to change the number of times the desired letter will be sent. For example, 1/1 means every character will be the same, 1/2 means the desired character will appear half the time, and so on. The letter "G" signifies group size and can be set from any number up to five. The "S" sets the speed the characters are formed with a default of 20 wpm. The letter "D" gives speed delay between characters. Keep in mind that while the characters are formed at 20 wpm, they can be sent with up to 3 seconds between characters (ideal for beginners).

### The PROFICIENCY Routine

The PROFICIENCY routine sends a random sequence of code practice characters with programmable starting and finishing speeds during a programmable time frame. The setup display looks like this:

S-START SPEED	05
F-FINISH SPEED	20
D-PRACTICE DUR	10.0
C-CHARACTERS	36
G-GROUP	5-CHAR
M-MODE	FAST
CURRENT SPEED	05

This display shows code practice will begin at 5 wpm, and over a period of 10.0 minutes will gradually increase to 20 wpm. The code will consist of the letters A-Z and the numerals 0-9. The characters will be arranged in groups of five with an element speed of 20 wpm the entire code practice duration.

Here is a description of each option:

S. Start Speed—The start speed can be set for any speed from 5 to 99 wpm.

F. Finish Speed—The finish speed can be any speed from 5 to 99 wpm. It can be a faster start speed going to a slower one.

D. Practice Duration—This option sets the time it takes to get from the start speed to the finish speed in tenths of minutes. One enters three digits for a duration of 00.1 to 59.9 minutes.

C. Characters—This is the same as

the session number. (There are 45 different sessions available.) This gives you a wide variety of practice material.

G. Group—By pressing the letter "G" on the keyboard, this gives random length groups rather than the customary five character groups.

M. Mode—Permits setting longer intervals between characters. However, as pointed out earlier, at all speeds of less than 20 wpm the characters are formed at 20 wpm.

### Sending Analysis

This routine is one that can humble the finest CW operator. It analyzes your sending for you. The ANALYSIS display looks like this:

- C. CHAR ANALYSIS
- S. SPACING ANALYSIS

The routine asks you to send a letter. The screen then shows you your average character speed. When you send text, it shows you how good your character and word spacing is. In my own case, like many amateurs, I progressed from a straight key, to a bug, then to an electronic key, and from there to a keyboard. Then, when I got really heavy into computers, I got a chance to use the computers for automatic code reception. Then I really found out how "imperfect" most code operators really are. (And that, of course, included this writer.)

### Receiving Game

Another routine is the RECEIVING GAME, which is a video game devoted to

learning the code. The video display of your computer is used for this. The screen shows a row of beam antennas across the bottom of the screen and thunder clouds roll across the top of the screen. Your job is to protect the antennas from being hit and destroyed by lightning. As soon as one of the thunder clouds approaches, it sends out random code characters (instead of thunder), and your job is to copy by hitting the correct key of the random characters before the lightning strikes. When 19 antennas are destroyed, the game is over.

### The MORSE KEYBOARD

The MORSE KEYBOARD routine permits you to make up your own code practice. You can type it in, edit it, and then store the text in the buffer. When completed, it can be transmitted to the video display. A line just below the top of the screen shows a readout, banner style, of the transmitted code. As with the other routines, the speeds can be set.

### Conclusions

The instruction manual is excellent, and a lot of thought went into the writing of the manual. It is in large, easy-to-read print and is some 30 pages long. It does something very few instructional code manuals does in that it holds your hand through a sample QSO, spelling out the meanings of typical CW abbreviations.

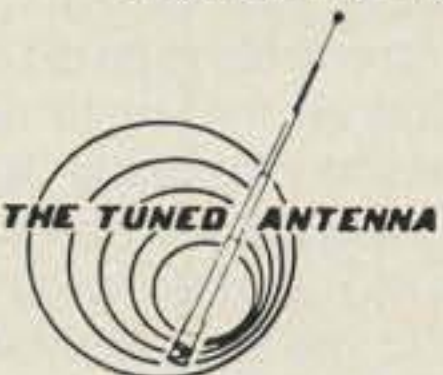
The course list for \$39.95. It is manufactured by Advanced Electronics Applications (AEA), Lynnwood, WA 98036-0918 (206-775-7373).



## THE SMILEY ANTENNA CO.

### THE HAND TUNED PERFORMANCE SYSTEM

FEATURING PORTABLE RADIO SIMULATION TUNING

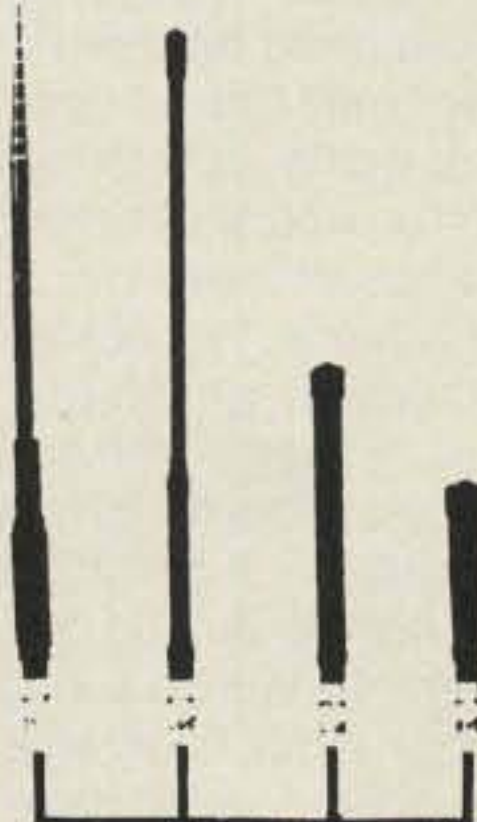


**THE TUNED ANTENNA**

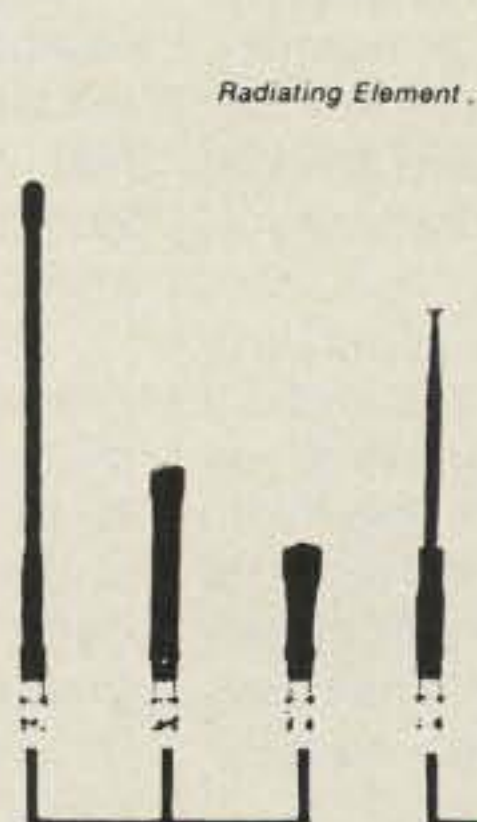
**Electrical**

Maximum Power ..... 50 Watts.  
Frequency Range ..... 118-932 MHz.  
Impedance ..... Matched to the Portable  
Specialized Tuning Available.

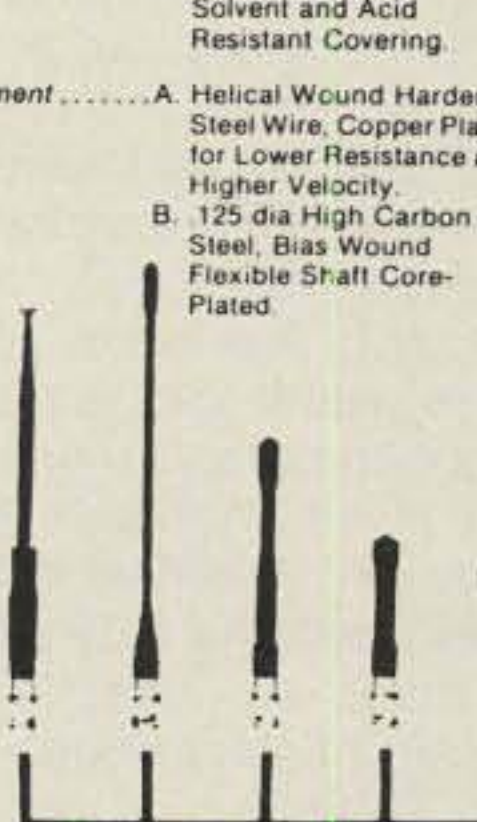
**"Quality through Technology"**



Available from  
136-174 MHz



Available from  
210-250 MHz



Available from  
440-470 MHz

**FOR DEALER  
LOCATION**

**CALL 619 579-8916**

SMILEY ANTENNA CO., INC. 408 LA CRESTA HEIGHTS ROAD EL CAJON, CA 92021  
CIRCLE 12 ON READER SERVICE CARD

**Is there more to the Novice life than just upgrading?  
What is it you want out of your Novice experience?  
KB1N gives you some practical advice on setting goals.**

# So You Don't Want To Be A Novice Anymore?

BY PETER O'DELL\*, KB1N

**J**ust what is it that the average Novice "desires"? *CQ* Editor Al Dorhoffer suspects that the "desire," or goal, of most Novices is not to be a Novice anymore. If that is true, then it is not surprising to see so many Novices drop out of the hobby.

After all, the easiest way not to be a Novice is not to be a ham at all. I should know. Back in the 60s when I had my first Novice license, the only goal I had was not to be a Novice, and I succeeded. Is there really more to the Novice life than code tapes and "Q & A" manuals?

## What Are Goals?

Let's take a look at goals in general. Most people who study this topic tend to break up goals into three categories: short range, intermediate range, and long range. Short-range goals are those which can be achieved in a few days to a few months. Intermediate-range goals usually take a little longer to win—i.e., six months to two years. Of course, the long-range goals are those which may reasonably be expected to take more than two years to accomplish.

If you are looking at your personal life, you may find that you have goals in terms of your career, money, your relationships, further education, and so forth. Basically, the goals that you have are dependent on where you are and where you want to go in your life.

Another way of looking at goals is to ask if they are reasonable. Is the amount of effort required greater than what you are willing to invest? Although you might want to be elected President in 1988, are you willing to invest the time and money needed to reach this goal? That says nothing about minimum age require-

ments and other such odds and ends that can render goals impractical—particularly, short-range ones.

## Are Your Goals Good For You?

Using this sort of scheme, what can we say about our Novice goal of upgrading (let's make it as positive as possible!)? For most people, upgrading is going to be a short- or intermediate-range goal. But with the 10-year renewable license, it could be a long-range goal. It is certainly a reasonable goal, if you allow yourself enough time to adequately prepare.

More importantly, though, such a goal is very, very, very *narrow* in the range of possible activities as a Novice. Novices can make contacts—next door or around the world. Novices can build equipment. In other words, Novices (just like all amateur radio operators) can do things on the air or off the air that have nothing to do with upgrading. (Actually, anything that you do as a Novice will make upgrading a little easier.) I wonder what would have happened to me as a Novice if my goals had been a little broader and better thought out?

Does this mean that Novices should have on-the-air and off-the-air goals? Absolutely! Not only should you have these two types of goals, but you should be dividing them up into short-, intermediate-, and long-range as well.

"Wait a minute," I hear some of you saying. "This is beginning to sound too much like my job. I got into amateur radio for fun and relaxation, not to meet quotas!"

Well, having goals doesn't mean that it can't be fun. Not having goals doesn't guarantee that it will be fun, either. Few hot-air balloon pilots know where they are going to land, but they all have the goal of getting off the ground—and most of them know which way the wind is blowing! In fact, most psychologists will agree that the lack of some form of goal in any ac-

tivity will usually lead to boredom and frustration.

## On-The-Air Goals

First let's look at some on-the-air type goals that a Novice might think of adopting. One possible goal that comes to mind quickly is Worked All States (WAS), which is issued by the ARRL to stations demonstrating contact with other stations in each of the 50 states. Is it a reasonable goal? That depends on the time frame in which it is considered. For most Novices it probably is not a reasonable short-range goal. But just about anyone could achieve this goal in six months to a year if they work at it.

There are dozens of other awards to be won. *CQ* sponsors the Worked All Zones award, which is one of the premier DX awards. The ARRL sponsors the DXCC program, another DX award. Each of these awards would most assuredly take more time and effort for the average Novice than WAS.

## The Best Short-Range Goal

So, we are still left with non-short-range goals. What would be a reasonable short-range objective? Take a look at your log book for the last month or so. How many contacts have you made? Take the total number of contacts and divide by the number of weeks. That will tell you how many contacts you are averaging for each week. Divide by seven to get the number of contacts per day. I'll bet dollars to doughnuts that most of you came up with a figure less than one for the last one.

A possible short-range goal is to make one contact each day. If you do that, you will have made 30 contacts within the first month, 180 in 6 months, and 365 within the year. At your present rate, how long will it take you to make 365 contacts? Could you make two contacts per

\*7 Brian Rd., South Windsor, CT 06074

day? If so, you will have 60 in a month and over 700 in a year.

How does this tie in to your intermediate goal of WAS? Well, if you are only making two contacts per week, you will have only 52 contacts after six months. Since you need one contact from each of 50 states for WAS, you can only have two duplicate contacts. This also assumes that each of those 52 is perfectly willing to QSL!

But what happens if we have our one per day? At the end of six months, you have about 180 contacts. So it doesn't matter so much if you have several contacts from one state. And if some turkey hasn't sent you his QSL, chances are you've worked someone else in that state who will. (Honestly, if you have made 200 to 300 contacts, do you think you will still be puttering along at 5 wpm? That'll get you to General class, won't it?)

As for long-range goals, WAZ or DXCC might just fill the bill. When the sunspot cycle picks up in a year or two, you will find many more DX stations in the Novice bands than now. Why not start looking for the DX stations now? A journey of 1000 miles begins with a single step.

For on-the-air activities, this is one possible line-up of goals: one contact per day, short range; WAS, intermediate range; and WAZ, long range. Of course, there could be dozens of others. Traffic handling, rag chewing, contesting, and public-service activities are all possible areas of interest for the Novice to pursue on the air. If you look closely at any of these, you can easily define short-, intermediate-, and long-range goals for them.

### Off-The-Air Goals

Off-the-air activities lend themselves to goal setting, too. Suppose you do not feel yourself to be a "technical person"? That's great. None of us were born that way. So you get to start at the same place that we did.

A few years ago I found myself working in a two-way radio shop repairing Motorola equipment. I was gently picking up a Micor (100 watt mobile transceiver), when my boss came in. Noticing how I was handling the radio, he took it from me and hurled it about 10 feet through the air onto the service bench. He looked at me and smiled, "That's the trouble with you hams. You're too gentle with your equipment." The Micor was no worse for the treatment it got.

Oh, I'm not advocating that you throw your rig across the room. I myself still wouldn't do that. But I think he was right about most amateurs being too gentle (maybe intimidated?) with their equipment. If you haven't been inside the case, unplug the power cord and remove the screws that hold on the cabinet. Pull the chassis out and take a look at what's inside.

Get out your service manual and locate some of the different circuit boards. Using the layout templates, identify two or three components on one of the boards. Now locate these same items on the schematic diagram. Congratulations. You just did something technical.

If you don't have the service manual, order one today if you can. For several years now I've made a point of always getting the service manual with each new rig I get. If I can't fix it, I've got friends who can, if we have the service manual available. A couple of years ago I bought a fancy, new hand-held 220 MHz transceiver, even though there was no service manual available. Of all the equipment I have, it's the only piece that has needed repair. Without the service manual, there was nothing to do but send it back to the factory. Dumb.

A good short-range goal, then, is just to become familiar with your equipment. After you've gotten comfortable just taking off the cover, try checking some of the voltages given in the service manual. Just be careful where you put your fingers.

### Build Something

An intermediate-range goal might be to build something simple. The Heath Company offers a wide range of kits. Most assuredly, you will find at least one item in

their catalog that will be useful to you. I've found their instructions to be easy to follow, thorough, and accurate—in short, superb.

If kit building isn't your cup of tea, then build a simple station accessory from CQ or one of the other amateur radio magazines. The key here is to go for something simple and easy to build. Keep the difficult construction projects on the back burner for your long-range goals. Another area that you can explore is antennas. The goals that you can set for yourself here are limited only by your access to real estate and your budget.

### The Beginning

By no stretch of the imagination does this exhaust the possible activities in which you as a Novice can be involved. Take a few minutes now and make up a list of all the things you would like to do as a ham. Put down everything that comes to mind. You can decide on the reasonableness of any given item later on. Now sort them into short-, intermediate-, and long-range goals (some of them may be really long range, but that's okay).

For the intermediate- and long-range goals decide what steps you need to be taking now to reach them in the proper time frame. Hop to it now. Ham radio is like life. By the yard, it's hard, but by the inch, it's a cinch!

CQ

## IT'S NOW EASIER TO CALL DOC'S 2 Locations for fast ordering and quick help



ICOM



YAESU



KENWOOD

And all your other favorite lines of Amateur gear  
**DOC'S COMMUNICATIONS**

**NEW** 3401 South Blvd.  
Charlotte, NC 28209  
**(704) 523-7003**

702 Chickamauga Ave.  
Rossville, GA 30741

**(404) 866-2302**  
**or 861-5610**

CIRCLE 76 ON READER SERVICE CARD

## IRON POWDER and FERRITE PRODUCTS

**AMIDON**  
*Associates*

Fast, Reliable Service Since 1963

Small Orders Welcome

Free 'Tech-Data' Flyer

Toroidal Cores, Shielding Beads, Shielded Coil Forms  
Ferrite Rods, Pot Cores, Baluns, Etc.

12033 OTSEGO STREET, NORTH HOLLYWOOD, CALIFORNIA 91607

CIRCLE 78 ON READER SERVICE CARD

# The 1987 Handbook has it all!

The 1987 ARRL Handbook for the Radio Amateur is your source for the most up-to-date information on:

- Packet Radio and other forms of digital communication
- RF Circuits and design
- Power amplifiers
- Visual communication — ATV, SSTV, and FAX
- Propagation
- Operating
- Antennas and transmission lines
- Voice communication
- Space communication

The 64th edition has 40 chapters and over 1200 pages. It's packed with practical construction projects and there are many with printed-circuit board etching patterns. Every year the *Handbook* is updated to reflect changes in the state-of-the-art. Whether you are a radio amateur, engineer or technician you'll find the latest edition a must addition to your technical library. There is no change in price from last year! Paperbound: \$18 in the US, \$19 elsewhere; cloth: \$27 US, \$29 elsewhere. Payment must be in US funds. Add \$2.50 (\$3.50 for UPS) shipping and handling.



WA6P operated this solar powered packet station during 1986 Field Day as part of the McDonnell Douglas Amateur Radio Club and Southern California Amateur Club entry. The photographer was WA6AUF.

Order from: ARRL, 225 Main Street, Newington, CT 06111 USA

No 45-46



# MIRAGE /KLM

*Expanding Our Horizons*

Introducing

## Mirage/KLM 1.2-44 LBX

The first 1260 MHz to 1300 MHz  
Made in the U.S.A.

- Factory Tested
- Completely Assembled
- Completely Weatherized Balun
- Also Available Soon . . .  
Power Dividers

### SPECIFICATIONS

#### Electrical

- Band Width . . . . . 1260-1300 MHz
- Gain . . . . . 18.2 db
- VSWR . . . . . Better than 1.5 to 1
- Feed Impedance . . . . . 50 Ohms
- Balun . . . . . 4:1 Rigid Coax

#### Mechanical

- Boom Length . . . . . 12'4"
- Element Length . . . . . 4.5"
- Mast Required . . . . . 2"O.D.
- Windload . . . . . 1 sq. ft.

**Mirage Communications Equipment, Inc.**

**P.O. Box 1000**

**Morgan Hill, CA 95037**

**(408) 779-7363**

CIRCLE 135 ON READER SERVICE CARD

**Common sense says it won't work and a lot of theory says it can't work, but if you try it for yourself you'll be surprised. It does work!**

# The "U" Antenna

## A High-Performance DX Receive Antenna For 80 and 160 Meters

BY BOB FARKALY\*, K9RHY

**T**hese days, when you can count the sunspots on the fingers of one hand, the low bands are the only DX game in town. Listening to 20 meters on a winter evening during the sunspot minimum is like listening to a dummy load. Because I was looking for something a bit more exciting, I decided to try 80 meter DXing.

The first antenna erected was an inverted Vee with the apex at 70 feet (21.5 meters). Next, because everyone says you need a vertical to work DX on 80, a Butternut HF2V followed. The Butternut is top-loaded and has 4000 feet (1225 meters) of radials in the ground system, making it a competitive transmit antenna. This choice of antennas worked pretty well. My 80 meter DXCC total went from zero to 77 in a couple of months. All continents were worked, and nice ones such as AZ1, P29, J5, 5V7, and VR6 added flavor. What frustrated me from day one, however, was noise. There is no shortage of this commodity on 80 meters.

The Vee was noisy, and the vertical was worse. My noise level hovered around the S9 mark most of the time, rising occasionally when a storm showed up anywhere within a 500 mile (800 km) radius. Trying to extract a signal only a few dB above the noise was giving me headaches.

I kept hearing about how great the Beverage antenna is for serious 80 meter DX work. I read and heard about the Big Guns who routinely check different propagation paths by selecting the appropriate Beverage. When you research this classic antenna, however, reality and limited real estate get in the way. Nice as a Bev-

erage might be, there simply was no space for one.

Just as I was about to throw in the towel on 80 meter DXCC and WAZ, KS9U, a fellow member of the Northern Illinois DX Association, came to the rescue. He described his low-band receive antenna which seemed to combine many of the attractive performance features of the Beverage but with the benefit of being able to be installed on a suburban lot. Because this antenna was first described to me by KS9U, and because it is shaped like a big letter "U," I call this my U Antenna for 80 meters. Incidentally, it plays well on 160, too.

### Theory of Operation

A little background information on the Beverage antenna is appropriate at this point. The Beverage is a high-performance low-band DX antenna for four reasons:

1. It discriminates in favor of DX signals arriving at low incoming angles (less than 45 degrees).
2. It is insensitive to atmospheric noise, and rain and snow static.
3. It is very sharp directionally.
4. It discriminates against signals arriving at high incoming angles. Signals from within a radius of about 1000 miles (1600 km) are typically 25 to 30 dB down on the Beverage.

The U Antenna has all of these characteristics with the exception of the directional bias. Although I can't confirm it, I would guess the theory of operation of the U Antenna is similar to the Beverage. Why does it work? I don't know. How does it work? Great.

### Construction and Installation


The U Antenna installed at K9RHY

uses about 1000 feet (306 meters) of insulated wire. The length of the antenna does not appear to be critical, but longer is probably better than shorter. One end of the wire leads directly into the shack and is attached to the receiver via an antenna tuner. The rest of the wire runs into the trees and around three sides of the perimeter of the lot forming a large, rough U shape. The wire averages about 7 feet (2.1 meters) above the ground. No insulators or supports were used. The entire antenna is held above the ground by tree branches, bushes, and a few staples.

### Performance

The performance of the U Antenna has been great. During a recent DX contest 80 meters was wall-to-wall noise at S9+ on both the Vee and the vertical. No DX signals could be copied. Switching in the U Antenna transformed the noise into wall-to-wall DX signals. Unbelievable. The signal strength of the DX stations drops, but the noise disappears. Signals that were totally undetectable on the Vee or the vertical were absolutely Q5 copy. As an added benefit, QRM from local USA stations dropped down 25 to 30 dB in strength, making adjacent channel copy easy.

To use the U Antenna on 160 meters, a 16:1 toroid autotransformer makes an appropriate matching device. Direct connection provides the best match on 80.

The second user of the U Antenna, WD9AHJ, worked DXCC on 160 meters in two seasons. Another club member, KV9S, put up a U antenna last year. He has used it to come out on top of the 9th call area in 80 meter contest work. The U Antenna supports the well-known adage: "You can't work 'em if you can't hear 'em." 

\*731 Oak Spring Lane, Libertyville, IL 60048

# Dan's Got It All

**ICOM**  
IC-751A, IC-745, IC-02A, FT-980 CAT, FT-209 RH, FT-727R, FT-767GX, FT-757 GX

**YAESU**  
FT-757 GX

**TM-2570A**  
**PAKRATT PK-64**

**KANTRONICS**  
KPC-2400  
PACKET AT 2400 BAUD

**KENWOOD**  
TR-2600, TH-21A, TH-21AT, TS-940S, TS-930S

**WELZ CORP.**  
VSWR/POWER METERS

**WELZ**  
ST-20T

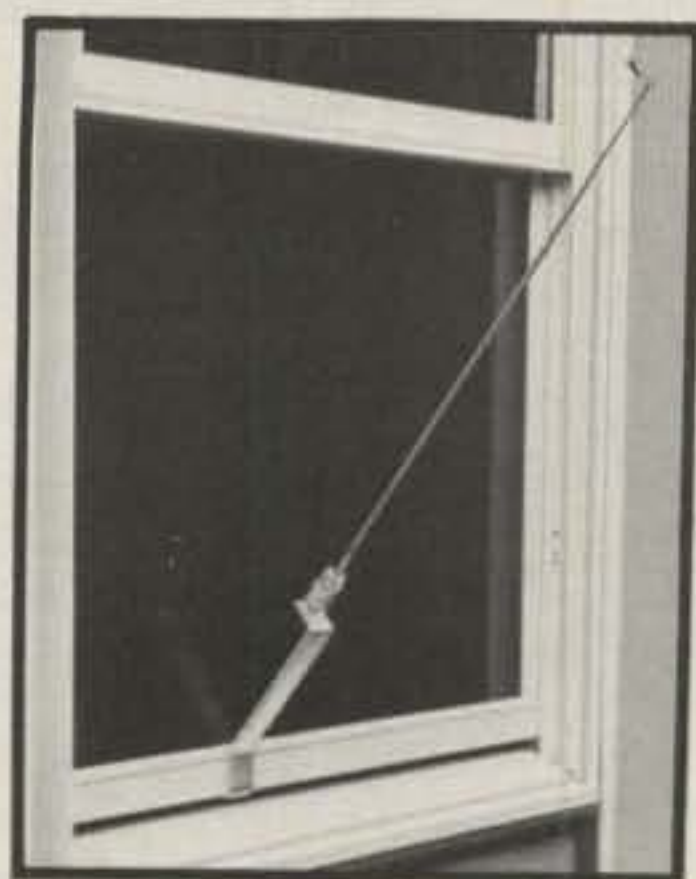
**SANTEC**

**Britt's 2-Way Radio Sales & Service**  
2508 Atlanta Street  
Smyrna, Georgia 30080  
Belmont Hills Shopping Center  
(404) 432-8006

All Of These "Goodies" And Many More At Super Savings.  
Come See Us Or Call 1-800-241-2027.

CIRCLE 35 ON READER SERVICE CARD

## PORTABLE ANTENNA



MODEL AP-10

Designed for  
APARTMENTS  
MOTELS  
VACATIONS

PRICE  
**\$51.95**

Add \$3.00  
Shipping and Handling

Quick Simple Installation. Operates on 2, 6, 10, 15, 20, 30 and 40 meters. All coils supplied. Only 22-1/2 inches long. Weighs less than 2 lbs. Supplied with 10 ft. RG 58 coax and counter poise. Whip extends to 57 inches. Handles up to 300 watts.

VSWR—1.1:1 when tuned

Write for more details and other B&W products

ALL OUR PRODUCTS MADE IN USA

**B&W BARKER & WILLIAMSON**  
Quality Communication Products Since 1932  
At your Distributors write or call  
10 Canal Street, Bristol PA 19007  
(215) 788-5581

PERFORMANCE  
AND VALUE  
WITHOUT COMPROMISE

## KRP-5000 REPEATER

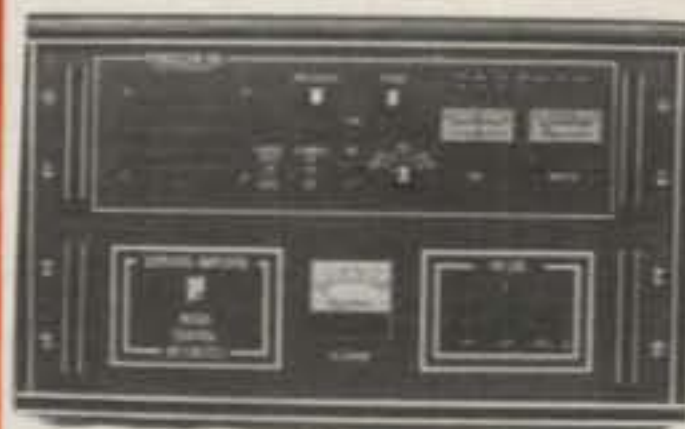
Word is spreading fast—  
"Nothing matches the KRP-5000  
for total performance and value. Not GE, not even Motorola."

RF performance really counts in tough repeater environments, so the KRP-5000 receiver gives you 7 helical resonators, 12-poles of IF filtering, and a precise Schmitt trigger squelch with automatic threshold switching. The transmitter gives you clean TMOS FET power.

Enjoy high performance operation with: remote programmability, sequential tone paging, autopatch, reverse autopatch, 200-number autodial, remote squelch setting, status inputs, control outputs, and field-programmable Morse messages

Call or write for the full performance story... and the super value price!

Micro Control Specialties  
23 Elm Park, Groveland, MA 01834  
(617) 372-3442



KRP-5000 Repeater shown  
with PA-100 Amplifier

The first choice in  
Transmitters - Receivers  
Repeaters  
Repeater Controllers  
Power Amplifiers  
Voice Mail Systems

CIRCLE 36 ON READER SERVICE CARD

**Once again N4ZB reminds us what can be done with a little ingenuity. A few of these venerable rigs can be put in shape by a club and used as loaners for new amateurs as well as teaching projects.**

## Oldies Can Still Be Goodies

BY GERALD SAMKOFKY\*, N4ZB

**N**o one can deny that owning one of the latest solid-state transceivers is every amateur's dream. Unfortunately, there still are many among new and would-be amateurs who simply cannot afford the price of one of these goodies as yet.

Five years ago I was approached by a new Novice (age 70 plus) whose total amateur budget for a station amounted to \$25.00! At that time I felt this represented an impossible task. However, an applied hunt along with some good luck plus a few hours spent on required repairs allowed this elderly amateur the pleasure of operating a 90 watt CW rig! (See "How To Get A Start In Amateur Radio For \$25.00," CQ, November 1980.) Since that article appeared I have had many inquiries from other people who also are seeking to enter amateur radio on a tight budget.

Five years ago there were far fewer used rigs offered for sale. As more and more sophisticated equipment became available, many tube rigs were placed on a back shelf where they slowly gathered dust. Many needing some repairs were set aside also, as amateurs devoted their time to operating their new rigs.

Recently, two newcomers of high-school age who had passed their General exams asked me if I could help them obtain their first rigs based on the limited funds available to them. We started by carefully checking through our local trading sheets. This first attempt did not indicate any amateur gear offerings. Some days later we checked through a comprehensive trading sheet from a neighboring town. Among the many CB items offered

were a venerable National NCX-3 (asking price \$40.00) and a Swan 500 (asking price \$90.00). Both ads indicated the rigs were being offered "as is."

The NCX-3 proved to be poor physically, and when we asked the owner to hook it up to 110 volts, he suggested the set did not work! Still it had been a fine unit some 20 years ago. We suggested a lower offering price, and with some haggling the set was purchased for \$30.00. Removed to my garage workshop, the scratched, dusty cabinet was removed. The following work was required before the unit was placed in use. Output tubes (badly burned) were replaced. A local TV service shop which no longer does repairs on tube-type TV's sold us a pair of output tubes for \$6.00. He graciously checked several tubes to come close to a matched pair. A burned RF choke was replaced, as were two bypass capacitors and the filter caps to reduce an annoying hum. After firing up the rig, we did a slight touch-up on the IF's and the set was electrically ready to go. The cabinet was sanded down to the bare metal, and several coats of gray "Rustoleum" were sprayed on. Decals replaced the original panel lettering. Total cost including a used crystal mike and wire for a 20 meter dipole amounted to \$60.00. Perhaps a digital readout, dual VFO's, noise blanker plus new FCC bands were lacking, but a new amateur was now able to add his voice to 20, 40, and 80 meter QRM! Best of all, he had actually assisted in the repair work done on his rig!

The Swan 500 also proved to have gone through some 20 years of hard use. Again, we saved \$15.00 from the \$90 asking price by indicating that the rig might need a lot of work. Removing the cabinet, again the first thing we noticed were the badly burned 6HF5's. The original single bias control was replaced with a dual

control (concentric unit placed in original hole made an additional hole unnecessary). It also allowed purchasing a pair of unmatched tubes from the local Radio Shack; these offer a lifetime guarantee (a welcome item where tubes can go bad quickly). Other repairs included replacing badly worn RF and audio controls, RF choke, plus a high voltage diode. The cabinet was sanded down and a black spray was applied along with new panel lettering. Total cost including a used microphone and wire for a 15-40 meter dipole came to \$112.00. Again, the young amateur helped in making the repairs.

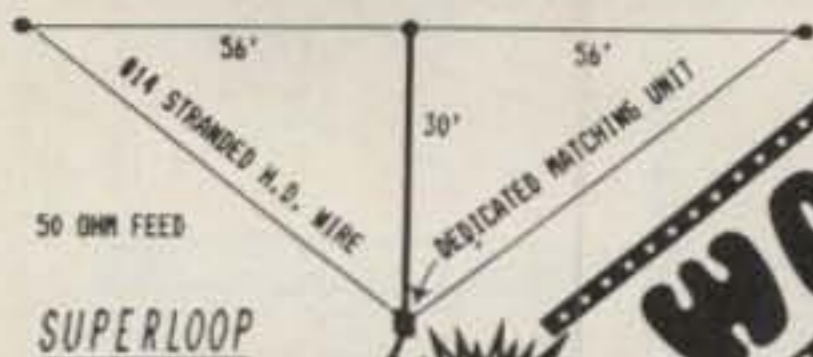
Of course, these are only two examples of what can be done if you apply yourself properly. I suggest in your search that you check through the many trading papers as well as classified ads in your newspapers. *Never purchase a rig without the accompanying manual. Ask and make sure the power transformer is in good condition, as these may be either impossible to obtain or costly to replace.* If possible, ask the present owner to hook up the rig to 110 volts for an on-the-air check. Finally, don't be afraid to haggle over the price, especially if the unit needs repairs. You will be surprised at the discount you might receive!

For new amateurs, carefully study the operating instructions in the manual. Study the circuit and compare wiring to see what previous work has been done. Also see whether any parts appear to be burned, check all soldered connections, and important—check all tubes! Point-to-point voltage checks can be made referring to the schematic. **NOTE: Do not attempt high-voltage checks unless guided by the manual!** Needless to say, carefully follow initial "on the air" instructions. If you do need help in making repairs, do not hesitate to visit your local amateur radio clubs.

\*1420 Mount Vernon Drive, Holiday, FL 33590

EVERYTHING IN HF WIRE ANTENNAS: FROM DIPOLES TO SUPERLOOPS

SEE WHAT WE'RE DOING WITH ANTENNAS & BALUNS!



**SUPERLOOP**  
80 & 40 M two band loop. SWR < 2:1 from 3.5 to 3.8 & 7.0 to 7.3 MHz. All bands with transmatch. New and only \$69.95

**RADIO WORKS**

COAX SEAL \$1.75  
RG-8X \$.14/FT  
#14 H.D. STRANDED ANT. WIRE \$.06/FT  
2 M BASE COLINEAR \$23.95  
2 M 5/8 MAG MOBILE \$22.95

INTERNATIONAL 9086 \$.37/FT SUPER CABLE (EQUIV. OF 9913)  
SUPPRESSOR STRIP, FULL 3 LINE PROTECTION, EMI/RFI NOISE FILTER, 6 OUTLET, IN DELUX METAL CASE \$13.95

DISCOVER THE NEW "C1-2K" AND "B4-2K" BALUNS ENGINEERED MAX PERFORMANCE BALUNS FROM \$15.95

SEND SASE FOR FREE CATALOG FROM JIM WATHU (804) 484-0140 BOX 6159 PORTSMOUTH, VA 23703

MONEY ORDER, VISA MASTER CHARGE OR UPS COD. PLEASE ALLOW FOR POSTAGE.

CIRCLE 21 ON READER SERVICE CARD

**PROPAGATION FORECAST**

**BANDAID**  
IBM PC  
\$69.00

**MUF PLOT**  
C64/APPLE  
\$30.00

Selectable HPF, MUF, FOT, LUF plots, Grayline, World Map, World Wide Beacon Network, QSL Data Base, 550 Target Database, Distance/Bearing, Graph or Table Output, Excelent User Interface. Not copy protected.

Base (2) Systems, 2534 Nebraska, Saginaw, MI 48601 or Call (517) 777-5613 for orders or information.

CIRCLE 18 ON READER SERVICE CARD

**USA-CA**

Order one or two today and start collecting counties for one of amateur radio's most prized awards.



76 N. Broadway, Hicksville, NY 11801

Please rush me \_\_\_ copies of the USA-CA Record Book.

Enclosed is \$1.25 for each record book.

Total Enclosed \_\_\_\_\_

Name \_\_\_\_\_

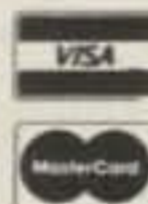
Address \_\_\_\_\_

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

**AMATEUR AND COMMERCIAL COMMUNICATION SERVICES**

- REPAIRS
- TESTS
- INSTALLATIONS
- ALIGNMENTS
- MODIFICATIONS
- EVALUATIONS
- FCC, NABER, SBE and APCO Licensed
- Modern Lab
- 90 Day Warranty On Work Performed
- Sales Of Commercial Land Mobile, Paging, Portable And Mobile Telephone And Marine Equipment With Antennas And Other Accessories
- KLM Electronics Repair Facility

Mon-Thurs  
8:00 am - 10:00 pm  
Fri 8:00 am - 5:00 pm



**PARSEC**  
COMMUNICATIONS, INC.  
13313 FOREST HILL RD.  
GRAND LEDGE, MICHIGAN 48837

Geff N8CE  
517-626-6044

CIRCLE 19 ON READER SERVICE CARD



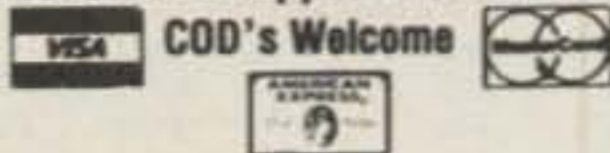
P.O. Box 4405  
220 N. Fulton Ave.  
Evansville, IN 47710

**Store Hours**  
MON-FRI: 9AM - 6PM  
SAT: 9AM - 3PM  
CENTRAL TIME

Send SASE For Latest Price Sheets  
Warranty Service Center For:  
ICOM, YAESU, TEN-TEC

**TERMS:**

Prices Do Not Include Shipping.  
Price and Availability Subject to  
Change Without Notice  
Most Orders Shipped The Same Day



HAPPY NEW YEAR FROM DAN, SANDI, LAURA, RICK, MARK, BRIAN, FRENCHY AND RUSS



**FT-767**

- HF/VHF/UHF Base Station
  - Plug-in Modules for 6m, 2m, 440 MHz
  - Loaded with Features
- \$ SPECIAL PRICE \$**



**CORSAIR II**

- You have to hear it to believe it!
  - Lowest Noise, Cleanest & Most Selective HF Transceiver Around—
- AMERICAN MADE**



**Power Meters**

- Large Selection of Meters Always on Hand
- \$ SPECIAL PRICE \$**



**IC-μ2AT**

- Pocket-Sized 2 Meter HT
- TX-140-150 MHz, RC 139-174 MHz
- 10 Memories and a LCD Readout

**\$ SPECIAL PRICE \$**



**IC-735**

- Most Compact and Advanced Full-Featured HF Transceiver on the Market.

**\$ SPECIAL PRICE \$**

**DISCOUNTS ON RIGS AND ACCESSORIES FROM:** AEA, ARRL, ALINCO, ALLIANCE, ALPHA-DELTA, AMECO, AMERITRON, AMP SUPPLY, ANTENNA SPECIALISTS, ASTRON, BENCHER, BUTTERNUT, B & W, CSI, CALLBOOK, CUSHCRAFT, DAIWA, DIAMOND, ENCOMM, HAL, HEIL, HUSTLER, ICOM, KDK, KANTRONICS, KENPRO, LARSEN, MFJ, MICROLOG, MIRAGE/KLM, NYE, PALOMAR, ROHN, SANTEC, SHURE, TE SYSTEMS, TELEX/HYGAIN, TEN-TEC, TOKYO HY-POWER, VIBROPLEX, W2AU BALUNS, WELZ, YAESU

For Orders and Price Checks Call 800-523-7731

Indiana and Information  
Call 1-812-422-0231



# KENWOOD



**TS-940S LIST \$2249**  
NEW Top-of-the Line  
HF Transceiver  
• 100% Duty Cycle  
• 40 Memory Channels  
**CALL FOR SPECIAL PRICES!!**



**TS-440S NEW! LIST \$1199**  
**CALL FOR SPECIAL SALE PRICE**



**TS-430S LIST PRICE \$819**  
**CALL FOR SPECIAL SALE PRICE!**



**TS-711A LIST \$899**  
**TS-811A LIST \$1049**  
**CALL FOR SPECIAL PRICE.**



**TW-4000A LIST \$599**  
**CALL FOR SPECIAL PRICE**



**TR-751A LIST \$599**  
**All Mode 2m Mobile**



**COMPACT 2M FM MOBILE**  
**TM 2570A (70W) LIST \$559**  
**TM 2550A (45W) LIST \$469**  
**TM 2530A (25W) LIST \$429**  
**CALL FOR SPECIAL PRICE**



**TR2600A - 2mtr**  
**TR3600A - 70cm**  
**High Tech HT XCVRS**  
**NEW Ultra-Compact HT XCVRS**  
**TH21AT 2mtr**  
**TH31AT 220 MHz**  
**TH41AT 440 MHz**  
**CALL FOR SPECIAL PRICES—SAVE \$\$\$!!**

# ICOM



**IC735 NEW General Coverage HF Transceiver Full Featured Ultra Compact - Economical LIST PRICE \$999**  
**CALL FOR SPECIAL PRICE!**



**IC-751A New Full Featured HF Transceiver. Top of the Line. LIST PRICE \$1649**  
**CALL TODAY FOR LOW TEXAS TOWERS/ICOM PRICE!**



**IC-R7000 25-1300 + MHz Rcvr. LIST \$1099.**  
**IC-R71A 10 kHz-30 MHz Rcvr LIST \$949**  
**CALL FOR SPECIAL PRICES!**



**IC271A LIST \$859 IC271H LIST \$1099**  
**IC471A LIST \$979 IC471H LIST \$1339**  
**IC 1271A LIST \$1229**  
**CALL TODAY FOR SPECIAL LOW ICOM PRICES!**



**IC-27A LIST \$429 IC-27H LIST \$459**  
**IC-28A LIST \$429 IC-28H LIST \$459**  
**IC-37A LIST \$499 IC-47A LIST \$549**  
**IC-38A LIST \$459**  
**CALL TODAY FOR SPECIAL ICOM PRICES!**



**IC3200 NEW 2M/70cm Dual Band Xcvr LIST \$599**  
**CALL FOR SPECIAL PRICE!**



**IC02AT - 2mtr**  
**IC03AT-220 MHz**  
**IC04AT - 70cm High Tech HT XCVRS**  
**IC2AT - 2mtr**  
**IC3AT 220 MHz**  
**IC4AT 440 MHz**  
**ALL IN STOCK—CALL FOR SPECIAL PRICES!**



**NEW IC-2AT 2m HT**  
• micro design covers  
140-163 MHz  
• 10 mem. w/scan  
• LCD Readout  
**CALL FOR SALE PRICE!**

# YAesu



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



**FT-757GX LIST PRICE \$995**  
**CALL FOR SPECIAL SALE PRICE!**



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



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



**FRG-8800 High Tech Shortwave Rcvr - LIST \$599.95**  
**FRG-9600 60-905 MHz Scanning Rcvr - LIST \$679.95**  
**CALL FOR PRICES - SAVE \$\$\$!**



**FT 209/709 RH NEW HIGH Tech HT's 5W Output**  
**New! FT727 RH 2m/70 cmHT**  
• 5w Output  
• 10 memories  
• Battery saver  
**Call For Sale Prices**



**FT 23R 2m HT LIST \$299.95**  
**FT 73R 70cm HT LIST \$314.95**  
• compact size  
• 10 memories  
• up to 5 W output W/F-11  
**CALL FOR SALE PRICES!**

# ET ALPHA SALE



MODEL	LIST	MODEL	LIST
76A	\$1,985	374A	\$2,595
76PA	\$2,395	78	\$3,495
76CA	\$2,695	77DX	\$5,695

**SALE PRICES TOO LOW TO PRINT CALL & SAVE \$\$\$!**

## ASTRON POWER SUPPLIES

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



Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	\$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

## MIRAGE AMPLIFIER SALE!



**B3016 ONLY \$229!**

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	\$289
B23S	2M	No	2W	30W	\$ 99
B23A	2M	Yes	2W	30W	\$129
B215	2M	Yes	2W	150W	\$259
B108	2M	Yes	10W	80W	\$159
B1016	2M	Yes	10W	160W	\$259
B3016	2M	Yes	30W	160W	\$229
D24	440	No	2W	40W	\$219
D1010N	440	No	10W	100W	\$319

**ABA New PK-64 Packet Controller . . . . \$219.95**  
**HF Modem Unit . . . . . \$99.95**  
**PK 232 Packet Controller . . . . . \$289.95**  
**PK 80 Packet Controller . . . . . \$219.95**

## AMERITRON

**AL80A NEW 1000 W 3-500Z Amplifier . . . . \$699.**  
**AL84 600 W PEP Output (4-6MJ6 Tubes) . . \$399.**  
**RCS-4 4 Pos Remote Antenna Switch . . . \$119.95**  
**RCS-8v 5 Pos Remote Antenna Switch . . \$119.95**  
**ATR 15 1500 W Tuner . . . . . \$299.95**

## ALINCO

**ELH-730D . . . . . 149.95**  
**ELH-730G . . . . . 119.95**  
**ELH-230D . . . . . 89.95**  
**ELH-260D . . . . . 129.95**  
**ALM-203T . . . . . 249.95**  
**ALR-206T . . . . . 279.95**  
**ACCESSORIES IN STOCK—CALL!**

## Kantronics

**KPC-2 Packet Controller LIST \$219.00 SALE \$199.95**  
**KPC 2400 . . . . . LIST \$329 SALE \$299.95**  
**2400 Modem . . . . . LIST \$199 SALE \$149.95**  
**UTU Terminal . . . . . LIST \$199 SALE \$189.95**  
**UTU Software IBM/CPM/TRS 80 . . \$19.95**

**TEN-TEC Corsair II . . . . . \$1149.95**  
**Titan Amp . . . . . \$2299.95**  
**229 2KW Tuner . . . . . \$259.95**

**ORDER FREE SHIPPING-UPS SURFACE TOLL FREE 1-800-272-3467**

(continental USA) (most items, except towers/antennas)

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

# TEXAS TOWERS

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

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

(Prices & Availability Subject To Change Without Notice)

CIRCLE 43 ON READER SERVICE CARD

### PAY TV and Satellite Descrambling.

100 pages of theory and schematics for major cable systems and 7 satellite systems. Bypasses, how illegal decoders are detected, Orion and VC pirate chips, etc., \$14.95. Cable TV how systems work, two way cable \$9.95. Experiments with Videocipher \$9.95. MDS/MMDS Handbook \$9.95. Satellite Systems under \$600., \$11.95. Any 3 for \$26. New catalog \$1.

#### SHOJIKI ELECTRONICS CORP.

1327Q Niagara Street  
Niagara Falls, NY 14303  
COD's 716-284-2163

CIRCLE 34 ON READER SERVICE CARD



### PORTAQUADS

2 MTR & 220 MHz  
FOLDS INTO CASE CA. ADD  
SPECIFY BAND \$73.95 6% TAX  
RADIO ENGINEERS  
3941 MT. BRUNDAGE AVE.  
SAN DIEGO, CA 92111  
619-268-7988

A RARE COMBINATION  
QUALITY AND ECONOMY

### QSLs by W4MPY

705 AUDUBON CIRCLE  
BELVEDERE, SC 29841

## CQ Showcase



### Pac-Comm Digipeater Products

Pac-Comm is manufacturing packet repeater controllers designed for the needs of packet radio networks and remote unattended operations. The DR-200 dual-port controller is designed to provide an inexpensive, off-the-shelf packet switch to move traffic on inter-LAN networks. The DR-100 provides basic, single-port controller capability in a rugged package at a low cost. This model is suited to applications where a single-frequency repeater is desirable. The DR-series controllers are housed in a new extruded aluminum case which is externally identical to the standard TNC-200 case. This proprietary design has an extra set of internal mounting rails in its upper portion which can be used to house accessory modems, data interfaces, and so forth, in the shielded environment. Several versions of dual-port software are available at no cost through Pac-Comm.

For more information and pricing, contact Pac-Comm Packet Radio Systems, Inc. 3652 West Cypress St., Tampa, FL 33607, or circle number 106 on the reader service card.

### Kenwood R-5000 Receiver

Kenwood's R-5000 receiver has 100 memory channels, optional computer control, direct keyboard frequency entry, voice synthesizer option, and more. The unit covers 100 kHz to 30 MHz in 30 bands with additional coverage from 108-174 MHz (with optional VC-20 converter installed). It features 102 dB dynamic range, choice of high- or low-impedance antenna connections, dual digital VFOs, dual noise blankers, built-in power supply, and more.

For more information, contact Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220, or circle number 101 on the reader service card.



# COLORADO COMM CENTER

## KENWOOD



TR-2600

- 2.5W/300MW (switchable)
- 2 Meter hand held transceiver
- LCD Readout
- 10 Memories w/ Lithium Back-Up
- Band and Memory Scan



TH-21BT

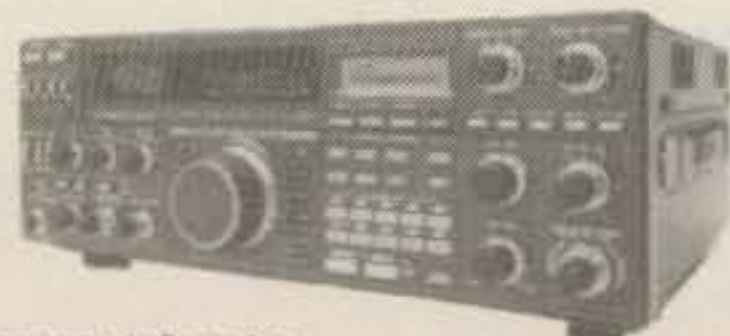
- Compact Pocket Size
- 1 Watt
- Opt. 500 M.A. Battery
- Programmable CTCSS Encoder Built-in

TS-440S

"DX-citling!"



Compact HF Transceiver • General Coverage Receiver • 100 Memory Channels • All Modes



- Programmable Scanning
- High Stability Dual Digital VFOs
- 40 Channel Memory
- General Coverage Receiver

TS-940S  
"DX-cellence"

800-227-7373

- AEA
- ALINCO
- ASTRON
- AVANTI
- B&W
- BENCHER
- BUTTERNUT
- CUSHCRAFT
- DAIWA
- HAM-KEY
- HUSTLER
- HYGAIN
- ICOM
- KANTRONICS
- KDK
- KENPRO
- KENWOOD
- KLM
- LARSEN
- MFJ
- MIRAGE
- NYE VIKING
- QUATRON
- SANTEC
- WELZ
- YAESU

Happy New Year!  
Call Today For Specials

## YAESU



FT-23R

- 2 Meter Mini HT
- Up to 5 Watts of Power
- 10 Memories
- FT-73R, 440 MHz Also Available



FT-727R

- Dual-band Microprocessor HT
- 5 Watts on Both 2 Meters and 440 MHz
- 10 Memories
- Scan Memories, Band Segments or Entire Band

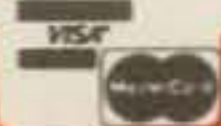
FT-290R

- 2 Meter, All-Mode Portable
- 25 W or 2.5 W with C-Cell Pack
- Work SSB, CW, FM
- 10 Memories
- FT-690R for 6-Meter



FT-767GX

- What a Rig! HF, 6M, 2M, 70cm • Receive from 100 kHz to 30 MHz • Full CW Break-in • Many More Features



525 East 70th Avenue, 1 West, Denver, CO • 80229 • 303-288-7373



# DX THAT STANDS OUT FROM THE CROWD

**A3** 10, 15, 20, \*40 meters  
Whether busting pileups, rag chewing or hunting rare DX, the A3 stands out from the crowd with the perfect combination of easy assembly, the right size, rugged durability and great performance.

## OUTSTANDING A3 FEATURES

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

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

## THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

All of my Antennas are Cushcraft and I'm very happy with them ... *Herb N4AEM*

For the price it can't be beat ... *Leo WD8DCA*

Have had the A3 for 7 years easy assembly and works FB ... *Charles W7KB*

Recommended highly by Hams who are using them ... *Roy K2LPO*

Cushcraft has an excellent tech staff and products are sturdy, reliable, and efficient. ... *Bob KA9VYI*

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

 **cushcraft**  
CORPORATION

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

AVAILABLE THROUGH DISTRIBUTORS WORLDWIDE.

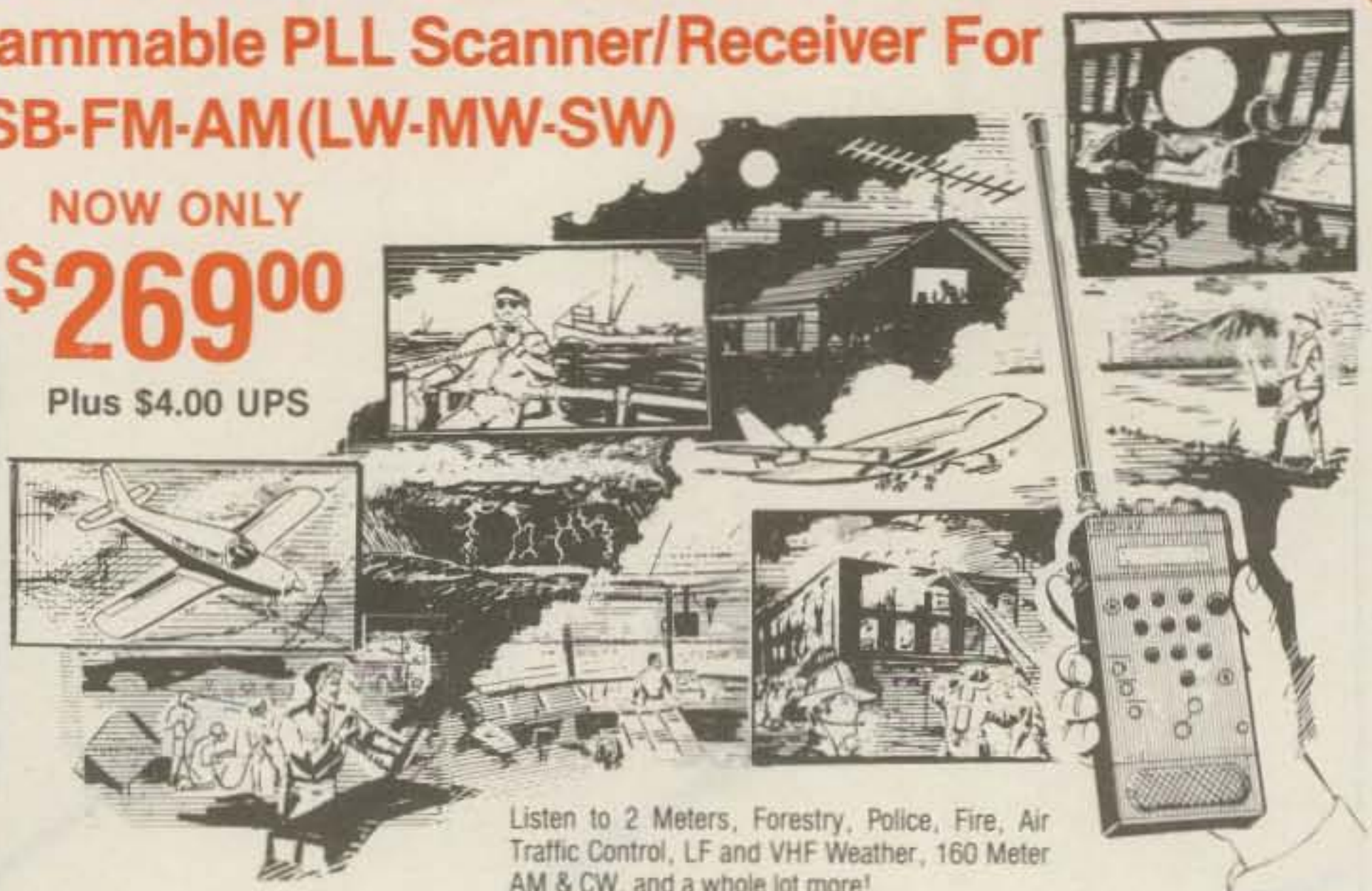
**New From Spectronics!**

# The SONY AIR-8 Is Here!

**Hand-Held Programmable PLL Scanner/Receiver For AIR BAND-2M/PSB-FM-AM(LW-MW-SW)**

NOW ONLY  
**\$269<sup>00</sup>**

Plus \$4.00 UPS



Listen to 2 Meters, Forestry, Police, Fire, Air Traffic Control, LF and VHF Weather, 160 Meter AM & CW, and a whole lot more!

### HERE ARE SOME OF THE AIR-8's OUTSTANDING FEATURES!

- Computer controlled PLL tuning system
- 40 memory presets
- Multi scan system (manual and auto)
- 11" Helical antenna w/BNC connector
- Priority channel
- Squelch (auto and manual)
- Direct tuning

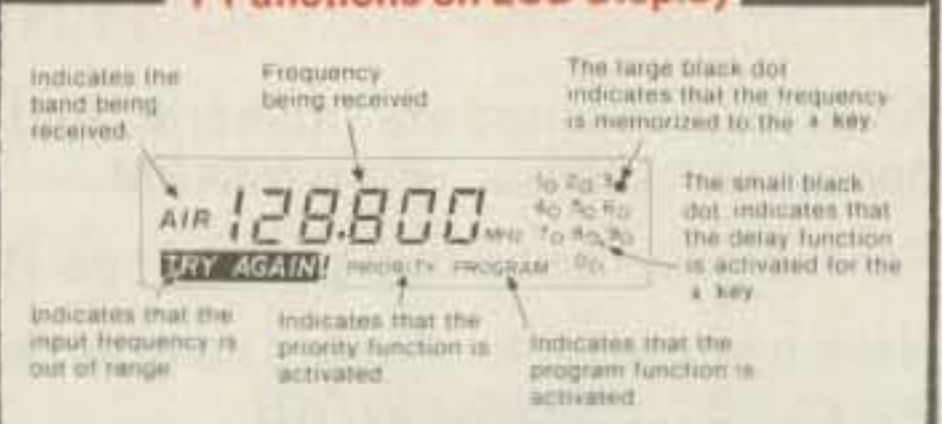
HERE'S TRUE SONY QUALITY! Feel the rugged construction, and listen to the high quality sound, and you'll know it's a Sony! The new Air-8 can scan four different frequency ranges in either direction and can store a total of forty frequencies in its four memory banks. You can recall any memorized frequency with the touch of a key, and can scan the ten channels in each of its four memory banks in any order. The Air-8 also has a delay function that prevents dropout enabling you to hear both sides of a conversation, and also a priority feature that samples a chosen frequency every three seconds for a signal. The quick-disconnect BNC connector allows different types of antennas to be easily coupled to the Air-8 for maximum performance.

The Air-8 measures 3 1/8" x 7 1/8" x 2", and weighs just 21 oz. This is truly a sturdy little companion that will give you years of dependable performance wherever you go.

#### 6 Frequency Bands

Band	Frequency range	Tuning interval
PSB	144 - 174 MHz	5 kHz
AIR	108 - 136 MHz	25 kHz
FM	76 - 108 MHz	50 kHz
AM	SW 1601 - 2194 kHz (1803 - 2194 kHz)	1 kHz
	MW 530 - 1600 kHz (531 - 1602 kHz)	10 kHz (9 kHz)
	LW 150 - 529 kHz (150 - 530 kHz)	1 kHz

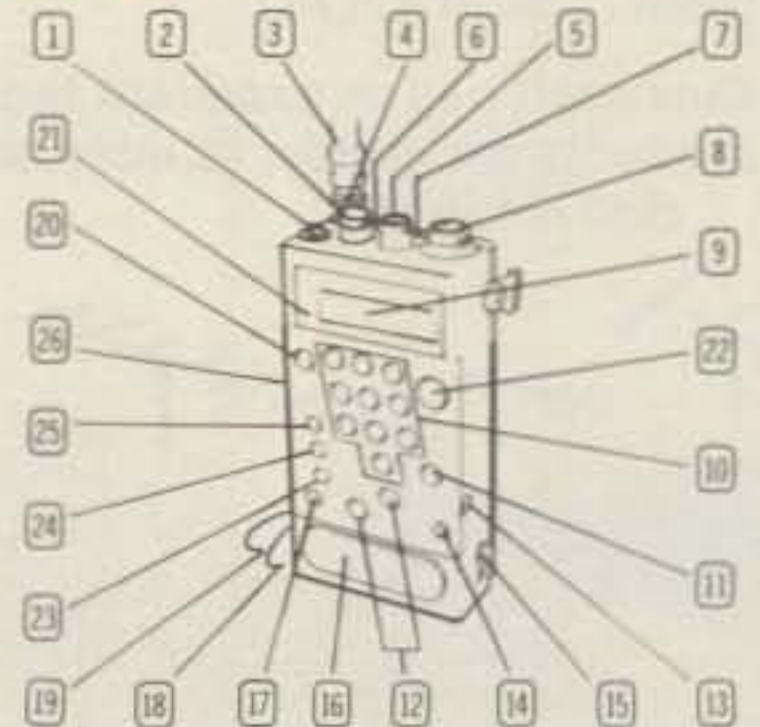
#### 7 Functions on LCD Display



**THOUSANDS IN USE  
ALL AROUND  
THE WORLD!**

### PACKED WITH SONY STATE-OF-THE-ART TECHNOLOGY

(1) POWER Switch (2) Volume Control (3) 11" Helical Antenna (4) BNC Antenna Connector (5) Squelch Control. Features both manual and automatic modes. (6) Earphone Jack (7) AM External Ant Jack (8) Band Selector. Selects Air, PSB, AM, or FM. (9) LCD Display (See detailed illustration above) (10) Counter Keys. Used to program frequencies for direct tuning and memories, and also to recall memories. (11) EXECUTE Key (12) SCAN Keys. Used for scan tuning and manual tuning. (13) LIGHT Switch (14) KEY PROTECT. Locks out all keys on front face. (15) EXTERNAL DC INPUT (16) High Quality Speaker (17) ENTER Key. Used to memorize frequencies. (18) Battery Compartment (rear) (19) 9kHz/10 kHz Selector (Inside battery compartment). Used to change MW tuning interval. (20) DIRECT Key. Used for direct tuning. (21) LED Receive Indicator (22) MEMORY Scan Key. Used for scan tuning each memory bank. (23) PROGRAM Key. Used to initiate the program function. (24) DELAY Key (25) PRIORITY Key. Used for sampling a priority channel every 3 seconds. (26) Heavy Duty Body. Rugged military/industrial grade construction. AND DON'T FORGET... IT'S A SONY!



**SPECTRONICS, INC.**

1009 GARFIELD ST., OAK PARK, IL. 60304

PHONE (312) 848-6777

**WORLD'S LEADING SONY COMMUNICATIONS SPECIALISTS!**



## PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

**Two Years Later**

It's been two years since our VHF column was introduced to CQ readers in January 1985. To use an oft-quoted phrase from the electronics industry, "Not much is new; everything's changed."

Well, maybe not everything. Two meters remains our most populated VHF band, 6 meters still has the F2 doldrums, the moon continues to orbit Earth, and meteors still shower. Belden 9913 cable, newly introduced when this column first appeared, is now the most popular coax used by VHFers. There is finally a multi-mode 23 cm transceiver (ICOM's IC-1271A), and commercially-made 33 cm gear is now available. We have come a long way, after all.

Me? I've been so busy unpacking from our recent move that as of this writing I don't have a station on the air, although I do have about 2,000 pounds of gear, plus antennas, in storage and hope to get something together by the time this is printed. I've wanted to dig a hole for my first tower at the new QTH ever since our moving day, but it has rained every weekend and I'm beginning to feel that Murphy will win this one. At least I've accomplished some of the indoor work by installing operating and work benches in the new "shack." I even painted the new benches, resisting the overwhelming temptation to set a station on them and begin working the weak ones. (Everybody would probably be weak at this point, since I have no antennas up yet.) But thanks for asking.

**VHF WPX Program**

A lot of people have asked, "Why a VHF WPX contest when there's no VHF WPX award?" Good question. Actually, the only thing preventing a VHF WPX award is the wording of Paragraph 2(B) of the Prefix Award Program rules, which lists the eligible bands as 1.8 through 28 MHz. If we extended this to include 50 through 1296 MHz (for starters), we'd have an award. Are we working on it? Yes! We have to come up with numbers of prefixes for the various band endorsements, and intend to use VHF WPX Contest logs from the past two years as a guideline. More on this in a month or two.

153 Rodman Court, Eatontown, NJ 07724

Along these lines, Terry Baxter, N6CW, of La Mesa, CA had some good comments. Terry wrote, "... how about using both prefixes and grid squares as multipliers (in the WPX contest)? This would give incentive to guys who like to go mountaintopping . . . The CQ World-Wide DX Contest uses countries and zones for multipliers, so the idea would not be too far out . . . Another problem with the prefix business is the fact that the WPX award does not count VHF prefixes. Why have a VHF WPX contest if the prefixes you work do not count for the WPX award?"

Well, Terry, your letter and others expressing similar sentiments got us thinking. Adding a VHF WPX award to the Prefix Award Program here at CQ is an idea whose time has come. Anyone who has a CQ award of any kind (and these include the WAZ, 5BWAZ, WPX, CQ DX, and USA-CA, not to mention the coveted DX Hall of Fame) knows the pride of their ownership. While each award is represented by a beautiful certificate, the "wallpaper" is only a printed acknowledgement of the skills possessed by its owner. As for adding grid squares to the VHF WPX contest scoring, this is not a very exciting prospect for those of us who were looking for something new. I'd almost rather add zip codes, except for the complexity of exchanging such lengthy data over very weak signal paths. But I won't speak for CQ or the rest of the amateur community, and anything can happen. In the meantime, we're going to increase promotion of the VHF WPX Contest, both here and abroad, to stimulate participation.

The merit of some contests is not easily judged by the quantity of entrants, although this is surely the easiest measure. Lured by a free certificate for every entrant in our inaugural VHF WPX Contest (1985), hundreds of people entered with very small scores (like 1 point). In 1986, with only category/area winners promised certificates, the "1 point" logs all disappeared; entrants' scores were clearly higher in 1986, but the number of logs received was smaller. Just about every 1985 record was broken in 1986, indicating more activity and dedication to the contest. Now we need to get some of the smaller stations to enter! Regardless of the quantity of logs received, though, the contest's *raison d'être* is to stimulate VHF/UHF activity during a season of po-

tentially exciting propagation. We've already accomplished this, with your help. Thanks, and keep plugging!

**What's Happening**

Probably lots more than I know about, since I've been off the air for two months. If you sense any bitterness in my tone, you're very perceptive. Nothing worse than moving, except moving to a house with no towers and having to put them up in bad weather.

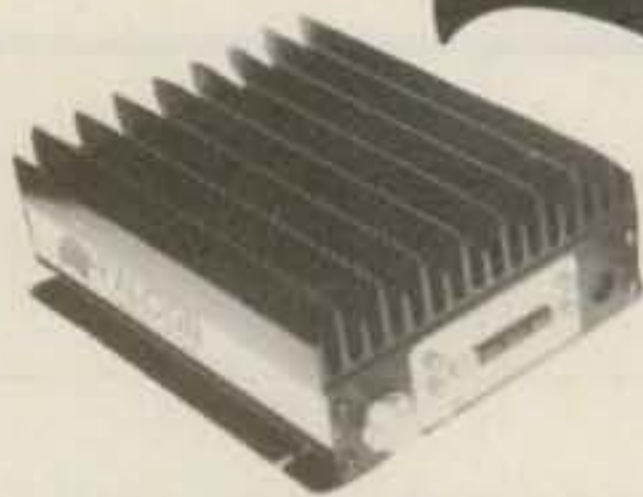
Larry Reiser, WB9MSV, of Dunlap, IL (EN50) wrote to advise he's added 220 MHz to his station and has already worked 16 grids in 8 states on the band. Larry's been running just 15 watts to a 14-element KLM Yagi (so far) and has an interesting observation about 135 cm. He says, "My farthest QSO on 2 (during the September QSO Party) with a KW at the antenna and 28 elements was W4BFB in NC. My best DX on 220 with QRP and the small Yagi was W4BFB also. Roughly a 22 to 25 dB decrease in station capability on 220, but we still made it."

I'm not surprised, Larry. There isn't much difference in propagation between 2 meters and 135 cm, and I've often found that anything I can work on 144 can also be worked on 220 using similar equipment. Not so in going from 144 to 432. I can't tell you how many times (a lot!) I've band-hopped with stations, usually during contests, from 50 MHz up, only to lose them when we got to 70 cm. There are many possible explanations for this, including the most obvious one—that my 70 cm antenna system is somewhat smaller in size (though not in elements), feedline losses are slightly higher, etc.—but it is obvious that path losses under average conditions are just plain higher on 432. To combat this we should all be using antenna systems that are nine times the number of square wavelengths (aperture) on 70 cm if we expect results which parallel what we expect from 2 meters.

WB9MSV goes on to say, "... what I'm getting at is more publicity about 220. Maybe you can start something up in CQ about station activity or band conditions . . . I guess people like me are also to blame for not getting on sooner!" At least you admit it, Larry. Actually, there is still a dearth of equipment for 135 cm weak-signal work. One piece of good news is that Microwave Modules Ltd. is finally manufacturing 28 to 220 MHz transverters in



# FALCON COMMUNICATIONS

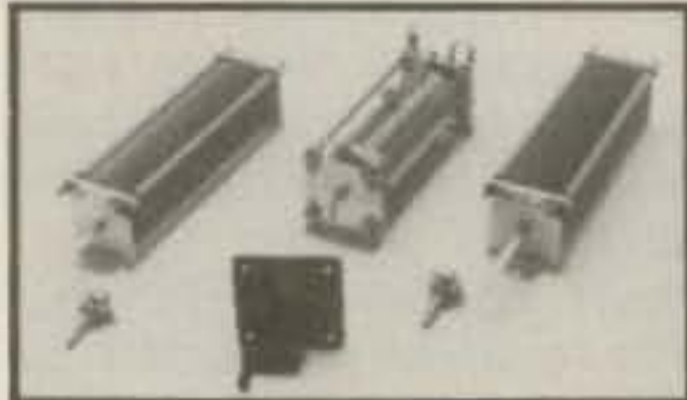


Falcon Communications, Well Known for MOSFET Repeater Power Amplifiers, Also Makes A Hard Working Line Of Bipolar Power Amplifiers For Mobile Use.

For Information On Our Complete Line See Your Local Dealer Or Call Factory Direct

P.O. Box 8979 • Newport Beach, CA 92658 • (714) 760-3622

## 1500 WATT PEP TRANSMATCH KIT



### BASIC KIT—

- 1 - rotary inductor 28 $\mu$ h
- 2 - 6:1 ball drives
- 1 - 0-100 turns counter
- 2 - variable capacitors 25-245 pf 4500 v rms

### OPTIONS—

- enclosure (pictured in Sept. 86 CQ) \$60.00
- 4:1 balun kit CIRCLE 81 ON READER SERVICE CARD \$18.75
- dials, terminals, ceramic standoffs, hardware, toroids, amp components, B&W coil stock, etc.

Call Now  
Nel-Tech DVK-100  
Digital Voice Keyer  
in STOCK  
\$349 net

### Basic Kit

**\$154.95**

Plus \$4.00  
Shipping and handling

1986-87  
CATALOG  
\$1.00



RADIO KIT  
P.O. Box 973-C  
Pelham, NH 03076  
(603) 635-2235  
telex 887697

## ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

### SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED.
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
- CROWBAR OVER VOLTAGE on all Models except RS-4A.
- HEAVY DUTY HEAT SINK. • CHASSIS MOUNT FUSE.
- THREE CONDUCTOR POWER CORD.
- ONE YEAR WARRANTY. • MADE IN U.S.A.
- VOLT & AMP METER ON MODELS RS-12M, RS-20M & RS-35M.
- Separate Volt and Amp meters, with Voltage adjustable from 5-15 Volts on VS-20M and VS-35M.
- Built-in Speaker on RS-12S and RS-20S.

### PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC.
- OUTPUT VOLTAGE: 13.8VDC  $\pm$  0.05 volts.  
(Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)
- REGULATION:  $\pm$  0.5 volts no load to full load & low line to high line.



MODEL VS-50M

Models	Continuous Duty (amps)	ICS* (amps)	Size (in.) H x W x D	Shipping Wt. (lbs.)
RS-50A, RS-50M, VS-50M	37	50	6 x 13 $\frac{3}{4}$ x 11	46
RS-35A, RS-35M, VS-35M	25	35	5 x 11 x 11	27
RS-20A, RS-20M, RS-20S, VS-20M	16	20	5 x 9 x 10 $\frac{1}{2}$	18
RS-12A, RS-12M, RS-12S	9	12	4 $\frac{1}{2}$ x 8 x 9	13
RS-10A	7.5	11	4 x 7 $\frac{1}{2}$ x 10 $\frac{1}{4}$	11
RS-7A, RS-7B	5	7	3 $\frac{3}{4}$ x 6 $\frac{1}{2}$ x 9 4 x 7 $\frac{1}{2}$ x 10 $\frac{1}{4}$	9
RS-4A	3	4	3 $\frac{1}{4}$ x 6 $\frac{1}{2}$ x 9	5

\*ICS - Intermittent Communications Service (50% Duty Cycle)

**ASTRON**  
CORPORATION

9 Autry  
Irvine, CA 92718  
(714) 458-7277

CIRCLE 58 ON READER SERVICE CARD

the U.K. (all the "black box" transverters for 220 had been previously manufactured by VE3CRU in Toronto) and is shipping them as factory-built units for 135 cm. Even with these fine black boxes, though, we still need high powered amplifiers and proper antennas to make full use of the band. I know that KC2PX of "The PX Shack" in NJ was instrumental in convincing the MMT factory to build 220 MHz transverters, and Ivars is working on the F9FT factory to produce antennas, for which there is no local (European) market. Let's work on Henry Radio and others to produce some good, commercial 220 MHz kilowatt amps.

Speaking of amps, I finished building a new 8877 legal-limit job last month for WA2VUN and it turned out just beautifully, producing 1.5 kw out with about 70 watts drive on 50 MHz. Identical (appearing) decks for 144 and 220 will follow, as soon as I can find the time. We should have a construction article on the 6 meter unit in the June "VHF" issue of CQ.

I received a letter from Fred Fish, W5FF, of Edgewood, NM regarding an error contained in our September '86 column. Eagle-eyed Fred says that the element spacing for director #3 is given in Table I as 45.5 inches, which does not agree with the cumulative spacing columns. To make the table consistent, the spacing between director #2 and #3 should be 48.5 inches.

Apparently, this mistake is a perpetuation of a mistake in an August 1984 article by WB3BGU in *Ham Radio*, which was referenced by the CQ article. W5FF says, "I doubt that the error will cause enough loss of performance to justify moving directors 3 through 5 by 3 inches, if the antenna is already in use." I agree. Thanks for the letter and the correction, Fred, and thanks for reading the column!

Encomm, Inc. of Plano, TX has made some fascinating mailings recently. At least two should be of interest to VHFers. In one mailing Encomm advises that users of Tokyo Hy-Power Labs (THL) VHF/UHF power amplifiers should be careful to use appropriate methods of cutting back drive power when necessary, and not rely on using the "low power" position featured by many popular transceivers to accomplish this task. The reason for this, according to the Encomm memo, is that many popular transceivers use an electronic automatic level control circuit to adjust output power, and the time constant of this ALC may be too long to protect the solid-state amplifier which follows from short-duration bursts of full power. I hadn't heard of this problem before, but it certainly makes sense. Users of THL equipment in particular (and possibly other types) should be aware of the potential hazard described and avoid setting drive level with the "low power adjust" until they are certain that no liabilities exist in doing so.

## ALL BAND TRAP VERTICAL ANTENNAS!

FULL 1/4th WAVE - All Bands! Automatic Selection with proven HI-Q Traps. 5 Models-ALL self supporting - Ground or roof mount. HI STRENGTH FIBERGLASS TUBING OVER - ALL - NO WOBBLING, LUMPY TRAPS - NO UNSIGHTLY CLAMPS needed - Size 1 1/4" all the way up - Traps hidden inside. You can use it in a 1 ft. sq. Backyard! FOR APARTMENTS, MOBILE HOMES - CONDOS etc. where minimum space and neat appearance is MANDATORY! Instant "Drive In" ground mount (included). Use with or without radials (included) (All angle roof mount - Extra) COMPLETELY PRE-TUNED-NO ADJUSTMENTS NEEDED EVER! NO TUNER NEEDED FOR MOST TRANSCIEVERS! Use - RGBU feedline, any length! 2000 Watt PEP, input power. Shipped - PREPAID IN USA. Assembles in 10 min. using only screwdriver. WEATHERPROOF!

No.-AVT80-10	5 Band	25'6"	\$199.95
No.-AVT40-10	4 Band	18'9"	\$139.95
No.-AVT20-10	3 Band	11'4"	\$109.95
No.-AVT80-10 W	8 Band	22'	\$299.95
No.-AVT40-10 W	7 Band	15'9"	\$269.95

SEND FULL PRICE FOR PP DEL IN USA (Canada is \$10.00 extra for postage, clerical, Customs) or order using VISA, MASTER CARD or AMER-EXP. Ph 1-308-236-5333 9AM-6PM weekdays. We ship in 2-3 days. All Antennas Guaranteed for 1 year - 10 day money back trial. Free Inf.

WESTERN ELECTRONICS  
Dept. AC Kearney Ne. 68847

CIRCLE 65 ON READER SERVICE CARD

## FREE EVALUATION and ADVISORY SERVICE



A NON PROFIT ORGANIZATION

For professional electronic technicians by prestigious non-profit organization. Earn University Degree (Bachelors or Masters) through Home Study! Credit given for previous schooling and professional experience. Upgrade your earning power. Free Details!  
CONTINENTAL EDUCATION ASSOCIATES  
P.O. Box 1197 - Champlain, NY 12919-1197

THE BEST PLACE TO BUY, SELL or TRADE NEW and USED EQUIPMENT  
**NUTS & VOLTS MAGAZINE**  
BOX 1111-Q • PLACENTIA, CA 92670  
(714) 632-7721

Join Thousands of Readers Nationwide  
Every Month

ONE YEAR U.S. SUBSCRIPTIONS  
\$10.00 - 3rd Class • \$15.00 - 1st Class

\$35.00 - Lifetime - 3rd Class

### NUTS & VOLTS

HAM GEAR  
COMPUTERS  
SOFTWARE  
SCANNERS • OPTICS  
TEST EQUIPMENT  
MICROWAVE  
SATELLITE  
AUDIO VISUAL  
NEW PRODUCTS  
COMPONENTS • KITS  
ANTIQUE ELECT.  
PUBLICATIONS  
PLANS • SERVICES

## ONV SAFETY BELT

SPECIAL BACK PROTECTION



ADJUSTABLE TO 46" WAIST  
Extra \$10.00 Large to 56"

ONV Tool Pouch 15.95  
Add 3.00 for handling  
VISA / M/C CHECK **\$74.95**

**UPI Comm. Systems Inc.**  
Box 886 • Saddle Brook, N.J. 07662  
201-368-3655 • Telex: 844-106 - (UPICOM)

CIRCLE 64 ON READER SERVICE CARD



# ICOM

# KENWOOD

# YAESU



IC-735

HF Equipment	List	Juns
IC-735 Gen. Cvg Xcvr	\$999.00	Call \$
IC-745 Gen. Cvg Xcvr	1049.00	Call \$
IC-751A Gen. Cvg. Xcvr	1649.00	Call \$
<b>Receivers</b>		
IC-R7000 25-1300 + MHz Rcvr	1099.00	Call \$
IC-R71A 100 kHz-30 MHz Rcvr	949.00	Call \$
<b>VHF</b>		
IC-271A All Mode Base 25w	859.00	Call \$
IC-271H All Mode Base 100w	1099.00	Call \$
IC-27A FM Mobile 25w	429.00	Call \$
IC-27H FM Mobile 45w	459.00	Call \$
IC-28A FM Mobile 25w	429.00	Call \$
IC-28H FM Mobile 45w	459.00	Call \$
IC-38A FM Mobile 25W	459.00	Call \$
IC-2AT FM HT	299.00	Call \$
IC-02AT FM HT	399.00	Call \$
IC-μ2AT Micro HT	329.00	Call \$
<b>UHF</b>		
IC-471A All Mode Base 25w	979.00	Call \$
IC-471H All Mode Base 75w	1339.00	Call \$
IC-47A FM Mobile 25w	549.00	Call \$
IC-48A FM Mobile 25W	459.00	Call \$
IC-4AT FM HT	339.00	Call \$
IC-04AT FM HT	449.00	Call \$
IC-3200A FM 2m/70cm 25w	599.00	Call \$
<b>220 MHZ</b>		
IC-37A FM Mobile 25w	499.00	Call \$
IC-3AT FM HT	339.00	Call \$
<b>Repeaters</b>		
IC-RP3010 440 MHz	1229.00	Call \$
IC-RP1210 1.2 GHz	1479.00	Call \$



TS-440S/AT

HF Equipment	List	Juns
TS-940SAT Gen. Cvg Xcvr	\$2249.95	Call \$
TS-940S Gen. Cvg Xcvr	2049.95	Call \$
TS-930S/AT Gen. Cvg Xcvr	1849.95	Call \$
TS-830S Xcvr	1099.95	Call \$
TS-530SP Xcvr	899.95	Call \$
TS-430S Gen. Cvg Xcvr	819.95	Call \$
TS-440S/AT Gen. Cvg Xcvr	1199.95	Call \$
TS-440S Gen. Cvg Xcvr	1049.95	Call \$
<b>Receivers</b>		
R-5000 NEW!	899.95	Call \$
R-2000 150kHz-30 MHz	649.95	Call \$
TS-670 All Mode Quad 6 M	799.95	Call \$
<b>VHF</b>		
TS-711A All Mode Base 25w	899.95	Call \$
TR-751A All Mode Mobile 25w	599.95	Call \$
TM-201B FM Mobile 45w	369.95	Call \$
TM-211A FM Mobile 25w	399.95	Call \$
TM-2530A FM Mobile 25w	429.95	Call \$
TM-2550A FM Mobile 45w	469.95	Call \$
TM-2570A FM Mobile 70w	559.95	Call \$
TH21-BT FM, HT	259.95	Call \$
TH-205 AT, NEW 2m HT	TBA	Call \$
TR-2600A FM, HT	359.95	Call \$
<b>UHF</b>		
TS-811A All Mode Base 25w	1049.95	Call \$
TM-401B FM Mobile 25w	399.95	Call \$
TM-411A FM Mobile 25w	449.95	Call \$
TH-41BT FM, HT	269.95	Call \$
TR-3600 FM HT	369.95	Call \$
<b>220 MHZ</b>		
TM-3530A FM 220 MHz 25w	449.95	Call \$
TH-31BT FM, 220 MHz HT	269.95	Call \$
TL-922A HF Amp	1499.95	Call \$



FT 757GX

HF Equipment	List	Juns
FT-ONE Gen. Cvg Xcvr	\$2859.00	Call \$
FT-757 GX Gen. Cvg Xcvr	995.00	Call \$
FT-767 4 Band New	1895.00	Call \$
<b>Receivers</b>		
FRG-8800 150kHz-30 MHz	599.95	Call \$
FRG-9600 60-905 MHz	679.95	Call \$
<b>VHF</b>		
FT-270RH FM Mobile 45w	439.95	Call \$
FT-290R All Mode Portable	579.95	Call \$
FT-23 R/TT Mini HT	299.95	Call \$
FT-209RH FM Handheld 5w	359.95	Call \$
<b>UHF</b>		
FT-770RH FM Mobile 25w	479.95	Call \$
FT-73 R/TT Mini HT	314.95	Call \$
FT-709RH FM HT 4w	359.95	Call \$
<b>VHF/UHF Full Duplex</b>		
FT-726R All Mode Xcvr	1095.95	Call \$
6m/726 6m Module	269.95	Call \$
FT-690R 6m, All Mode, Portable	569.95	Call \$
430/726 430-440 MHz	329.95	Call \$
440/726 440-450 MHz	329.95	Call \$
HF-726 10-15-20M	289.95	Call \$
SU-726 Sate Duplex	129.95	Call \$
<b>Dual Bander</b>		
FT-2700RH FM 2m/70 cm 25w	599.95	Call \$
FT-727R 2m/70 cm HT	479.95	Call \$
<b>220 MHZ</b>		
FT-109 RH New HT	TBA	Call \$
<b>Repeaters</b>		
FTR-2410 2m Repeaters	1249.95	Call \$
FTR-5410 70cm Repeaters	1289.95	Call \$
☆☆☆☆ CLOSING OUT SALE ☆☆☆☆		
<b>KENWOOD TR-2600A w/PB-26 \$259.95</b>		

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆



**ENCOM • TE • MIRAGE • AMERITRON • BIRD • AMP. SUPPLY • KANTRONICS • AEA • ASTRON •**

**• AMATEUR • TWO WAY • MARINE • CELLULAR MOBILE PHONE • SCANNER**  
★Free U.P.S. Cash Order ★SE HABLA ESPANOL  
(Most Items, Most Places)

**(213)390-8003**

**3919 Sepulveda Blvd. Culver City, CA 90230**

CIRCLE 69 ON READER SERVICE CARD

It is possible that other manufacturers of solid-state VHF power amps are aware of the problem discussed above. Microwave Modules Ltd., for example, supplies a 4 dB resistive attenuator with their MML100H two meter amplifier, along with instructions encouraging the use of the supplied "pad" when connecting to a drive source capable of producing more than 10 watts output. "How," you might ask, "can I install a 4 dB pad in series with my transceiver, and expect to receive weak signals through it?" Microwave Modules supplies the answer: a built-in, low-noise FET receive preamp in the amplifier case. The RX preamp has more than enough gain to overcome the loss in the attenuator, and it puts the gain up close to the antenna, where it will do the most good. In the case of the MML amplifiers, the preamp can be switched out for those installations where it is not required. I own a new MML100S amplifier, which is installed in my car for FM work, and it features a GaAsFET preamp which notably improves my mobile rig's ability to hear the weak ones. This, plus the 100 watt TX amplifier, makes for a good mobile setup. Still, I long for a mobile KW on 2 meters—wouldn't need repeaters then.

Another Encomm, Inc. mailing was a product announcement for the new KR-001 computer rotor control interface. This is a new product by Kenpro, the makers of the most popular elevation motor used by satellite enthusiasts. The popular elevation motor, model 500EL, is a fine product which will even support small EME arrays. Now Kenpro offers their model KR-001 and KR-010 computer interfaces to control their KR-5400A or KR-5600A el/az rotors with either a Com-

modore C-64 (KR-001) or any computer with an RS-232 serial port (KR-010). Along with each interface, Kenpro supplies software for manually aiming the rotor using the computer. However, tracking software is available from AMSAT and Encomm will provide a patch in "basic" to allow automatic tracking using AMSAT software. Additional information is available from Encomm, Inc., 1506 Capital, Plano, TX 75074 (telephone 214-423-0024).

Bill Olsen, W3HQT, of Burnham, ME (FN54) wrote a detailed letter of his activities and his company, Down East Microwave. It seems I missed Bill at the Packrats hamfest in October (I was walking around in a haze, anyway, having spent all night packing), so he wanted to let me know about some new Down East products for the UHF enthusiast. First, Down East is importing a broad range of UHF/SHF gear from LMW Electronics, Leicestershire, U.K. Two products which should be of immediate interest to those looking to activate on 23 or 13 cm are the model 1296TRV6D and 2304TRV2D transverters, which convert from 144 MHz and run 6 watts and 2 watts output, respectively. Both these units feature remote mountable GaAsFET preamps and T/R sequencers, adjustable IF drive level controls, built-in relative output meters, and a host of features to make the neophyte or seasoned experimenter happy. The best part is the price: \$489 complete for the 23 cm unit, or \$569 complete for the 13 cm rig. In addition, both these units are available in kit form, or without the GaAsFET preamp and sequencer, for even lower cost.

Bill reports that he had the 2.3 GHz

LMW unit with him on a trip to the Delaware shore the week of October 13 and "made several QSO's with the guys back in PA/NJ and then again from Chincoteague Island, VA with a pair of 45-element loops (Yagis) about 10 feet off the ground and not using the GaAsFET. Best DX was N3CX at about 170 miles (S4/5)." Wow! W3HQT has also been active on 902 MHz, and says the band works a lot more like 432 than 1296 MHz. Bill says, "With simple equipment and a single 33-element loop, most stations are working 200-300 miles easily. Tropo seems good, aircraft scatter is excellent, and I can't wait for the next big Aurora to see if we can stretch it up to 902 MHz." I guess I'll have to bite the bullet and get on 33 cm, Bill. As soon as I get the tower up, I'll contact you for a couple of loop Yagis.

Speaking of loop Yagis, these were Down East Microwave's first products and they remain a staple for both Bill and the UHF/SHF community. Down East offers high-gain long-boom "loopers" which are stackable and present much less wind loading than a dish antenna of similar gain. For further information on all of Down East's unique products, contact Bill at (207) 948-3741, or write to Box 1655A, RFD #1, Burnham, ME 04922.

Another product arrived for review. What I need now is about a hundred hours in which to perform all the tests and write up the results on all the fine stuff that's laying around my just-going-together hamshack. The new box is a World Systems Engineering Co. "Docking Booster" for 2 meter mobile work. You've probably seen or heard of these things, but I'd never used one and wondered if they worked as well as some folks claimed. I'll find out, too, as soon as I dig out and begin running lab tests. In the meantime, for anyone interested in a cute accessory which enhances the mobile performance of VHF/UHF handhelds, the importer/distributor of the WSE "Docking Booster" is Naval Electronics Inc., 5417 Jetview Circle, Tampa, FL 33634 (telephone 813-885-6091). I must admit that anything which improves the performance of H/T's gets a gold star in my book—the average "talkie" makes a lousy mobile rig.

## Exit

This is the month of America's most popular (so far) VHF contest, the January VHF Sweepstakes. The DX worked is not as great as during the summertime contests, and there aren't many mountaintoppers out, but it's a good opportunity to look for new states, grids, prefixes, or whatever or to check out new equipment. Get on, and have fun.

I hope to be better organized by the February or March issue, and have some product reviews which have been in the works for months.

**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.

Instant Service  
PH: 517-484-9794 WRIGHTAPES  
235 E. Jackson C-3 • Lansing, MI 48906

## HI-VOLTAGE RECTIFIERS

14,000 VOLTS - 1 AMPERE

REPLACES 866-872 IDEAL FOR 2 KW. LINEARS  
3B28 ETC. 250 A. SURGE

4 FOR \$30.00 POSTPAID  
K2AW's "SILICON ALLEY"

175 FRIENDS LANE WESTBURY, N.Y. 11590

## 757 QSYer - the best thing next to a 757



The QSYer provides the Yaesu 757 with keyboard frequency entry - the single major feature left off this remarkable transceiver. Actually a tiny computer terminal with its own 8-bit microprocessor, the QSYer is pre-programmed to mate with the 757's computer port. Installation is accomplished in seconds by plugging only two cables into the 757's rear panel jacks - one for data and one for the QSYer's power. Your operating frequency can now be changed immediately - anywhere in the range of the transceiver - just by pressing two or more buttons on the standard-sized telephone keypad. The QSYer is built with commercial-quality components throughout, and is housed in an attractive, sloped metal enclosure color-matched to the 757. A 90-day limited warranty is included.

\$89.50 plus \$2.50 shipping and handling in the US, and 5% sales tax for GA residents. Master Card and Visa customers please send name, card number, expiration date, and signature.

Stone Mountain Engineering Co • Box 1573 • Stone Mtn GA 30086

CIRCLE 20 ON READER SERVICE CARD



27th ANNUAL  
**TROPICAL HAMBOREE**  
 ARRL FLORIDA STATE CONVENTION  
 FEBRUARY 7-8, 1987



DADE COUNTY YOUTH FAIR GROUNDS

Tamiami Park, 10901 S.W. 24 Street (Coral Way) Miami, Florida

- FREE PARKING 15,000 VEHICLES
- 1,000 INDOOR SWAP TABLES W/POWER
- LICENSE EXAMS
- PACKET RADIO PROGRAMS
- TECH TALKS
- TRAFFIC HANDLERS BREAKFAST
- WOUFF HONG INITIATION
- 300 CAMPSITES WITH FULL HOOKUPS
- 200 COMMERCIAL EXHIBIT BOOTHS
- DX FORUM & DINNER
- COMPUTERS & SOFTWARE
- RCA FLORIDA SECTION LUNCHEON
- HAMBOREE DEALER SPECIALS
- ACTIVITIES FOR NON-HAMS

Registration: \$5.00 Advance . . . \$6.00 Door. Valid both days. (Advance deadline Jan. 30th)  
 Swap Tables, 2 days: \$16.00 each, Includes power.  
 All swap table holders must have registration ticket.

Campsites: \$10.00 per day, includes water, power, sanitary hook-ups, showers.  
 (All RV vehicles, tent campers, vans, trailers welcome — no ground tents please.)

Headquarters Hotel: Ramada Hotel, Airport, 3941 N.W. 22nd Street

Special Hamboree Rates: \$45.00 Single, Double, Triple or Quad

Reservation forms available through Dade Radio Club December 1st.

*Exhibit Booth  
 Information:*

**Evelyn D. Gauzens,  
 W4WYR, Chairman**  
 2780 N.W. 3rd St,  
 Miami, FL 33125

Telephone:  
 (305) 642-4139

Make checks for Registration, Swap Tables & campsites payable to:  
**DADE RADIO CLUB, P.O. BOX 350045, MIAMI, FL. 33135**

*4 Page Brochure  
 Available . . .  
 December 1st*

*Drop in*  
 to a  
**Charge-Rite**

rapidcharger for ICOM rapidcharge  
 batteries; BP2, BP5, BP7, BP8



**\$58.95**

include \$3.00  
 shipping & hdlg

Fla. residents  
 include 5% tax

- \* Charges a BP5 in 1 hr. from 110 vac or 12 vdc
- \* Complete with mobile cord and ac transformer

*available from*  
**Charge-Rite**

P.O. Box 17015  
 Plantation, Fl. 33318

305-476-8580

Please send all reader inquiries directly.

**RENO  
 RADIO**

P.O. Box 20548  
 Reno, NV 89520  
 12 Glen Carran Circle  
 Sparks, NV 89431  
 (702) 331-7373

**KENWOOD TS-940S**



IC-751A



**ALINCO**



IC-02AT

**ICOM**

**YAESU**



ALR-206T

FT 767 GX

**Call Toll FREE:  
 1-800-345-5686**

AEA • ALINCO • AMERITRON • AMP SUPPLY • B & K  
 • BELDEN • BUTTERNUT • CUSHCRAFT • DAIWA •  
 HUSTLER • ICOM • LARSEN • KANTRONICS • KENPRO  
 • KENWOOD • MIRAGE/KLM • MFJ • TEN-TEC • YAESU  
 & Many Others

*For Fast and Courteous Response Call Jim Myers,  
 WA6ICB President or Dale Scott, KA7QYX Store Manager.*

*No - 63 - 64*

## A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

### Antennas: This and That

This time it's a look at antenna and guy-wire lengths, as well as some new antenna products and books for the hamshack. Our columnist W8FX also takes note of some software you're likely to find interesting. Stick with us.

—K2EEK

Last month we concluded our multi-part examination of hamshack personal computers (PCs). In that extended series of columns we looked into computers from several different aspects: selection, installation, operation, maintenance, and software. Hopefully, we presented some useful acquisition suggestions and operating guidelines in getting the most from the PC in the hamshack environment. To be sure, we enjoyed presenting the series, and we also learned a good deal in the process of doing so.

This time it's a potpourri of interesting subjects. We will first discuss some important guy-wire length considerations, and then revisit K5KG's handy HF antenna length chart which appeared in last March's CQ ("An Antenna Length Chart" page 42). We'll also highlight several new antenna products which have recently come to our attention, and discuss some new amateur software of note. We'll also pull down from the bookshelf a few new items of reading matter.

First, let's chat about guy-wire lengths in the HF installation.

#### Guy-Wire Lengths

For obvious reasons, most antenna towers and masts require some sort of guying. As a rule, for masts up to about 50 feet in height Number 12 wire can make an adequate guy. For taller poles and masts, or in locations where a high wind velocity is the norm, heavier wire or stranded cable should be used. Heavy-duty synthetic materials have been used with some success, also. Generally, three guy wires, set 120 degrees apart, are used in a set. However, if it's a horizontal antenna that is being supported, two guys in the top set will usually be adequate to counteract the "pull" exerted by the antenna.

How much wire is required? Each length can be calculated using simple trigonometry. The "right-angled-triangle rule," in which the sum of the squares of the two sides is equal to the square of the hypotenuse, will provide the answer. Thus, the distance from the base of the mast to the guy anchor (on the ground) should be measured and this figure squared. Added to this should be the square of the mast or pole length to the point where the guy wire is attached. The square root of this sum provides the length of the guy. To determine the total wire length required, multiply this figure by the

ft =>	00000000111111112222222222223333333333344444444445
	12345678901234567890123456789012345678901234567890
	::: ::: : : : : : : : : : : : : : : :
160M	::: ::: : : : : : : : : : : : : : : :
80M	::: ::: : : : : : : : : : : : : : : :
40M	::: ::: : : : : : : : : : : : 11: : : : : :
30M	::: ::: : : : : : : : 1 : : : : : : : : : : 2
20M	::: ::: : : : 1: : : : : : : : 22: : : : : : : : 333
15M	::: ::: : 11: : : : : : : 22 : : : : 33: : : : : : : : 44:
12M	::: ::: : 1 : : : : : : : 2: : : : : : : 3: : : : : : : 4: : : : : : : 55
10M	::: ::: : 11 : : : : : : : 22: : : : : : : 333: : : : 444: : : : 555: : : : 6666
	::: ::: : : : : : : : : : : : : : : :
ft =>	00000000111111112222222222223333333333344444444445
	12345678901234567890123456789012345678901234567890
	=====
	11
ft =>	555555556666666666677777777778888888888899999999900
	123456789012345678901234567890123456789012345678901
	::: ::: : : : : : : : : : : : : : : :
	::: ::: : : : : : : : : : : : : : : :
160M	::: ::: : : : : : : : : : : : : : : :
80M	::: 11111111: : : : : : : : : : : : : : : :
40M	::: 222: : : : : : : : : : : : : : 33333: : :
30M	::: : : : : : : : 3 : : : : : : : : : 4 : : : : : :
20M	::: 44: : : : : : : 555 : : : : : : : 6666: : :
15M	::: 55 : : : : 66: : : : 77 : : : : 888 : : : : 999: : :
12M	::: 6 : : : 7 : : : 88 : : : 9: : : : 00 : : : : :
10M	::: 7777 : : 8888: : 999999 : : 00000 : : 111111 : : 222222: : :
	::: ::: : : : : : : : : : : : : : : :
	::: ::: : : : : : : : : : : : : : : :
ft =>	555555556666666666677777777778888888888899999999900
	123456789012345678901234567890123456789012345678901

Fig. 1—"Safe" guy-wire lengths. Vertical colon strings indicate "safe" guy-wire lengths. Numbers in the chart indicate which quarter wavelength could be resonant at the given length for a particular band.

number of individual guy wires in the set, perform the same calculations for each set of guy wires used at various heights, and add together the resultant figures.

The question of the need to use break-up insulators in the guys is a difficult one; experience over the course of many years does not yield a final answer. However, it's generally agreed that it's better to break up the guying to at least some extent to minimize possible guy self-resonance and reradiation from the guy wires. Doing so should avoid adversely or unpredictably impacting antenna performance.

Several guying rules-of-thumb and guidelines have been established over the years. One common rule is that guys supporting various types of towers (especially those which are themselves radiators) should be insulated from the tower and from ground, and they should be broken up into sections that are short enough so that currents induced in them don't distort the antenna's radiation pattern. Strain insulators are usually installed at the guy anchor points on the ground, at intervals along the guy wires, and at the points of attachment to the tower.

What should these intervals be? One guideline has it that the maximum length of any guy-wire section should not exceed  $\frac{1}{8}$  to  $\frac{1}{10}$  wavelength; another is that an insulator every 25 feet or so is adequate, at least up to about 30 MHz, thus generally avoiding most fundamental or harmonic frequency relationships. The insulators used should be of the familiar "egg" variety, which has the insulating material under compression so that the guy will not part if the insulator fractures.

KA2WRY, Father John J. ("J. J.") Stryjewski, gave the guy length question careful consideration in guying a set of poles to support a large multiband loop. He decided that it would be useful to develop a set of "safe" guy-wire lengths based on avoidance of all quarter-wave resonances over the 160 through 10 meter bands. Fig. 1 shows the computer-generated table which he developed, depicting guy lengths up to 101 feet; the columns of vertical colons indicate the safe lengths which he determined. I might add that, while long guy lengths may be "safe" by using the specific lengths suggested by Father J. J., it would be wise to favor the shorter lengths in the table,

317 Poplar Drive, Millbrook, AL 36054



WE SHIP WORLDWIDE

# Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:  
212-925-7000  
Los Precios Mas Bajos en  
Nueva York...

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.  
Saturday & Sunday 10 to 5 P.M.

Monday-Friday 9 to 6:30 PM Thurs. to 8 PM  
Come to Barry's for the best buys in town.



Ring in the New Year  
With the best of Barry's New Gear

## KENWOOD



TS440S/AT, R-5000, R-2000, TS-940 S/AT,  
TM-201B, TR26/3600A, TM2570A/50A/30A, TR-751A  
Kenwood Service/Repair, TH21/31/  
41AT, TM-211A/411A, TS-  
711A811A, TM3530A, TH205AT

COMPU-FIRE EXTINGUISHERS

VoCom/Mirage/Daiwa  
Tokyo Hy-Power/TE SYSTEMS  
Amplifiers &  
5/8 HT Gain  
Antennas IN STOCK



Soldering  
Station,

48 Watts, \$68

MICROLOG-ART 1, Air Disk,  
SWL, Morse Coach

KANTRONICS  
UTU, KAM, UTU-XT,  
KPC 2400, Packet Comm II

EIMAC  
3-500Z  
572B, 6JS6C  
12BY7A &  
4-400A

AEA 144 MHz  
AEA 220 MHz  
AEA 440 MHz  
ANTENNAS

BIRD  
Wattmeters &  
Elements  
In Stock

## Antennas

A-S  
Cushcraft  
Hy-Gain  
Hustler  
KLM  
METZ  
Mini-Products  
Mosley

YAESU  
FT-23/73/727R  
FT-2/709R/H  
FT-1903/1123

ICOM  
IC2AT/12AT  
ICO2AT  
IC-03/04AT  
IC-A2/U16

Land-Mobile H/T  
Midland/Standard  
Wilson Maxon  
Yaesu FTC-2203, FT-4703  
Icom IC-M12 (Marine) M700  
Tempo M-1



## YAESU

FT-767GX, FT-980, FT-757GX, FRG-8800  
FT-726, FRG-9600, FT-270/770RH, FT-2700RH



Alinco  
Amplifiers

## AMERITRON AMPLIFIER AUTHORIZED DEALER



Yaesu FTR-2410, Wilson  
ICOM IC-RP 3010 (440 MHz)  
ICOM IC-RP 1210 (1.2 GHz)

Computer Interfaces  
stocked: MFJ-1224  
AEA CP-1, DR.DX  
PK-64A, PK-64, Dr. QSO,  
PK-232, PM-1



ALPHA AMPLIFIERS

Complete Butternut Antenna  
Inventory In Stock!

DIGITAL FREQUENCY COUNTERS  
Trionyx, Model TR-1000, 0-600 MHz  
AMP SUPPLY STOCKED

Long-range Wireless  
Telephone for export in stock

BENCHER PADDLES,  
BALUNS,  
IN STOCK

MIRAGE AMPLIFIERS  
ASTRON POWER SUPPLIES  
Saxton Wire & Cable



## ICOM

IC-R71A, 751A, 745, 28A/H, 38A, 48A, R-7000,  
1271A, 271A/H, 3200A, 471A/H, 735, Micro2



## SMART PATCH

CES-Simplex Autopatch 510-SA Will Patch FM  
Transceiver To Your Telephone Great For  
Telephone Calls From Mobile To Base. Simple  
To Use.

PRIVATE PATCH III in stock

Budwick ANT. Products

FLUKE 77 Multimeter



Nye MBV-A

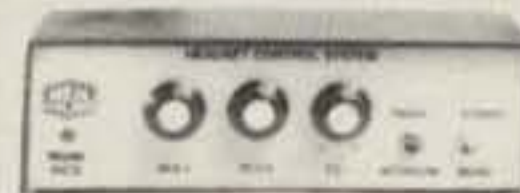
3 Kilowatt Tuner



Ten-Tec Tuner 229A

MFJ Models  
422, 313, 989B, & 941D

SANGEAN Portable Shortwave Radios



HEIL  
EQUIPMENT  
IN STOCK



New TEN-TEC

Corsair II, Argosy II, Century 22, 2510 RX-325

Tri-Ex Towers  
Hy-Gain Towers  
& Antennas, and  
Rotors will be  
shipped direct to  
you FREE of  
shipping cost.

MAIL ALL ORDERS TO BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012.

New York City's

LARGEST STOCKING HAM DEALER  
COMPLETE REPAIR LAB ON PREMISES

## "Aqui Se Habla Espanol"

BARRY INTERNATIONAL TELEX 12-7670  
MERCHANDISE TAKEN ON CONSIGNMENT  
FOR TOP PRICES

Monday-Friday 9 A.M. to 6:30 P.M. Thursday to 8 P.M.  
Saturday & Sunday 10 A.M. to 5 P.M. (Free Parking)

AUTHORIZED DIST. MCKAY DYMEK FOR  
SHORTWAVE ANTENNAS & RECEIVERS.

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 Equipment  
Stocked: ICOM, MAXON,  
Midland, Standard, Wil-  
son, Yaesu. We serve  
municipalities, busi-  
nesses, Civil Defense,  
etc. Portables, mobiles,  
bases, repeaters...

We Stock: AEA, ARRL, Alpha, Ameco, Antenna Specialists, Astatic, Astron,  
B & K, B & W, Bencher, Bird, Butternut, CDE, CES, Collins, Communications  
Spec. Connectors, Covercraft, Cushcraft, Daiwa, Dentron, Digimax, Drake,  
ETO (Alpha), Eimac, Encomm, HeilSound, Henry, Hustler (Newtronics), Hy-  
Gain, Icom, KLM, Kantronics, Larsen, MCM (Daiwa), MFJ, J.W. Miller, Mini-  
Products, Mirage, Newtronics, Nye Viking, Palomar, RF Products, Radio  
Amateur Callbook, Rockwell Collins, Saxton, Shure, Telex, Tempo, Ten-Tec,  
Tokyo Hi Power, Trionyx TUBES, W2AU, Waber, Wilson, Yaesu Ham and  
Commercial Radios, Vocom, Vibroplex, Curtis, Tri-Ex, Wacom Duplexers,  
Repeaters, Phelps Dodge, Fanon Intercoms, Scanners, Crystals, Radio  
Publications.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS

HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED

COMMERCIAL RADIOS stocked & serviced on premises.

Amateur Radio Courses Given On Our Premises, Call

Export Orders Shipped Immediately. TELEX 12-7670

ALL  
SALES  
FINAL

where even long, nonresonant lengths might affect performance, particularly in compromising the antenna's radiation pattern.

If after constructing the mast and supporting guy structure a length of guy wire is found to be resonant at a particular operating frequency and has a significant reradiated field, it should be detuned. This is easiest to accomplish by simply breaking up its length with an insulator. Parasitic currents may be explored for in guy wires using techniques similar to those used in measuring currents in individual transmission lines.

### Antenna Length Chart Revisited

In the March 1986 issue, George I. Wagner, K5KG, presented a handy clip-and-save chart that was designed to save readers a good deal of time in constructing a variety of HF antennas. The chart he prepared, using the VisiCalc™ electronic spreadsheet program on an Apple II+ computer, arose out of his need to have a convenient and ready dimension reference when it was most needed, eliminating the need for calculator or pad and pencil.

George's chart was developed after consulting the various antenna handbooks, and it is useful for all amateur bands from 160 through 10 meters, including the new WARC bands. His chart is based on standard assumptions for antenna dimensioning, to include wire antennas supported by end insulators. The chart is set up in both feet and meters to accommodate quarter-wave verticals, half-wave dipoles, full-wavelength loops, and other antennas that make use of these dimensions. It is shown in fig. 2.

### New Antenna Products of Note

**ADN Microloops.** We've covered the "renaissance" in transmitting loops in the column before. While relatively small loops are generally considered to be much better as receiving antennas than as transmitting antennas, a small group of enthusiastic experimenters has concluded that with proper design and construction the small loop can do a respectable job on transmitting as well as on receiving. One such researcher is Ted Hart, W5QJR, whose extensive loop work and book, *Small High Efficiency Antennas*, was discussed several months ago in the column. Two other *aficionados* are Ken Keenan, K4ADN, and Ivan Senia, K1IS, who market a series of transmitting loop antennas through ADN Microloops of Pinellas Park, Florida.

These antennas are a series of relatively small-diameter, copper monoband loops using a special coaxial tuning capacitor. The loops will fit into much smaller spaces than will most other practical antennas, and they are said to provide performance about equivalent to that of full-size dipoles. The loop, unlike the dipole, generally radiates in all directions, not just in the two directions favored by the dipole. The omnidirectional coverage provided is thus like that of the vertical antenna, but the loop is inherently less noisy due to its typically horizontal polarization and the sensitivity of the antenna to magnetic, rather than electric, fields.

However, vertical polarization of the Microloops is recommended for 30 and 40 meter operation, both from a wave-angle standpoint and mechanical considerations. Horizontal polarization is recommended for 10, 15, and 20 meter use. The loop diameters range from 27 inches on 10 meters, to about 104 inches on 40 meters. The Microloops come with the ne-

cessary mounting hardware for the polarization appropriate to the operating band; a 2 inch PVC mast is required, though the antennas may be suspended from a tree using nylon rope.

Bandwidth of the Microloops is relatively narrow, one of the penalties paid when using a physically small antenna. The claimed bandwidth (for a 1.5:1 SWR) ranges from about 46 kHz on 10 meters down to 14 kHz on 40 meters. The manufacturer recommends that the loop be tuned to the center of the desired operating frequency range by means of the loop's coaxial capacitor, and the gamma match adjusted to provide minimum SWR at that frequency. While "purists" might not approve,

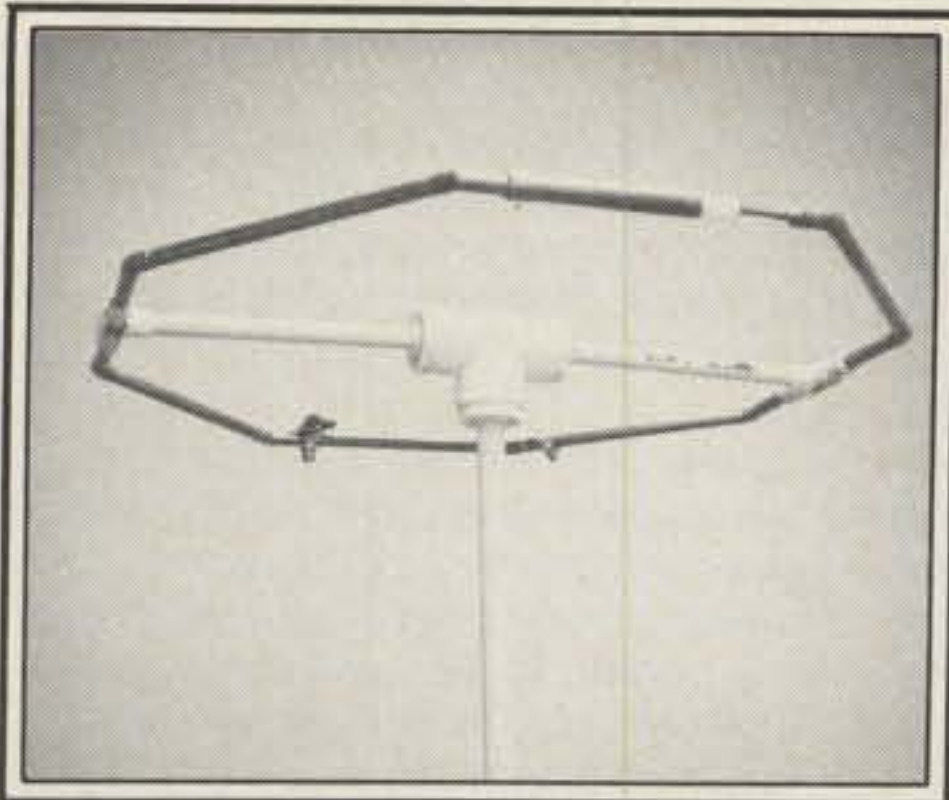
some frequency excursion is possible if an antenna tuner is used to fudge a bit, to allow your rig to "see" a 50 ohm resistive load.

The Microloops have a maximum power-handling capacity of 200 watts CW or PEP. While they are not suitable for high-power operation, they are useful in low- and medium-power stations where limited space and a low visibility profile are factors, and also as a supplement in beam-equipped stations for beam pointing ("bird dogging") and backup or bandscanning.

For more information and an interesting set of technical literature, contact Advanced Design Networks, Inc., 8601 66th St. North, Pinellas Park, FL 33565.

***** * ANTENNA LENGTH CHART BY K5KG * *****								
* FREQUENCY * * (MHZ)	* WAVELENGTH - FEET *				* WAVELENGTH - METERS *			
	1/4	1/2	1/2+5%	FULL	1/4	1/2	1/2+5%	FULL
* 1.8	129.87	259.75	272.73	519.49	39.58	79.17	83.12	158.33
* 1.825	128.09	256.19	269.00	512.38	39.04	78.08	81.99	156.16
* 1.85	126.36	252.73	265.36	505.45	38.51	77.03	80.88	154.05
* 1.9	123.04	246.08	258.38	492.15	37.50	75.00	78.75	150.00
* 3.5	66.79	133.58	140.26	267.17	20.36	40.71	42.75	81.43
* 3.6	64.94	129.87	136.37	259.75	19.79	39.58	41.56	79.17
* 3.7	63.18	126.36	132.68	252.73	19.26	38.51	40.44	77.03
* 3.8	61.52	123.04	129.19	246.08	18.75	37.50	39.38	75.00
* 3.9	59.94	119.88	125.88	239.77	18.27	36.54	38.37	73.08
* 4	58.44	116.89	122.73	233.77	17.81	35.63	37.41	71.25
* 7	33.40	66.79	70.13	133.58	10.18	20.36	21.37	40.71
* 7.05	33.16	66.32	69.63	132.64	10.11	20.21	21.22	40.43
* 7.1	32.93	65.85	69.14	131.70	10.04	20.07	21.07	40.14
* 7.2	32.47	64.94	68.18	129.87	9.90	19.79	20.78	39.58
* 7.3	32.02	64.05	67.25	128.09	9.76	19.52	20.50	39.04
* 10	23.38	46.75	49.09	93.51	7.13	14.25	14.96	28.50
* 10.5	22.26	44.53	46.75	89.06	6.79	13.57	14.25	27.14
* 14	16.70	33.40	35.07	66.79	5.09	10.18	10.69	20.36
* 14.1	16.58	33.16	34.82	66.32	5.05	10.11	10.61	20.21
* 14.2	16.46	32.93	34.57	65.85	5.02	10.04	10.54	20.07
* 14.35	16.29	32.58	34.21	65.16	4.97	9.93	10.43	19.86
* 18	12.99	25.97	27.27	51.95	3.96	7.92	8.31	15.83
* 18.5	12.64	25.27	26.54	50.55	3.85	7.70	8.09	15.41
* 21	11.13	22.26	23.38	44.53	3.39	6.79	7.12	13.57
* 21.1	11.08	22.16	23.27	44.32	3.38	6.75	7.09	13.51
* 21.25	11.00	22.00	23.10	44.00	3.35	6.71	7.04	13.41
* 21.45	10.90	21.80	22.89	43.59	3.32	6.64	6.98	13.29
* 24.89	9.39	18.78	19.72	37.57	2.86	5.73	6.01	11.45
* 24.93	9.38	18.75	19.69	37.51	2.86	5.72	6.00	11.43
* 24.99	9.35	18.71	19.64	37.42	2.85	5.70	5.99	11.40
* 28	8.35	16.70	17.53	33.40	2.54	5.09	5.34	10.18
* 28.5	8.20	16.41	17.23	32.81	2.50	5.00	5.25	10.00
* 29	8.06	16.12	16.93	32.24	2.46	4.91	5.16	9.83
*****								
* FORMULAS USED *								
* ----- *								
* 1 METER = 3.281 FEET *								
* LENGTH OF 1/2 WAVELENGTH ANTENNA (METERS) = *								
* (300 * .95 * .5) / FREQ (MHZ) = 142.50 / FREQ (MHZ) *								
* LENGTH OF 1/2 WAVELENGTH ANTENNA (FEET) = *								
* (300 * .95 * .5 * 3.281M/FT) / FREQ (MHZ) *								
* = 467.54 / FREQ (MHZ) *								
* NOTE: 1/2 WAVELENGTH + 5% IS USED FOR INVERTED VEE ANTENNAS *								
*****								

Fig. 2—Antenna length chart by K5KG.



Shown here is one of the ADN Microloops, compact HF monoband antennas for 40, 30, 20, 15, 12, and 10 meters. Across-the-loop dimensions vary from 27 inches for 10 meters to 104 inches for 40 meters. Performance of the Microloop is claimed to be approximately equivalent to a full-size dipole. (Photo courtesy Advanced Design Networks, Inc.)

**G2DYM Aerials.** A flyer we received from merrie olde England brings word of a new line of rugged HF antenna traps. An offshoot of G2DYM's established line of trap dipoles, individual traps are now available for the 10, 15, 20, 40, and 80 meter bands.

The "aerial traps," as they are called, are available in pairs for trap dipoles or singly; the 10, 15, and 20 meter traps are \$13 each, the 40 meter traps are \$15 each, and the 80 meter traps are \$18 apiece, plus shipping. For beam and vertical antenna builders, the 10 and 15 meter traps are available with 4 inches or 6 inches of aluminum tube at each end. Kits of 4, 8, and 12 traps for various types of antennas and band combinations may also be obtained. Trap rating is 2 kw.

For more details and shipping information, contact G2DYM Aerials, Uplowman, Tiverton, Devon.

**W3HQT Microwave Components and Antennas.** Bill Olson, W3HQT, offers a line of microwave products through his firm, Down East Microwave. This is a small firm in central Maine ("down east country") which manufactures a line of products specifically for the amateur UHF and SHF enthusiast. Among the products offered are a series of Loop Yagis and accessories for 902 through 2304 MHz, as well as an expanding line of solid state linear amplifiers and low-noise preamplifiers for these bands.

Central to Bill's product line is the Loop Yagi. Based on pioneering work by G8AZM, G3JVL, and others, this antenna, in Bill's view, is becoming the standard for weak-signal work on the 23 cm band. He points out that four 45-element "loopers" in a box configuration compare favorably in gain to that achieved by a 7 or 8 foot dish, with much less wind resistance. Even at frequencies where dish antennas are popular, such as 2304 MHz, the Loop Yagi nevertheless has considerable merit, since it can be installed higher without worry because of its low wind resistance. Due to the all-metal construction using hardened aluminum elements, 6061-T6 aluminum booms, and stainless steel hardware, the Loop Yagis he offers are considered to be very reliable, rugged, and weatherproof.

A recent catalog shows several 33- and 45-element Loop Yagis for UHF and SHF work priced in the \$60-85 class. For more details, contact Bill Olson, W3HQT, at Down East

Microwave, Box 1655A, RFD#1, Burnham, ME 04922.

**Notes from Radio Engineers.** About a year ago in the column we described the Radio Engineers Type 2MQ PortaQuad™, a full-size, two-element, 2 meter portable cubical quad antenna designed for both portable and semi-fixed operation. As we indicated then, the antenna's unique mechanical design allows it to fold up for stowage or transportation in a container. The container also doubles as the antenna's support base when the antenna is erected.

Bob Decesari of Radio Engineers brought to our attention two Portaquad accessories. One is the PM-1 PortaMast™. Designed specifically to mate with the 2MQ quad, the \$33.95 de-

vice is designed to support the quad approximately 8 feet off the ground. The PortaMast assembly consists of three 2 foot lengths of PVC tubing with threaded and slip-type couplings. A special cap fitting is provided which mounts the mast to the base/container. Four guylines with stakes are attached to the mast and are used to hold the mast upright.

Also offered is the SB-1 base, useful for hard surfaces such as pavement which don't allow the use of stakes. The \$23.95 self-supporting base consists of two interlocking crossmembers which center the PortaQuad base/container and provide eyelets to which the guy-lines may be attached.

For more information, contact Radio Engi-

## 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 49 ON READER SERVICE CARD

## Save Time-Money with HAZER

- Never climb your tower again with this elevator system.
  - Antenna and rotator mount on HAZER, complete system trans tower in verticle upright position.
  - Safety lock system on HAZER operates while raising-lowering & normal position. Never can fall.
  - Weight transferred directly to tower. Winch cable used only for raising & lowering. Easy to install and use.
  - Will support most antenna arrays.
  - Safety - speed - convenience - inexpensive.
  - Complete kit includes winch, 100 ft. of cable, hardware and instructions. For Rohn 25 G Tower.
- Hazer 2-Heavy duty alum., 12 sq.ft. ld. \$297.00 ppd.  
Hazer 3-Standard alum., 8 sq.ft. load 213.00 ppd.  
Hazer 4-Heavy galv. steel, 16 sq.ft. load 278.00 ppd.  
Ball thrust bearing TB-25 for any of above 42.50 ppd.  
Satisfaction guaranteed. Call today and charge to Visa or MasterCard.
- As an alternative, purchase a Martin M-13 or M-18 aluminum tower engineered specifically for the HAZER system, or a truly self-supporting steel tower. Send for free details.



GLEN MARTIN ENGINEERING INC.  
P.O. Box C 253 Boonville, Mo. 65233  
816-882-2734

CIRCLE 48 ON READER SERVICE CARD



# TUBES and IC's FAST DELIVERY LOWEST PRICES

call Toll Free (800) 221-5802

In-depth Inventory - Industrial & Receiving Tubes  
Here are 2 dozen examples...

3-500Z	85.00	8122	135.00
572B	75.00	813	45.00
811A	15.00	MRF450	12.95
6146B	8.75	MRFY54	18.95
M2057	15.00	MRFY55	14.95
8950	12.50	MRFY92	19.95
4CX250B	75.00	6LF6	8.26
6883B	9.50	6JS6C	7.46
SG613	10.50	6CA7	6.91

### CHEMTRONICS CHEMICALS

TUN-O-WASH 24 oz. \$3.89 TUNER RENU 6 oz. \$1.25  
TUN-O-POWER \$3.39 FREEZE IT 22 oz. \$3.39

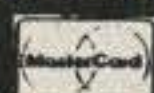
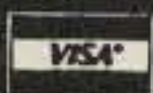
Major Manufacturers Factory Boxed and Full line of  
Sylvania ECG Replacement Semiconductors



Minimum order \$25.00

Allow \$3 UPS charge

## TRANSELETRONIC INC.



Box No. C, 1365 39th STREET, BROOKLYN, NY 11218  
Tel. 718-633-2800/Watts Line 800-221-5802  
FAX # (718) 633-4375

CIRCLE 47 ON READER SERVICE CARD

# AUSTIN. When only the best will do!

Taking the leading role in custom antenna design comes easily to Austin. With over 25 years of engineering and consulting experience, how could we offer you less than the best?

And our high performance solutions go beyond our popular MULTIBAND antennas.

There's THE OMNI sidebander with horizontal and vertical polarization. Or the ALL BAND SCANNER with high gain that outperforms the competition. And THE STICK, a broad band design for operation from Amateur to Marine frequencies. Just a sampling of the choices available.

Whatever your antenna needs, the winner is Austin.

Call or write for product information.  
Dealer inquiries invited.



AUSTIN  
CUSTOM  
ANTENNA  
P.O. Box 357  
Sandown, NH 03873  
(603) 887-2926

CIRCLE 50 ON READER SERVICE CARD

neers, 3941 Mt. Brundage Ave., San Diego, CA 92111.

### Software Sampler

**KA9GLB Software.** We've mentioned Walt, KA9GLB's line of software for the Vic-20 and Commodore 64 computers several times over the past two to three years. KA9GLB software focuses on small, inexpensive but "handy" hamshack programs for Commodoreans.

Walt writes that he has rewritten all of his Vic and C-64 software for the Commodore 128. At least 17 titles are available, including the Capacitance Program, MUF Calculator, Ham Antennas, Beam Headings, SWR Graphs, Custom Beam Heading List, and more. All of the Commodore 128 programs are written to be used with the C-128 in its "native" 128 mode, a 1541 or 1571 disk drive, and either a 40 or 80 column monitor. Program prices range from \$4 to \$18.

For program descriptions and a price list, send a large SASE to Walt, KA9GLB, 4880 N. 49th St., Milwaukee, WI 53218. Specify which computer you own when writing.

**Newsome Interfaces.** Newsome Electronics offers a versatile line of Vic-20 and Commodore 64/128 RTTY/CW interfaces. These are hardware/software packages consisting of two separate units (program and terminal units) which plug into the computer's cartridge and user ports, respectively. They feature a number of advanced features, including automatic Baudot or ASCII rate scanning, over 100 program functions, automatic CW tracking from 5-127 WPM, MSO (RBBS) capability, logging scratch pad, 26 call-up message buffers, split screen, complete keyboard control, on-screen clock, and more. Complete details

on the Newsome interfaces are found in Lew McCoy, W1ICP's in-depth review of the units which appeared in the November 1985 CQ, "The Newsome CM-64 and CM-20 RTTY Terminal Units." Price class for the units is about \$125.

An interesting product that Newsome also offers is the "PAKMON," a receive-only packet radio adapter that works with the Commodore Vic-20, C-64, and C-128 computers. This is a two-part device which consists of a plug-in program cartridge that installs in the computer's cartridge (game) port, and a small printed circuit board (which must be assembled) that plugs into the user (modem) port. No modification of the computer is required, and the only connection to the transceiver is an audio take-off from the radio's speaker or headphone jack. The device looks like a good bet for one who just wants to get his or her feet wet by "reading the mail" on packet without purchasing a full-blown packet terminal node controller.

The PAKMON units (Model VHF-1200-20 for the Vic and VHF-1200-128/64 for the C-64 or C-128) are available for \$59.95; add \$20 for an assembled and tested unit and \$3.50 for shipping and handling. When I obtained my unit about six months ago, they were on sale for \$39.95, so inquire as to current pricing. Contact Newsome Electronics, 19675 Allen Rd., Trenton, MI 48183. (Note: I'm using a PAKMON just for fun, and enjoy its simplicity. But if you purchase one, I'd recommend going for the assembled unit; I found assembly of the circuit board tricky.)

**Callmark Computing.** Vern Epp, VE7ABK, offers a line of Radio Shack and IBM-PC software, both for amateur radio and electronic applications. For a listing of Vern's software

offerings for these two computers, write to Callmark Computing, Box 371, Nelson BC Canada V1L 5R2. I love Vern's motto, which appears on his business card: "Two bytes in the hand are worth more than one bit in the bush!"

One of Vern's more interesting electronic applications is his Satellite Utility for the IBM-PC and its clones. The program is a comprehensive one for commercial satellite antenna installation of both 4 GHz and 12 GHz systems. Among other things, the program makes LNA (low noise amplifier) conversions, calculates theoretical parabolic dish efficiency, determines carrier-to-noise ratio, finds path loss between your location and the satellite, and performs several "margin" tests. The program also allows you to design your own parabolic dish with any focal/diameter ratio desired. I suspect that some amateur SHF experimenters may also find use for this type of program in their hamshacks.

### From the Bookshelf

**The DXers Guide to Computing.** Of special interest to shortwave listeners (SWLs), from Radio Sweden International comes information on a new 35-page booklet, "The DXers Guide to Computing," Edition 3.0. The completely updated guide covers all aspects of using computers in the radio listening hobby, including RTTY and packet radio interfaces and computer-controlled receivers. Authored by well-known DXer George Wood, the booklet is available for \$3 (US) directly from Radio Sweden International, S-105 10 Stockholm, Sweden.

**Free from Holland.** Also of interest to SWLs is a free booklet, "Shortwave Software," Edition 2, available from Radio Nederland Wereldroep. The booklet contains a number of useful

## SWR/POWER METERS



#### CN-720B

1.8-150 MHz  
20/200 W/2 kW  
SO-239

#### NS-663PA/N

140-525 MHz  
3/30/300 W  
Peak Pwr Reading  
SO-239/N-Type

#### NS-660PA

1.8-150 MHz  
30/300 W/3 kW  
Peak Pwr Reading  
SO-239

#### NS-668

900 MHz-1.3 GHz  
1.5/15/60 W  
N-Type

Prices and specifications subject to change.  
All models and types not represented.



**DAIWA**

Electronics Corporation

1908A Del Amo Blvd. • Torrance, CA 90501 • (213) 212-6057

• CYPRESS GARDENS • SILVER SPRINGS •

DAYTONA BEACH  
KENNEDY SPACE CENTER  
DISNEY WORLD

Come to Florida  
for the  
WINTER HAMFEST



SEA WORLD  
BUSCH GARDENS  
CHURCH STREET STATION

The foremost

**HAMCATION  
AND COMPUTER SHOW**

at Expo Centre  
MARCH 13, 14, 15, 1987



1987 ARRL  
Southeastern Region  
Convention

AIR CONDITIONED SWAP AREA TABLES \$20  
REGISTRATION:  
\$5 Advance \$7 At The Door  
Banquet \$12.50

For tickets & swap table reservations  
SEND check and SASE to:

Orlando Hamcation & Computer Show  
Dept. CQ, P.O. Box 547811, Orlando, FL 32854-7811

• EPCOT • DISNEY WORLD • SEA WORLD •  
Say You Saw It In CQ

CIRCLE 11 ON READER SERVICE CARD

BASIC language computer programs of interest to DXers, including a propagation prediction program and a sunrise-sunset calculation program. Also available is another free booklet, "Infodutch Edition 2.0," which includes some slow-scan television (SSTV) and amateur radio software information.

For more details and availability of these booklets, write to Radio Nederland Wereldomroep, P.O. Box 222, 1200 JG Hilversum, The Netherlands.

**Addison Wesley Catalog.** A recent catalog from the Addison Wesley Publishing Company shows a number of interesting computer and software titles—suitable gifts for the computerist who "has everything." While I found no specific amateur radio related titles, I did find a number that would be of definite interest to the serious computer user, ham or otherwise. These include titles in the realm of artificial intelligence, operating systems, programming, and algorithms. Particularly interesting were titles such as *Digital Image Processing*, *Software Engineering*, and *An Introduction to Data Communications and Computer Networks*. One book that they distribute and which I think should be on the "must have" list for everyone who writes computer and software instruction manuals is this one: *How to Write a Computer Manual!*

For a copy of the catalog, write to the Addison Wesley Publishing Company, Reading, MA 01867.

### Short Bursts

**Radio Frequency Chart.** A nine-color, 16" x 20" frequency spectrum chart which prominently displays the amateur bands across the MF, HF, VHF, and UHF spectrum from 300 kHz to 3 GHz is available from Robert Rover, KB6DYM, 2135 Columbia St., San Diego, CA 92101. Made specifically for amateurs, short-wave listeners, and scanner enthusiasts, the chart is especially intended for hamshack and classroom use. Printed on heavy stock and suitable for framing, the chart is available for \$4.50 plus \$1.50 postage, shipped in a heavy mailing tube. (Clubs and others can order the chart in quantities of 25 or more for \$1.00 each, plus shipping.)

**International Radio, Inc.** This organization serves as a clearinghouse of information and specialized supplies for users of ICOM, Kenwood, and Yaesu equipment. Of special note, the firm publishes newsletters for owners of these makes of ham gear as a worldwide medium of exchange. Material covered in the newsletters includes equipment interfacing, modifications, improvements, manufacturer's or agent's service notes, and suggested operating procedures. Also covered are troubleshooting information and reviews of new and accessory equipment not generally available from other sources. The newsletters also include operating schedules of the various user radio nets which the organization encourages; naturally, it's not necessary to be a subscriber to participate in one of the nets.

A little background on the organization should prove useful. The Users International Radio Club began operations in September 1979. The first newsletter was the ICOM-701 International Club; the newsletter was later expanded to cover all ICOM products. In early 1980 the Kenwood International Club was begun; it featured all Kenwood products. Both newsletters have since been included under the International Radio, Inc. umbrella, but are published separately. Beginning in January



*Does one of these classic Yaesu "Memorizers" grace your hamshack or hamshack-on-wheels? If so, or indeed if you own any ICOM, Kenwood, or Yaesu gear, you may be interested in the services offered by International Radio, Inc. See the text of this month's column for more details. (Photo courtesy Yaesu)*

1986 the organization took over publication of the well-known Fox-Tango Yaesu Newsletter, which was formed by Milton Lowens, N4ML, in 1971.

For more details on the newsletters and other products and services offered, write to International Radio, Inc., 747 S.W. South Macedo Blvd., Port St. Lucie, FL 33452.

**By the Way...** To a large extent, we consider the Antennas & Accessories column an exchange or clearinghouse of information on antenna, hamshack accessory, and computer topics. Accordingly, we pass on information received that we think would be of interest to CQ readers. While we strive for accuracy in presenting material in the column, we cannot be responsible for errors which may creep into print or for what you do with the material.

Too, we provide addresses and prices which we believe to be current and accurate but we provide this information as a guide, not as "set in concrete," as the saying goes. So be sure to contact any firms or individuals mentioned in the column *before* ordering a product or sending any money; satisfy yourself that the product is still available and confirm its current price. Bear in mind that there is a few months' delay between the time we write the column and the time it appears in print. 'Nuff said.

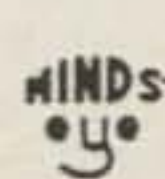
### Wrapping It Up

That's all my Commodore 128 could write for this month! We've discussed guying dimensions and considerations, a handy antenna-length reference chart, some new antenna products, and some interesting software. We've also brought to the fore some interesting hamshack reading matter and delivered a couple of "short bursts." Next time, more timely antennas & accessories topics of interest. Tune in then.

73, Karl, W8FX

### "INSTANT" MORSE CODE

Beginners: Deliciously Easy  
Experts: Automatically Fast  
**CURLY CODE™ Manual only \$6.50**  
Guaranteed



Minds eye Publications, Dept. C-21  
Suite 115-199  
1350 Beverly Rd.  
McLean, VA 22101

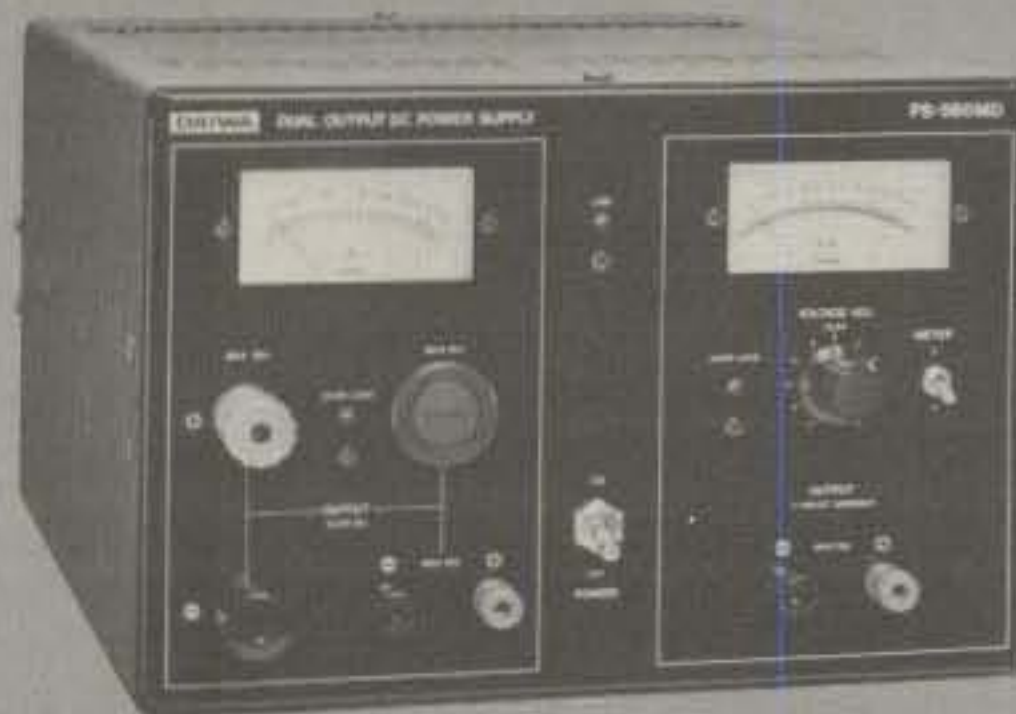
USE  
YOUR

F  
R  
E  
E

I  
N  
F  
O  
R  
M  
A  
T  
I  
O  
N

C  
A  
R  
D

## POWER SUPPLIES



**PS-560MD**  
Sub Outlets

IMAX 56A/ICONT 44A, 13.8V Fixed  
IMAX 10.6A/ICONT 10A, 1-15V Variable

Model	IMAX/ICONT	Output VDC
PS-51XM	5.6A/5A	9-15 Variable
PS-120M	12A/10A	3-15 Variable
PS-30XM	31A/24A	1-15 Variable
PS-560W	56A/44A (Low V) 28A/22A (High V)	3-15 Variable 6-30 Variable

Prices and specifications subject to change.  
All models and types not represented.



**DAIWA®**  
Electronics Corporation

1908A Del Amo Blvd. • Torrance, CA 90501 • (213) 212-6057

## INFO ON AMATEUR RADIO LICENSING

### *When Will I Get My New License Upgrade?*

**B**eing a VEC, hardly a week goes by when someone doesn't call and complain about waiting "nearly two months" and still no ticket. "Is something wrong?" This month let's look into what happens to your FCC Form 610 between the time you pass the needed "upgrade" examinations and receive the license.

After the test session is over, the volunteer examining team has a time limit of ten calendar days to forward the applications (FCC Form 610's) and session papers to the *Volunteer Examiner Coordinator* (VEC). It is not just a case of stuffing the applications in an envelope. The VE team must be certain administrative procedures have been followed. The application must have a previous license attached—sometimes a previous *Certificate of Completion* if code credit is claimed. The test papers must also be submitted to the VEC. Reports must be completed.

Not every VE handles this promptly. Remember this is a "volunteer program" and other things sometimes must take priority. The VEC acts as the administrative link between the testing team and the government. They will look over the paperwork to be sure that everything is in order and then authorize the FCC to issue the appropriate license. The VEC also has ten days to process the applications and forward them by mail to the FCC's licensing facility in Gettysburg, Pennsylvania. We mail Form 610s to the Commission every day.

So you can see, considering mail time, it can take up to a month just to get your application to the FCC. Actual license processing and issuance can take another three to six weeks depending upon the difficulties encountered. It is normal for an amateur radio operator upgrade license to take anywhere from five to nine weeks to be received by the applicant, although longer periods of time are not at all uncommon.

#### **The FCC Gets Your Application**

All amateur radio service related mail received by the FCC's amateur section in Gettysburg is sorted into one of 23 *different piles*! Some of these categories are applications concerning clubs, military recreation, RACES, aliens, new applications, renewals with and without changes, VEC program new/upgrade requests,

*National Volunteer Examiner Coordinator,  
P.O. Box 10101, Dallas, TX 75207*

new Novices, resubmitted applications, various types of modifications, cancellations, duplicates . . . You name it! *Every day* pounds and pounds of mail arrive in Gettysburg.

Some applications get handled faster than others. Amateur license renewals, changes of address, and requests for routine callsign change go directly to the *Automated Support Section* (data entry), and new licenses are usually issued within two to three weeks—sometimes faster depending on the workload in the "key-stroke department." General inquiries and other correspondence go to *Consumer Assistance* for a response. The *Returns and Research* section works on cancellations, duplicate licenses, reinstatements, and certain license modifications.

The two categories with which we are most concerned, new *Novice* applications and *VE/VEC program* upgrades, are handled by *Processors* who open and work each test session packet individually. "Problem" applications—ones that contain errors or missing information by the applicant or the VE team (that weren't caught by the VEC)—must be returned to the VEC or the applicant for correction. Blank items, items answered incorrectly, and licenses not attached normally add two weeks *or more* to the processing time.

The license data is output on transfer tape after being "keystroked" into a terminal. The tape used to be driven by courier to Washington for comparison with the FCC's "master file" data base. It is now transferred over the telephone lines (via a modem) to the FCC in Washington. It gets returned the following day. While in Washington, the license data is run (compared) against the FCC's "master file," checking callsign, name, and class on the modifications, renewals, and upgrades. If the information agrees, a license will be printed. Discrepancies are posted to an "error list" for further research. Many applications hit the error list, often for insignificant reasons. (Sometimes the FCC has "instructed" the computer not to issue an amateur license or upgrade to an individual because of a past compliance situation.)

Licenses are printed in Gettysburg weekly, usually on a Tuesday. They are printed on long multi-paged computer paper sets—already in the mailing "envelope"—in just a few seconds. After the week's run is complete, they are given to

the General Radio Branch supervisor for checking. The Mail Unit sends the new license to you. Hopefully you'll get it—that is, if you haven't moved during the period between test taking and license delivery, which is another problem. The FCC always has many "returned" licenses on hand!

The FCC in Gettysburg generates an *Authorization Request/Disposal Report* for the many services for which it issues licenses. This *speed of service report* can be very misleading in that it only reflects time taken for routine processing such as renewals without change, callsign changes—and time taken to dispose of an application which could even be the return of an FCC Form 610/Application for clarification or further information to the applicant. The "Speed of Service" report does not cover Novice and VE system upgrade exams, and applications that are defective.

So you can see that there are many variables to processing an amateur radio operator license. It all depends on how long it took to go through the VEC system, on errors and omissions made by the applicant or by the VEC. Assuming routine handling by the VEC team and no problems, you should have your upgrade license within a couple of months. But it isn't at all unusual for it to take longer. By far the most common reason for a delay is a mistake by the applicant!

You should contact your VE team leader if you do not have your upgrade license within 12 weeks of examination administration. Under no circumstances should you contact the VE team (or VEC) if less than 60 days have transpired. At the three-month point it legally can be considered as "lost" and action initiated to find or reconstruct the original application. Every VEC keeps records of all examinations taken and passed, and application reconstruction can easily be accomplished. It doesn't happen often, but it has happened.

#### **Multiple Applications**

A copy of your most recent license must be attached to all applications. In this day of "no waiting" to take and pass examinations, many applicants have more than one application awaiting license issuance—often at different VECs! It is not unusual for many months to pass before the licensing catches up with your test taking. You can upgrade

without having your most recent license in your possession, but the VEC can't submit your application to the FCC without it being attached to the reverse side.

As long as you have an "upgrade certificate," you can take the next more difficult examination. If you upgrade further, the VEC will write to you advising that they are holding your application at the VEC office until you send them a copy of your previous license. Your application then goes into a "hold" file. The VEC attaches it to the back of your 610 when received from you and sends it on. License issuance without your most recent license in your possession necessarily takes a lot of time.

The system works, however. You just have to be patient and understanding. It makes little sense to contact a VE, VEC, or the FCC regarding non-receipt of your license too soon after you have taken an examination. It only causes further delays, since time must be taken to respond to your inquiry. Your "upgrade certificate" allows you to operate for a full year with the rights and privileges of your new class. There is really no reason to push the panic button.

Having been to Gettysburg and witnessed the actual processing and issuance of amateur licenses, I can tell you that they do a terrific job. There are applications everywhere. It is not unusual for 10,000 applications to be in some stage of processing at any one time.

If you inquire as to whether the FCC has your license you will probably be told that they have "no record" of it, and they usually don't. They only have a "record" once the data is input into the system. That frequently takes a while.

## How To Save Time

A hint on how to save some license processing time: Take as many examinations as you can at one time! Novice applications can be held by the applicant or VE until the Element 3 (Technician) examination is passed. This eliminates the wait needed to receive a Novice license before upgrading further. A couple of months can be saved getting the Technician license!

Another way to save time—a lot of time—is to be accurate when you fill out the application. Your 610 will be pulled out of line if you forget something or make a mistake. Write legibly. You would not believe the poor handwriting that appears on FCC Form 610 applications! If we can't read it, neither can the data entry clerk.

A misspelled name and your application hits the "error list" when it is compared with the FCC's master file in Washington. More time lost. We encourage all VE teams to place maximum emphasis on the proper completion of the application. Something as simple as forgetting to

check a routine box can cost you weeks of time.

## From The Mailbag

Every month we try to answer general-interest questions that readers have submitted.

**What are the chances of ever having a no-code amateur license?** This question keeps reoccurring. Those in favor of retaining a code-type entry into the Amateur Radio Service feel that the code requirement serves many purposes. Besides being a low-cost communications method, code proficiency takes a certain amount of motivation and dedication. It isn't difficult to learn, and many feel that those who struggle to learn it are more serious about amateur radio and, accordingly, are better candidates than those who want something for nothing, and having obtained it easily, place little importance on it.

They point toward 11 meters as an example of a communications service with no entry requirements. The mail we get seems to indicate that presently licensed amateurs are more concerned with "who" and "how many" enter amateur radio than with code proficiency. The code requirement, they feel, controls "who" and "how many." Some object to entry requirements that are less than those they had to acquire to enter the service.

On the other hand, those who favor a codeless entry into amateur radio say that a larger pool of those interested in radio will exist under a code-free license. Many will go on and upgrade to the mainstream of amateur radio. They point to the boom years of CB radio, the late 1970s, as being responsible for the corresponding increase in the amateur ranks. Many code-free proponents have a digital interest, but it is in the marriage of computers and electronics, rather than Morse proficiency. Some would-be amateurs have trouble understanding

the necessity of learning something that they will not utilize and do not need on the spectrum they wish to operate.

It may be some time before we will see a totally code-free entry in U.S. amateur radio, although it appears Canada is seriously considering it since it has the backing of their two largest amateur groups, the Canadian Amateur Radio Federation and the Canadian Radio Relay League, formerly a division of the ARRL.

The FCC's Private Radio Bureau is on record as saying they will not introduce a code-free amateur license unless it has the support of the ARRL. The League, of course, represents amateurs who are basically opposed to code-free operation. The last time that the FCC proposed "no-code," it was vetoed by the Commissioners at the eleventh hour. The FCC had even already programmed their computers in Gettysburg to issue *Communicator* licenses!

The Commission's long-range-thinking department, the *Office of Plans and Policy*, said in a recent *working paper* that "The FCC should insure that amateur examination elements are appropriate to the types of operation that would be performed by the licensee. There have been many complaints over the years that Morse code proficiency requirements have constituted an unnecessary and artificial impediment to fuller use of the Amateur Radio Service."

**How is the new VEC program progressing?** It is going very well. So well, in fact, that the FCC is thinking about proposing legislation to Congress which would enable the Commission to delegate responsibility for preparing and administering all *commercial radio operator examinations*.

There are currently six types of commercial radio operator licenses and two types of endorsements issued by the FCC. The Commission issued a *Notice of Inquiry* in September asking for public comments on whether to allow a private

**TAKE A LOOK AT THIS...**

A New  
**HAM RADIO STORE**  
in  
**PENNSYLVANIA**

**NORTHEAST ELECTRONICS SUPPLY CO., INC.**  
WHITEHALL, PENNSYLVANIA  
(40 miles north of Philadelphia)

**DICOM**  
We have what you need at the prices you want!

**TEN-TEC**

**YAESU**  
Guaranteed Repair Service

**VISA** **MasterCard** **TeleCheck**

146.745 2m Repeater  
**W3GQQ, WB3EAN**  
**Bob & Diane Jones**  
1952 MacArthur Road  
215-820-0112



**CONTACT YOUR DEALER  
FOR MORE INFORMATION**

Amateur Radio Baluns-  
Traps-Remote Coaxial Switches  
Or Write To:

**UNADILLA DIV. of ANTENNA'S ETC.**  
P.O. Box 215 BV ANDOVER, MA. 01810  
617-475-7831

## The Mean Little Kit



New compact 24-piece kit of electronic tools for engineers, scientists, technicians, students, executives. Includes 7 sizes screwdrivers, adjustable wrench, 2 pair pliers, wire stripper, knife, alignment tool, stainless rule, hex-key set, scissors, 2 flexible files, burnisher, miniature soldering iron, solder aid, coil of solder and desoldering braid. Highest quality padded zipper case, 6 x 9 x 1 3/4" inside. Satisfaction guaranteed. Send check, company purchase order or charge Visa or Mastercharge. We pay the shipping charges.

JTK-6 Tool Kit ..... \$88.00

### Free Catalog!

Page after page of hard-to-find precision tools. Also contains complete line of tool kits and tool cases. Send for your free copy today!



**JENSEN TOOLS INC.**

7815 South 46th St., Phoenix, AZ 85044  
Phone: 602-968-6241 TWX: 910-950-0115

CIRCLE 33 ON READER SERVICE CARD

### MOBILE RADIO MOUNTS

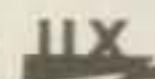
MM 10013

MM 1007



- Government • Industrial
- Commercial • Recreational

All New 1987 Y-5 Catalog FREE



IIX Equipment Ltd.

P.O. Box 9 Oaklawn, IL 60456 (312) 423-0605

CIRCLE 62 ON READER SERVICE CARD

### \*\*\*\*\*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 HOURS

FOR FREE CATALOG ONLY 1-800-345-8927  
FOR ALL INFORMATION 1-818-716-5914

**PACIFIC CABLE CO. INC.**

7325 1/2 RESEDA BLVD., DEPT. 920  
RESEDA, CA 91335

CIRCLE 168 ON READER SERVICE CARD

License Class	Min. Age	Written Test	Can be Given by	Code Test	Can be Given by
Novice	18	Element 2	General	5 wpm	General
Technician	18	Element 3	Advanced	None	
General	18	None		13 wpm	Extra
Advanced	18	Element 4A	Extra	None	
Extra	18	Element 4B	Extra	20 wpm	Extra

Table 1- VEC testing guidelines.

organization to collect fees from applicants to offset administrative costs and whether the administration of commercial radio operator examinations by the private sector would violate any domestic or international regulations.

The FCC also said that the privatization of commercial radio operator examinations may result in "more contemporary examinations, more flexibility to meet public demands for increased geographic availability and more frequent exams as often as needed."

The Commission is also concerned that reduced resources and personnel cutbacks would limit the FCC's future ability to adequately revise and update commercial radio operator examinations. The same justification existed in 1982 when Congress enabled the FCC to use volunteers to administer amateur radio service examinations.

**Will I be able to select an amateur callsign of my choice?** A procedure is currently under consideration by the FCC that will allow currently licensed amateurs to apply to the ARRL for a secondary callsign of your choice. The primary callsign will continue to be assigned by the FCC. Under the proposal, the League will be able to issue you a specific callsign and must provide the FCC with this information so that they can relate the secondary callsign to your primary one.

The callsign of your choice won't be free. We hear a "cost recovery" figure of \$20 to \$30 being talked about. There will be an implementation period when certain initial requests for specific callsigns can be honored. Then it will be opened to the general amateur public. Guidelines for the new program are being worked on now by the Commission.

The program will offer an opportunity for amateurs to obtain "memorial" callsigns, previously held calls, "special event" callsigns, and the like. The possibility of this happening is very good since it has the support of both the ARRL and the FCC.

**What are the requirements to be a Volunteer Examiner?** Remember that there are two different volunteer programs: the Novice program and the Technician through Extra class level VE program. Novice VE's do not have to be accredited, while VE's for the Technician and higher are accredited by a VEC. (See Table I.)

In all cases VE's cannot be related to applicants being tested, must never have had their amateur license suspended or revoked, nor can they own a significant interest in or be an employee of any firm in the amateur equipment or license preparation business.

Novice written and code examinations are designed by the VE. At present Technician through Extra class written examinations are designed by the VEC, although the FCC is in the process of also allowing VEs to design the examinations. The question pools, presently determined by the FCC, are to be turned over to the various VECs to maintain and revise as they feel necessary.

When this happens, all license classes will operate in pretty much the same way. That is, a certain number of questions will be selected by volunteer examiners for the written examination. The answers to the written examinations are the responsibility of the VE and can be required to be in essay, true/false, multiple-choice, or other formats.

Code tests are now the complete responsibility of the VE and can be given in any number of ways, including fill in the blank, one minute solid copy, true/false, or multiple choice.

Realistically, however, I doubt that the applicant will see little change in the way amateur examinations are administered. I expect that all VECs will still provide the answers and answer formats to their VEs. They won't be required to use them, however, but most will in the interest of harmony, standardization, and ease of conducting a test session.

The W5YI-VEC program is the second largest volunteer examining operation. At present we are conducting about 100 (Technician and higher) test sessions a month. Write to us for a VE application if you are an Extra class amateur and would like to know more about how you or your group can conduct periodic test sessions. We don't accredit Advanced class VEs since only the Extra class VE can administer any of the code examinations above the Novice level.

We offer fastest VE accreditation, complete instructions, and immediate testing with testing fees (expense reimbursement) shared with the VE team. (Write to: W5YI-VEC, P.O. Box 10101, Dallas, TX 75207.)



## NEWS OF CERTIFICATE AND AWARD COLLECTING

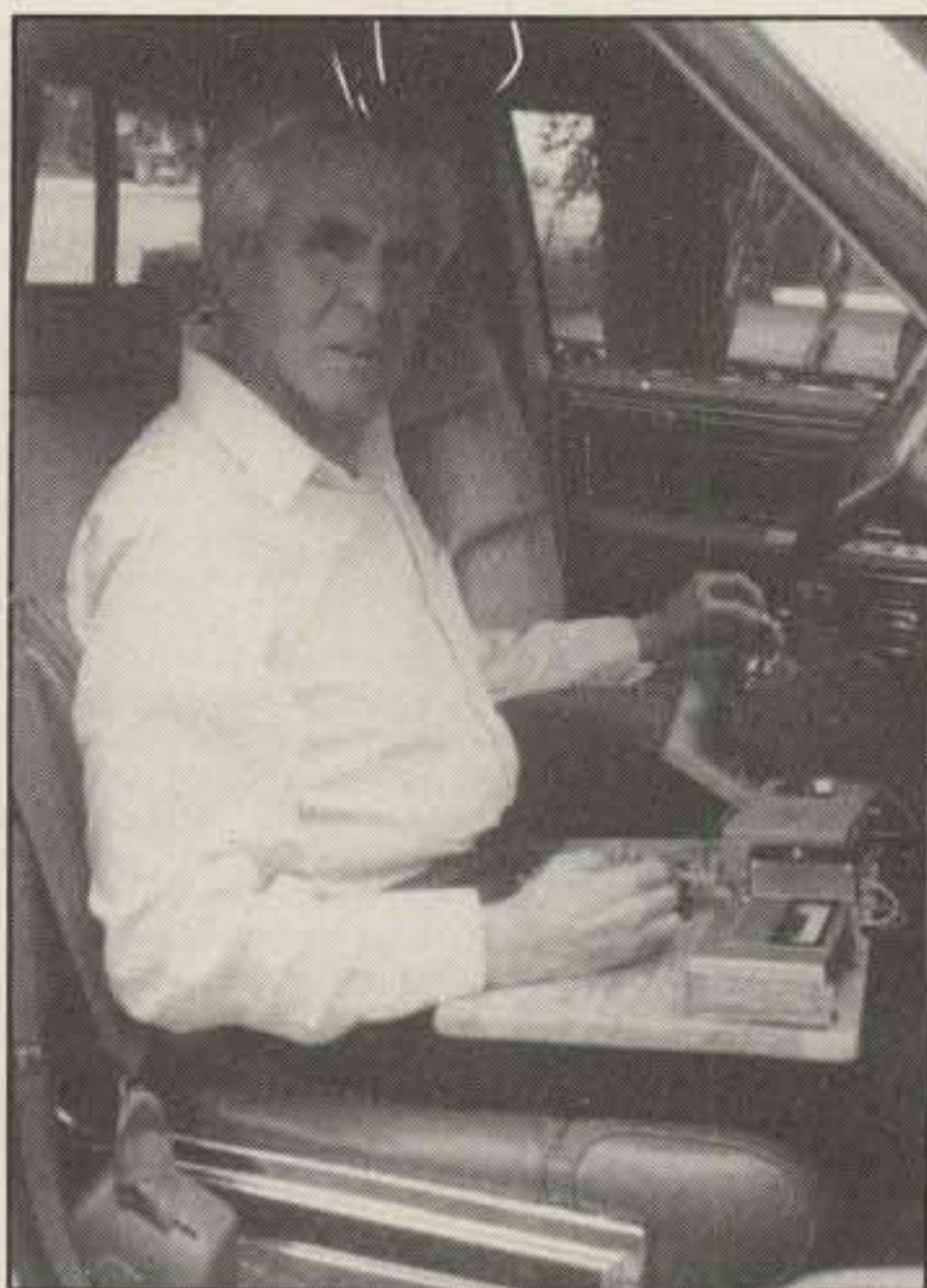
The Story of the Month for January is:

**Ed A. Sanders, WA6VJP  
USA-CA All Counties #500,  
All CW, 9-11-85**

"When I started in amateur radio, I had no idea that I would be county hunting; in fact, at that time, it was non-existent. I had been chasing DX several years and had received several awards. One day, while looking through the Amateur Radio Awards booklet, I came across the USA-CA Award. That's when it started.

"Amateur Radio, for me, started at the age of 10 in Los Angeles, California where I was born on June 30, 1924. A neighbor who happened to be a ham took me under his wing and taught me basic radio and Morse code. I was well underway towards a license. However, our family moved to another part of the city, and unfortunately I did not pursue this venture further. I did, however, continue building the inevitable crystal radios and other items, and it was not until years later that I was to take advantage of this newly acquired knowledge.

"Then came World War II. I served in the U.S. Army Infantry in World War II and later in Korea. It was in the early months of the war in Korea that I was hit by a Chinese hand grenade, while a Military Advisor to First ROK BTN of the Sixth Div. (K MAG). I was totally blinded. The next two years found me in and out of military hospitals and rehabilitation centers. It was in one of these rehab centers, Hines VA Hospital in Maywood, Illinois, that I met Sally Lou O'Kelly. The whirlwind courtship followed, we were married in 1953 and settled down in Elmhurst, Illinois (DuPage County). After we started our family, I took up the interest I had earlier in amateur radio. I went to night school at Willowbrook High School in Villa Park for Radio Theory and Morse code. Six weeks later, in January 1960, I had my Novice ticket, KN9VGO. My first rig was a Knight T-50 Transmitter and Hammarlund HQ-170 Receiver. I found myself on the roof of our new house stringing up a 40 meter dipole. Shortly thereafter, I got my General Class license, K9VGO. In 1961 our family had grown to five when we moved to my present location, Oxnard, California. I transferred to the Naval Base at Point Mugu, California. My new call was now WA6VJP. It was here that I



*Ed Sanders, WA6VJP, USA-CA All Counties #500, 9-11-85, at the operating position of his fine mobile station.*

became very active in amateur radio. I joined the Ventura County Amateur Radio Association, RACES, and the Pt. Mugu Amateur Radio Emergency Service Net. In addition, I became very active in the Southern California Net of the National Traffic Service. (Note: By this time my code speed was well into 20 WPM and it was the SCN/NTS that greatly improved my code speed both receiving and sending. I highly recommend this mode of operation for any who want to increase their code speed.)

"I then got involved with Boy Scouts of America and became Scoutmaster of local Troop 205. Sally and I were both very proud when our two older sons, John and Wayne, became Eagle Scouts and also received the God and Country Award. Then later I set up and became custodian of Explorer Post 2202, WA6UOW, as an associate advisor. We also set up the amateur radio station at the Santa Clara High School in Oxnard and became custodian of WB6OTK. I headed several classes of code and theory and FCC rules and regulations for the purpose of qualifying individuals for their licenses. A feeling of gratification came when I administered Novice exams to three young blind applicants after having taught them code and theory.

After this came years of Field Day operations, Emergency drills, message traffic handling during the Alaskan earthquake, California fires, midwest floods,



*Ed Sanders, WA6VJP, with (future amateur ???) grandson, John.*

and other emergencies. As manager of the Handicap Program at Pacific Missile Test Center at Point Mugu, California, I set up a radio station for the IAUE (International Abilities Unlimited Expo) at the Convention Center, Los Angeles. The station demonstrated all the possibilities of amateur radio operation for individuals with handicaps at all levels. Also set up, on an annual basis, was the same radio station at the Air Show at PMTC Navy Base, Point Mugu, California. Some of the equipment used was provided by the Handi-Ham Organization. I was now embracing the concept of amateur radio as a public service. This eventually led to county hunting. I must add at this time that not even receiving the prestigious DXCC Award gave me the sense of accomplishment that USA-CA did when I received #500, dated 9/11/85. A good definition for DXCC versus county hunting is: "DXCC is every man for himself against all others plus adverse band and atmospheric conditions, where county hunting is all those involved helping each other accomplish the final goal of USA-CA in spite of conditions, QRM, and other factors—i.e., Woodpecker, Cricket, RTTY, AMTOR, etc.

"I was introduced to county hunting the last week in January 1983 by Russ, KU9G, then N9AUZ. I got my first county shortly thereafter in Indiana from Scott, N9AG, and completed my first 500 in Louisiana from N5QQ, Bob. My last county was acquired from Woody, N0CYB, in Oceana County, Michigan on 8/24/85. At this time I want to extend thanks to all those county hunters who made it possible to achieve my USA-CA #500. This includes, of course, the mobiles and also the net controls (both fixed and mobile)

333 South Lincoln Ave., Mundelein, IL 60060

who are a tremendous help. Thanks also to all the fixed stations who are always ready to assist with information to the mobilers and the NCS. And while on the subject of net control, I feel that I am speaking for all mobilers, as one of the most vital roles in county hunting is that played by the NCS. Mobiling is difficult enough without having a net control for assistance and as the name implies, controlling the net. It must be noted here that a special thanks is due to the mobiler who takes over the net when there is no net control available. I would like to take this opportunity to ask all of you to get involved in this very necessary process toward the ultimate goal of USA-CA.

"For many of you, a good feeling is achieved when you put a face together with a station call. This is accomplished at our annual and mini conventions. As you can well imagine, with me it's the linking of a voice with the call letters. But in either case, this is the time when camaraderie is at its peak. These conventions foster a great sense of friendship and provide a way of promoting the amateur radio fraternity. My first convention was in Kansas City; I had a great time there and also in Coeur d'Alene, Idaho. I am looking forward to the next one.

"The epitome of county hunting for me came when I went mobile for the first time. Since then Sal and I have operated mobile in Arizona and California, all counties, and in the northwestern states. We were also able to run counties on our way to and from the convention in Asheville, North Carolina. I can say, without reservation, that county hunting is the most enjoyable part of amateur radio, and a great deal of this enjoyment is brought about because my XYL has become part of the team and enjoys it as much as I do. I can honestly say that without Sal county hunting for me would be virtually impossible."

(Ed. note: Ed's modesty tempers his story. I know from other sources that his accomplishments since that fateful day in 1951 can be an inspiration to us all: more than 14 years a machinist; 10 years an inspector of precision machine parts; six years a Scout Master; professional musician; author of "The Blind Inspector," used by state rehabilitation departments and American Foundation for the Blind; recipient of state and local awards for public service, as well as the national John T. Fogarty Public Person of the Year Award.)

### Awards Issued

Tom Ross, K9GTQ, added the following endorsements to his already impressive array of accomplishments, all dated 9-20-86: Class 3000 #279, All 75M, All SSB; All Counties #250, All 75M, All SSB; and First Operator, All Counties Two Bands, All SSB.

Bob Kemp, WA4CHI, worked that elusive "last one" and qualified for USA-CA

### USA-CA Special Honor Roll Robert A. Kemp, WA4CHI All Counties -520, All SSB, 9-15-86

#### USA-CA Honor Roll

3000		1000	
WA4CHI	552	K4MF	936
		WA4CHI	937
2500		500	
WA4CHI	618	K4MF	2126
		NT7R	2127
		T10RC	2128
KF5AT	678	T14BGA	2129
WA4CHI	679	JA9CWJ	2130
		KM3D	2131
1500		AA4SL	2132
WA4CHI	764	WA6OCI	2133

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

All Counties #520, USA-CA 3000 #552, USA-CA 2500 #618, USA-CA 2000 #679, USA-CA 1500 #764, and USA-CA 1000 #936, 9-15-86, All SSB. Bob also added 40M, All Mobile, endorsements to his Class 500 #1095 and Class 1000 #937, 9-15-86.

Joe Chambers, KF5AT, claimed USA-CA 2000 #678, 9-4-86, Mixed, and added another gold seal to his certificate.

Gary Fowks, K4MF, received USA-CA 500 #2126 and USA-CA 1000 #936, 9-2-86, All CW.

USA-CA 500 Certificates went to:

Gary Fowks, K4MF, USA-CA 500 #2126, 9-2-86, All CW.

O. Brian Schreen, NT7R, USA-CA 500 #2127, 9-8-86, All CW.

R.C. de Costa Rica, T10RC, USA-CA 500 #2128, 9-12-86, Mixed.

Bengt Hallden, T14BGA, USA-CA 500 #2129, 9-12-86, All CW.

Yoshiharu Katada, JA9CWJ, USA-CA 500 #2130, 9-22-86, all CW, first to JA9-land.

Harry Bump, KM3D, USA-CA 500 #2131, 9-22-86, All CW.

Jim Briles, AA4SL, USA-CA 500 #2132, 9-24-86, Mixed.

Adam Quandt, WA6OCI, USA-CA 500 #2133, 9-25-86, All 20M, SSB, Mobile.

### Awards Available

**The Filipinas Award.** The Filipinas Award is a beautiful two-in-one award available to all licensed radio amateurs and short-wave listeners except those in the Philippines. Contacts may be on single mode or mixed mode, single band or mixed band. Applicant can apply for either (WADU or 5BWDU) or both. The rules are as follows.

**WADU Award.** Applicant must have



The Filipinas Award, offered by the Philippine Amateur Radio Association.

worked or heard and confirmed each of the nine Philippine districts. Any missed district may be substituted with a club station (DX prefix), but no more than two.

**5BWDU Award.** Applicant must have worked or heard and confirmed Philippines on five bands.

**Requirements:** Have log extract certified by two licensed amateurs holding General class or above, by a national-level radio organization or its affiliated club. Send certified log extract to Robin U. Go, DU9RG, Award Custodian, P.O. Box 125, Cotabato City 3901, Philippines. The fee is US \$10.00. It is suggested that applications be sent via registered airmail. The award will likewise be sent via registered airmail.



The Tel-Aviv Award, presented by the Tel-Aviv Jaffa chapter of the Israel Amateur Radio Club and the Mayor of Tel-Aviv Jaffa.

**Tel-Aviv Award.** The award is available to licensed amateurs and SWLs. Contacts on or after January 1, 1984 are valid. Do not send QSL cards. A list showing full details of the contacts should be certified by the awards manager or two amateurs. The fee is \$3 or DM.8 or Pounds 2. The address for applications is Shlomo Mussali, 4X6LM, Postbox 8225, Tel Aviv 61081, Israel.

**Rules:** Contacts with stations in Tel Aviv—Jaffa only. All bands, all modes may be used. Contacts with same station and different bands are permissible.

**Requirements:** Minimum of 10 points. Contacts with 4X75TA count as 10 points. Contacts with station from Jaffa or sta-

tion with special callsign such as 4X5, 4X38, or 4X85 and others count as 5 points. Other stations—one point.

**The WNYDXA Award.** The WNYDXA Award is available to any amateur station who has established two-way communications with a total of six different members of the Western New York DX Association dated June 10, 1984 or later. The con-



The WNYDXA Award given by the Western New York DX Association.

tacts may be on any HF band or mode, or satellite. A standard GCR list is required (log information will be checked by the award manager). The cost of the award is 4 IRC's or the equivalent in U.S. funds to help defray the cost of printing and postage. This award may also be given gratis

to stations judged deserving by general consensus of the membership.

*Present Roster (15 September 86):* K2CBM, GKM, IGW, LCT, UD, ZL; KA2AJT, CJS, DWV, KPB, VYW, WIK; N2AC, BJX, CJT; W2FXA, ICZ, KKZ, QWS, SSC; WA2AOG, CYQ, DSC, ECA, EKW, HZO, JBV, LYF, MBM, PYT, SON; WB2ABD, CJL, EZU, GTB, IVO, UQA, YQH; VE3GQ, HO, KYL, OIT; W9BM. Club Station: W2RR.

Send application and funds to: WNYDXA Awards Manager, Paul T. Antos, WB2ABD, 170 Maple Ave., Blasdell, NY 14219 USA.

**Diplome des Villes Francaises (French Towns Award).** This new award is distributed by U.R.C. (Union des Radio-Clubs). The D.V.C. is available to all licensed radio amateur and SWL stations being able to prove their contacts or listening with different French stations which have their QTH in the main town of the departement.

In each departement the importance of the town was chosen according to the number of stations having a radio amateur callsign. To be valid, a station must have its QTH in the town of the list below. The QTH of fringe towns doesn't count. One station in /P or /M in a town of the list counts. The name of the town must be written clearly on the QSL card.

QSL cards from SWLs count as much

as the ones from licensed amateur stations.

There is no restriction in band or mode allowed in the radio amateur service.



Diplome des Villes Francaises distributed by U.R.C. (Union des Radio-Clubs).

The award is issued in 5 classes: Class III confirmation of 10 different towns; Class II confirmation of 30 different towns; Class I confirmation of 50 different towns; Class Excellence confirmation of 70 different towns; and Class Honor confirmation of 90 different towns.

Contacts on or after January 1, 1968 are valid. Send no QSL cards, only GRC list and fee of 35FF or \$5 or 10 IRCs to the Awards Manager, FE6FNA, Lehembre J-

## MIRAGE /KLM

### ANTENNA POLARITY SWITCHER MODEL APS-1

The APS-1 is a self-contained control head designed to allow remote polarity switching of circular antennas such as the Mirage/KLM range of crossed yagis.



The APS-1 may be powered by the power adaptor (included) or may alternately be powered from a vehicle or other 13-17 VDC source.

In addition to switchable outputs for two antennas, the APS-1 also contains a 6-13 volt regulated DC power supply. This feature is designed for powering items such as preamplifiers, VHF/UHF converters, etc., but may also be used whenever a low-current stabilized variable voltage source is required.

#### SPECIFICATIONS:

Power Requirement (AC) ..... 117V ± 10% AC 50/60 Hz 15 Watt

Power Requirement (DC) ..... 11-16 VDC 500 mA

Outputs ..... Two 12 VDC unregulated, switched (antenna relay supply).  
One 6-13 VDC variable regulated auxiliary supply.

Total output current 500 mA with AC transformer that is included, 1 amp with optional high current transformer or external DC supply. This unit has our popular five (5) year warranty.

P.O. BOX 1000

MORGAN HILL, CALIFORNIA 95037

(408) 779-7363

CIRCLE 7 ON READER SERVICE CARD

Pierre, 8 rue de Verdun, 77270 Villeparisis, France.

Valid towns are (The first figures are the department number. It is on the zip codes on French QSL cards.): 01, Bourg en Bresse; 02, Soissons; 03, Montluçon; 04, Manosque; 05, Gap; 06, Nice; 07, Bourg St Andeole; 08, Charleville Mezieres; 09, Foix; 10, Troyes; 11, Carcassonne; 12, Millau; 13, Marseille; 14, Caen; 15, Aurillac; 16, Angoulême; 17, La Rochelle; 18, Bourges; 19, Brive la Gaillarde; 2A, Ajaccio; 2B, Bastia; 21, Dijon; 22, St. Briec; 23, Gueret; 24, Périgueux; 25, Besançon; 26, Montellimar; 27, Evreux; 28, Chartres; 29, Brest; 30, Nîmes; 31,

Toulouse; 32, Vic Fezensac; 33, Bordeaux; 34, Montpellier; 35, Rennes; 36, Chateauroux; 37, Tours; 38, Grenoble; 39, Lons le Saulnier; 40, Mont de Marsan; 41, Blois; 42, St Etienne; 43, Le Puy; 44, Nantes; 45, Orleans; 46, Cahors; 47, Agen; 48, Mende; 49, Cholet; 50, Granville; 51, Reims; 52, Chaumont; 53, Laval; 54, Nancy; 55, Verdun; 56, Vannes; 57, Metz; 58, Nevers; 59, Lille; 60, Beauvais; 61, Alençon; 62, Calais; 63, Clermont Ferrant; 64, Pau; 65, Tarbes; 66, Perpignan; 67, Strasbourg; 68, Mulhouse; 69, Lyon; 70, Vesoul; 71, Chalon sur Saone; 72, Le Mans; 73, Chambéry; 74, Annecy; 75, Paris; 76, Le Havre; 77, Melun; 78, Versailles; 79, Niort; 80, Amiens; 81, Castres; 82, Montauban; 83, Tou-

### GIVE YOUR EARS A BREAK!



### AUTO-KALL AK-10

The AUTO-KALL AK-10 is a DTMF selective calling unit. It connects to the external speaker jack on your VHF/UHF FM transceiver, scanner, etc. Your speaker remains silent until someone sends your personal 3-digit Touch-Tone® code. That means you (and the XYL!) don't have to listen to all the chatter all the time. But if someone wants to reach you they can. Great for families with two or more hams, activation of emergency nets, etc.

- Assembled and ready to use • Set your personal code in seconds with small rotary switches. No jumpers to solder • Speaker resets automatically to silent-standby and leaves red LED on to let you know someone called if you were away from the rig • 8-15 VDC CMOS circuitry provides for low current operation • Built-in speaker. External speaker jack also provided • Measures only 1 1/4 x 3 x 5 1/2 inches • Decodes all 16 digits

**Motron Electronics**  
695 W 21st  
Eugene, OR 97405  
503-687-2118



**AUTO-KALL AK-10**  
**\$89.95** Plus \$3.00 shipping/handling  
117 VAC power supply and audio patch-card included.

CIRCLE 38 ON READER SERVICE CARD



### 1-800-433-WIRE

FOR ALL AMATEUR WIRE & CABLE  
Belden & Equivalent  
(803) 895-4195 (SC & Ragchew)

**CERTIFIED COMMUNICATIONS**  
PITTMAN ROAD, ROUTE 2, LANDRUM, SC 29356

**Q:** Do you check the actual operating frequency of your rigs from time to time using a good frequency counter?

**A:** A 500 MHz pocket frequency counter, with 4 digits (switchable to 6) only \$49.95.  
500 MHz handheld frequency counter, 7 big digits \$79.95.

**Q:** Do your rigs copy the really weak signals????

**A:** PA-19 Preamp, 0.5 to 200 MHz, 19 db (10x) gain \$9.95.

**DIGITREX ELECTRONICS**  
division of NCI  
10073 North Maryann  
Northville, MI 48167

West Coast Distributor  
Ray Lukaszewicz  
(805) 497-2397  
Personal checks or money orders are accepted.  
Or call in a COD Phone 313-348-7313 NOW

CIRCLE 37 ON READER SERVICE CARD



For most Ham Rigs from:  
**KENWOOD • YAESU • HEATHKIT**  
Also Drake R-4C/7 Line, COLLINS 75S3-B/C  
and ICOM FL44A, FL52A, FL53A clones.

Finest 8-pole Construction  
**ALL POPULAR TYPES IN STOCK**  
**CW • SSB • AM**  
ASK ABOUT OUR MONTHLY  
**UNADVERTISED SPECIALS**

Phone for Information or to Order.  
VISA/MC or COD accepted  
Why risk disappointment? Buy time-tested Fox-Tango Filters to be sure!

### FOX-TANGO Corp.

Box 15944, W. Palm Bch, FL 33416  
Telephone: (305) 683-9587  
European Agent: INGOIMTEX, Post Fach 2449,  
D8070 Ingolstadt, West Germany

CIRCLE 68 ON READER SERVICE CARD

### MULTI-BAND SLOPERS

ALSO: DIPOLES & LIMITED-SPACE ANTENNAS

Outstanding performance of W9INN antennas is well known. Now enjoy multiband BIG-SIGNAL reports! Automatic bandswitching • Very low SWR • Coax feed • 3 kw power • Compact • FULLY ASSEMBLED to your specified center frequency each band • Easy to install • Very low profile • Complete instructions • Your personal check accepted

4-BAND SLOPER - 160, 80, 40, 30, or 20M	60 ft. long	\$ 48 ppd
3- " " " " " " " " " " " "	60 ft. " "	\$ 43 " "
2- " " " " " " " " " " " "	40 ft. " "	\$ 35 " "
3- " " NO-TRAP DIPOLE - 160, 80, 40M	113 ft. long	\$ 71 " "
2- " " " " " " " " " " " "	85 ft. " "	\$ 55 " "
9-BAND SPACE-SAVER DIPOLE - 160 thru 10M*	46 ft. long	\$ 88 ppd

\* Requires wide-range tuner (80, 40, 20, 15M without tuner)  
SEND SASE for complete details of these and other unique antennas  
W9INN ANTENNAS 312-394-3414  
BOX 393-Q MT. PROSPECT, IL 60056



The magazine for Computerist & Amateur Radio  
Your #1 source of Packet info.

"... received my moneys worth with just one issue"

—J. Trenbick

"... always stop to read CTM, even though most other magazines I receive (and write for) only get cursory examination..."

—Fred Blechman, K6UGT

U.S.A. \$18.00 for 1 year  
Mexico, Canada \$32.00  
Foreign \$43.00 (land) - \$68.00 (air)  
(U.S. funds only)  
Permanent (U.S. Subscription) \$150.00  
Sample Copy \$3.50

**CHET LAMBERT, W4WDR**  
1704 Sam Drive • Birmingham, AL 35235  
(205) 854-0271

CIRCLE 40 ON READER SERVICE CARD



John Verdegiglio, award manager of the Marco Polo DX Award, with his fiancée, Rosa, in Catanzara, Italy.

lon; 84, Avignon; 85, La Roche sur Yon; 86, Poitiers; 87, Limoges; 88, Epinal; 89, Auxerre; 90, Belfort; 91, Palaiseau; 92, Rueil Malmaison; 93, Montreuil; 94, Sucey en Brie; 95, Argenteuil; 971, Point a Pitre; 972, Fort de France; 973, Cayenne; 974, St Denis de la Reunion.

**Marshal Islands Special.** The Kwajalein ARC will operate KX6BU from 0600Z 31 January until 0600Z 9 February 1987 to commemorate the 43rd anniversary of the Battle of Kwajalein and Roi-Namur. Frequencies: SSB 14.250, 21.350, 28.550; CW 7.025, 14.050, 28.050. For \$6.00 KX6BU will issue a QSL, certificate, and 64-page book on the battles of Kwajalein and Roi-Namur. Three dollars (\$3.00) will bring the QSL and certificate. All requests should be sent to KX6BU, Box 444, APO San Francisco, 96555-0008.

**Marco Polo DX Award.** Starting January 1, 1987 the brass medal will be awarded to applicants submitting at least 125 points, instead of 110 points as of now.

Word has been received from Gianni Verdegiglio, 18QLI, award manager for the prestigious Marco Polo DX Award, sponsored by Associazione Radioamatori Italiani (and featured in CQ in May 1985), that it has been won by 251 DXers in 37 countries. Congratulations to all!

### Notes

Once again old man winter is closing his grip on this part of the world. I hope you are also enjoying the turn of the seasons in your part of the world, and that your new year is getting off to a good start.

73, Dorothy, WB9RCY

## NEWS OF COMMUNICATION AROUND THE WORLD

*I called and heard, and knew at last,  
 The How and Why of DX past,  
 And present and forevermore,  
 The eternal enigmas, cleft to the core . . . .*

**Y**ears back, even in another decade or two, we were advised by a Navy radio-man, Jim Hayes, whom we met in the basement of a Federal building, that "Knowledge is Power!" Then we thought he was talking about the bureaucracy upstairs. Years later we realized he was talking about DXing. Last week when one of the Locals came trudging up the hill through the end of a winter storm front from the Pacific, we remembered Jim and the late realization that came. The Local came looking for some way he could work more DX. When he left, we were hoping that he had learned what every true-blue DXer eventually must learn—that DX Knowledge is Power and has always been.

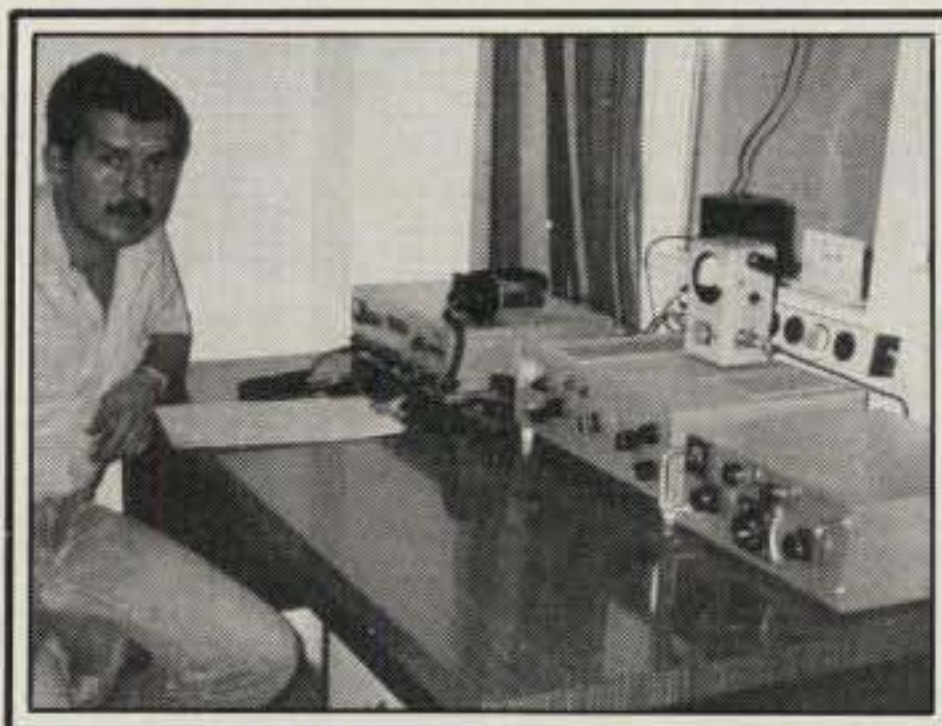
"I think I need help," this Local advised. "When I started DXing a couple of years back, I got the idea that DX was everywhere and always. Maybe it still is, but the DX I find these days is mostly repeats. Few that I work are good for new counters. Am I doing something wrong? What do you think?"

We really did not think he was doing anything wrong. He had done as many new DXers do by working them as they came. He found them in the CQ World-Wide Tests, in the spring WPX tests, by listening on the DX nets, and at times by catching some in mid-flight. Initially it seems that the supply of countries will be inexhaustible. But the abundance thins when one gets up around the 200 country mark, and while one may be confident in working anything he hears, the knowledge comes that you have to hear them to work them.

"Has anyone ever suggested to you," we asked, "that one need not know all the answers to be a DX expert, but rather one must know where to find the answers when needed?" The Local shook his head.

"That sounds right," he said, "but what has that to do with DXing?" It was the answer we had anticipated.

"More than you might think," we continued. "How many of the big-total, old-time DXers do you know who do not



*This is Ahmet Aybirtek, TA1P, at his operating position there in Istanbul. Ahmet works mostly CW and handles his own QSLing: P.O. Box 33, 34432 Istanbul, Turkey. Take a good look at his station, all homebrew, and possibly the first homebrew station in Turkey. Ahmet currently is using dipoles, but aims for better antennas in the future.*

watch things with the aid of a DX bulletin?" The Local quickly admitted that he could not name any. "What would I get there that I can't get from the DX columns in magazines and by just listening on the air?" It was hurting to plumb the depth of his ignorance.

"Suppose you need to work one for a new country and you can learn in advance that a station will be on from there. And suppose you know the band and the frequency it will be on, and probably the time it will be operating as well. What would you do?" The Local smiled.

"For sure I would be waiting at the pass," he told us. "And if I hear them, I'll work them. But why do you ask?"

We thought that the answer for the questions was obvious. DX bulletins are specialized information for the DXer pointing to what may be coming shortly and noting what is being worked, and filled with relevant information for the DXer. "You will have to understand," we explained, "that once past the easy DX countries your need for early and definite information will grow. The more your DXCC total, the more you need a DX bulletin. And when they tell you that a station was on last week from a country you need and the operator was scratching for calls, you will really understand that those DXers who know are the DXers who work them. There is no solace when you learn that DX ignorance is not bliss but a tragedy. That's why you need a DX bulletin." We were getting the feeling that the Local was hearing our words, but was not yet quite convinced.

"Tell me more," he suggested. "Which bulletin is the best?" We had expected such a question and quickly re-

plied, "The best bulletin for you is the DX bulletin that you think is best for you." We also quickly realized that there was hardly any doubt that we had taken a backwards step from the universal understanding this one sought. A faraway look lingered in his eyes. About this time the Old Timer came wandering down the hill, obviously fretting from having been kept indoors by the several days of rain just ending. So we passed the question on to him: Which is the best DX bulletin? When the Old Timer speaks, Locals listen. We even listened ourselves.

The Old Timer said just what we expected. "All DX bulletins are good, and some are even better. But sometimes one is better to a DXer than others for a variety of reasons. Some bulletins arrange everything in alphabetical order by callsign, while others go to a narrative form. The alphabetical format is good if you save your bulletins for reference, but the narrative often goes into more detail. The alphabetical format often limits itself to one sheet, at times only one side of the sheet, while the narrative form may run to four or more pages. Some bulletins expand some issues to give more specific information on a DX subject, things like new countries being considered or background information on an upcoming effort to a highly needed DX location. But the thing to consider is how long after publication you can expect the information in your shack, and how extensive the effort is to gather DX news and to develop sources to supply news. And you might over a period of time try to gauge how accurate the information is." The Old Timer paused to ask the Local if he was understanding all of this. It sounded simple and logical to us. The Local had some questions.

"You mean that all the information may not be right?" he asked, and the Old Timer nodded. "There is always something popping up that may be a passing rumor, sometimes deliberately lofted, but some bulletins do seem to be able to sense that which is valid or run up a caution flag. However, some seem to print anything, possibly to retract or correct later. This is something to learn."

We found ourselves remembering more than one such incident in the past. Once we asked a bulletin editor how he handled it. "Some of the stories that come in just don't ring right," he told us. "Sometimes it is so far-fetched that it is easily recognized. Other times there are just little signs to warn you that something might be wrong. And sometimes they just slip by. When that happens, all

## The WPX Program Mixed

1234 ..... JI1MNT 1237 ..... KS3F  
1235 ..... IK5CXL 1238 ..... SV1UG  
1236 ..... K2NJ

### S.S.B.

1844 ..... IK2DZN 1847 ..... JR1BMU  
1845 ..... YC0BLO 1848 ..... T12LC  
1846 ..... HK8BVN 1849 ..... XE1JIW

### CW

2401 ..... JA9CWJ 2404 ..... DL1ZQ  
2402 ..... IK3DMK 2405 ..... VE3JFH  
2403 ..... NR5Q

### Endorsements

Mixed: 450 JI1MNT, IK5CXL, TF5BW, K2NJ, SV1UG, NK2M, 500 K2NJ, JI1MNT, IK5CXL, TF5BW, 550 JI1MNT, K2NJ, 600 K2NJ, 11EEW, 650 K2NJ, K6UXO, 11EEW, 700 K2NJ, 11EEW, 800 K2NJ, 11EEW, 850 K2NJ, 900 K2NJ, DF6EX, 950 K2NJ, DF6EX, 1000 K2NJ, DF6EX, 1050 K2NJ, N2AIF, DF6EX, 1100 K2NJ, WD4RAF, N2AIF, 1150 K2NJ, N2AIF, 1200 K2NJ, 1250 W5UR, 1300 W5UR, W6OUL, 1350 W5UR, 1400 W5UR, 1450 W5UR, I2MQP, 1500 W5UR, I2MQP, 1700 IN3ANE.

S.S.B.: 350 HK8BVN, JR1BMU, IT9ONV, IN3VZE, IK2AEO, 400 HK8BVN, KA9JOL, IT9ONV, IN3VZE, 450 TF5BW, HK8BVN, IT9ONV, IN3VZE, 500 HK8BVN, IT9ONV, HB9BVV, IN3VZE, 550 HK8BVN, IT9ONV, HB9BVV, IN3VZE, 600 HK8BVN, IT9ONV, HB9BVV, IN3VZE, 650 HK8BVN, KS3F, IT9ONV, N2AIF, HB9BVV, 700 HK8BVN, N2AIF, 11EEW, N2CIC, HB9BVV, 750 AC3T, W6OUL, 11EEW, 800 11EEW, 950 W5UR, 1000 W5UR, 1050 W5UR, 1100 N2AC, 1250 F6BVB, 1300 F6BVB, 1350 F6BVB, 1400 F6BVB, 1450 F6BVB, I2MQP, 1500 F6BVB, I2MQP, 1700 DJ6VM.

C.W.: 350 JA9CWJ, DL1ZQ, VE3JFH, KS3F, JJ1EMA, 400 JA9CWJ, DL1ZQ, VE3JFH, 450 JA9CWJ, 500 JA9CWJ, JA1OJZ, 550 JA9CWJ, G3VQO, PA3BEJ, K4MF, 600 JA9CWJ, PA3BEJ, K4MF, 550 JA9CWJ, K6UXO, 700 JA9CWJ, N4IB, 750 JA9CWJ, 800 JA9CWJ, 850 JA9CWJ, SM5DAC, N2AIF, 900 W5UR, W6OUL, N2AIF, 950 W5UR, 1000 W5UR, 1050 W5UR, 1100 W5UR, 1150 W5UR, 1550 K8MFO, 2000 W3ARK, 2050 W3ARK.

VPX Endorsement: 950 ... SM4-3434.

10 meters: DF6EX  
15 meters: DL9JI  
20 meters: DL9JI, DF6EX, HB9BVV, NK2W.  
40 meters: W5UR, N4IB.  
80 meters: HB9BVV

Asia: F6BVB, 11EEW  
Africa: F6BVB, 11EEW  
No. America: CX9CO, F6BVB, 11EEW  
So. America: F6BVB  
Europe: NK2W, DL1ZQ, KS3F, F6BVB  
Oceania: CX9CO, DF6EX

**Award of Excellence Holders:** OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMO, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YLW4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9HC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX.

**Award of Excellence Holders with 160 Meter Endorsement:** LU3YLW4, VE7WJ, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, W4VQ, K6JG, W4CRW, N4MM, SM0AJU, KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BUS, NN4Q, G4BUE.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

you can do is print the straight information when you know it and try to be a bit more wary the next time out." The Local had another question of his own.

"But DX bulletins have been around for a long time," he argued. "Certainly by now one must be acknowledged the



Takis Panageas, SV1VF, operated the special call SX1MBA aboard the Greek memorial Battleship Averof. If you worked SX1MBA, a certificate to mark the special event is available. SV1VF used an ICOM IC-730 with dipoles to work from the old warship.

best." The question was a good one, but the Old Timer just shook his head.

"DX bulletins are often sideline efforts by interested DXers," he said. "Some last longer than others, and some DX editors last longer than others. But there is a change always going on and changes in those who work in the trenches. The better the bulletin, the more the work usually, and even the most dedicated can tire. Thus, one should be acquainted with all the bulletins. Experience alone is probably the best judge. You will have to make up your own mind. One should not reject a new bulletin. One should also not be reluctant to abandon an old one. Their value to you as a DXer should be the salient point, but sometimes that is hard to explain. There often is a loyalty which is not easily shed."

By this time we were thinking that while every question would not be answered, certainly the Old Timer was giving the Local something to think over. If you subscribe to a DX bulletin, everything in the Old Timer's words is easily understood. But if you are still on the learning curve, you may still have some question. The Local did.

"Okay. How about some names? Tell me what you think I should be looking at to help get my DXCC totals up. Can you do that?" The Old Timer could and quickly did. He continued.

"Here in the states you should take a look at *Inside DX*, which is published by N2AU at 436 No. Geneva Street, Ithaca, NY 14850. You should also look at *The DX Bulletin* published by Chod Harris at 816 Fourth Street, Santa Rosa, CA 95404. Definitely you should look at *QRZ DX* published by W5KNE, and this one is at Box 834072, Richardson, TX 75083. There is an excellent VE publication; this is *Long Skip* published by the CANAD-X Assn. at Box 717, Station Q, Toronto, Canada M4T 2N7, this giving extensive coverage and lots of photos. And while *Westlink Report* is not entirely a DX publication, it does cover a lot of the DX scene and is un-

equaled for background and developing information on amateur matters. It is written by WA6ITF and published by The Poco Press, 1119 Allegheny Street, Sun Valley, CA 91352. Overall, there is no equal to this publication in my estimation. You should also take a look at *Worldradio* published at 2120 28th Street, Sacramento, CA 91352. This covers all aspects of amateur radio with a fine DX section."

The Local was busily writing all this down, and without raising his head, he asked at the first opportunity, "You think if I read all these bulletins I will know everything about DXing?" The Old Timer was not yet ready to get close to telling him that, only that he would be making progress in the right direction.

"What I've named might be considered the mainstream sources of DX information," he told the Local. "But you must also keep in mind other sources that are helpful such as the *QSL Manager's List* turned out by the O'Briens at Box 700, Rio Linda, CA 95673-0700, and be sure to get that zip code right. There is also a good JA-QSL publication put out by JH1HWN at No. 2 Kikyo-bldg 401, 2-1-1 Odai, Miyamae-ku, Kawasaki City, Kanagawa 213 Japan. This is in English, by the way. And certainly you already know about the Northern California DX Foundation."

The Local continued to take notes, but the wide scope of available DX information was obviously getting to him. "Guess that's about it," he ventured, but the Old Timer shook his head.

"Not yet," he said, "not quite yet. You might also keep in mind that there are DX organizations that are of value to DXers. You should be acquainted with Jim Smith's Heard Island DX Assn. at Box 90, Norfolk Island; the International DX Assn. at Box 363, Richardson, TX 75083; and the YASME Foundation at Box 2025, Castro Valley, CA 94546, this being the group with which the Colvins have long worked. There is also the DX Incorporated which issues the monthly *INC Spots* and which can be reached at P.O. Box 1082, LaGrange Park, IL 60525, as well as the International Amateur Radio Society, which you can learn about from Louis Ouren, K0LST, at 2702 East Wisconsin Avenue, Appleton, WI 54911. You might also remember to listen on Bill Bennett's W7PHO's Family Hour at 14225 kHz around 1500Z. Overseas you might check the DX Family Foundation at P.O. Box 12, Shinjukukita-Ochai, Tokyo 161, Japan. This group is quite active in Southeast Asia. In South America the Grupo Argentino de Radiotelegrafia at Carlos Diehl 2025, 1854 Longchamps, Buenos Aires, Argentina, can give you a lot of information about the Antarctica, but a knowledge of Spanish will be helpful.

By this time the Local was really struggling. "You mean I need to read all of these?" he asked, and the Old Timer shook his head. "Not really," he said.

## The WAZ Program

### 10 Meter Phone

309 ..... NW5K

### 15 Meter Phone

237 ..... JA7FS

### 20 Meter Phone

579 ..... JR1CV  
580 ..... SP6DVP

### 20 Meter CW

248 ..... JA1UPO  
249 ..... NW5K

### 40 Meter CW

59 ..... NW5K

### All Band WAZ SSB

3055 ..... K9MPR 3057 ..... YB5NOF  
3056 ..... G4XZX 3058 ..... I0DGB

### CW/Phone

5999 ..... 9Y4VU 6005 ..... W9SC (CW)  
6000 ..... IK0AZG 6006 ..... IS0MVE  
6001 ..... KY7M 6007 ..... KB1JU  
6002 ..... W0GAX 6008 ..... JF2WKE  
6003 ..... JA7TQK 6009 ..... JA2LA  
6004 ..... W9SC

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4 1/2 x 9 1/2 to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

"Maybe just learn to know about them and use the ones you find of some value. DX bulletins will cover most of the needed information. The others will augment it. What you use will be your decision."

The Local wasn't going to argue the point. In a short time he was gone down the hill, clutching his list. Possibly he was apprehensive that the Old Timer might remember a few more absolutely needed ones. Even we were reluctant for a bit to speak. We finally reminded the Old Timer about what Jim Hayes had said years back: "Knowledge is Power!" and how it applied to DXing. "Those in the know are always the ones who know," we said, adding our own bit of obtuseness, but the Old Timer was listening in another sector.

"I ran into Jim Hayes down at the village market last week," he said. "Jim says he's working 40 CW on a long-wire these days." Things were quiet for a moment, and then the Old Timer continued. "You know something? Anyone who works 40 CW must be all right, don't you think?" and we had to agree. After all, years back he had told us that "Knowledge is Power" and he had been right. Sooner or later most DXers learn just how right he was.

### Some Notes on Mt. Athos

Previously note has been made of the Mt. Athos effort scheduled for last August. More information has come in from Angelo Fronimos, SV1PL, on the matter. Angelo notes that



There has long been a DX fable that top DXers never leave home for fear of missing a new one. Don't you believe it! Here is Ralph Dage, W8PHZ, at the operating position of BY1QH at the Tsing-hua University club station in Beijing. Ralph was in China as a consultant on a new telecommunications network. He has a 358 DXCC total (the top!), and Ralph has been at the top for 15 years. Top DXers may leave home, but they never get far from an amateur station.

when word of the planned effort came, queries to the Greek authorities indicated that a license had been issued for "scientific research and observation of the sunspot cycle." There was some thinking that this did not constitute a DXpedition. Also, Greece has no reciprocity agreement with Italy, and the scientific license was an exception to usual licensing practices. Further queries and open speculation as to whether "5 x 9" reports really constituted scientific observations, and the participation by a number of well-known Italian DXers, brought the issue of another ruling by the Greek authorities which specifically prohibited transmission on the amateur frequencies. This notice was given to the Italian group a week prior to the scheduled Mt. Athos effort.

The matter of this Mt. Athos operation was pursued by the Greek national amateur, RAAG, this leading to the determination that both the Greek civil license and the authorization from the Mt. Athos religious authorities was for scientific and not amateur activity. I0IJ was among the Italian DXers who had planned this trip. All this may help understand the Mt. Athos situation last August and the problems in getting any activity on the air.

### The DX Edge

XANTEK has added new features to their computer DX program. Now called the Super DX Edge, it includes the added MUF predictor and a Great Circle bearing calculator. The MUF is calculated between any two locations, and also the great circle bearing gives the distance between. The program is for the Commodore 64 and 128 computers. Elsewhere there was mention of the value of knowledge to the needy DXer. Sometimes knowledge is confused with instinct, some DXers doing things such as working the twilight path almost automatically without giving it a great deal of thought. Now you can do it with no thought at all; just punch the computer. If you want more information, ask for it by name from Tony Japha, N2UN, Box 834, Madison Square Station, New York, NY 10159.

### The Great International DX Convention

There are still some DXers who long through the years to work Albania. But then again there

are some who while they still long, seek yearly solace in the great DX gathering at Visalia in California. And for those who need either hope or solace, mark the dates for the 1987 gathering—April 3-5. It will be at the Grosvenor Hotel, the same place as last year but with a different name. The Northern California DX Club is the host club this year. Reservations should be made directly with the hotel at 9000 West Airport Drive, Visalia, CA 93277. If you try the hotel's 800 number they will probably advise you the hotel is filled. However, if you call them at 209-651-5000 and tell them you are a DXer, you probably will have no problems, the NCDXC having blocked off most of the rooms in the hotel for this convention.

Len Gerald, K6ANP, and Lyle Meek, WW6F, will be the co-chairmen for the DX Convention. Jay and Jan O'Brien, W6GO/K6HHD, are handling the publicity. Make your plans now. This is the convention where if it is not pure DX, it is pure DX contesting. Hardly anything else. And big-gun DXers everywhere you look. The time is near! Prepare!

### WWCC (The Alternative to DXCC)

AS one DXer has been heard to gripe: "DXCC is riddled with inconsistencies! Disputes rage over the rules and country definition, and the top position is overcrowded by an extraordinary number of amateurs worldwide." With a study of the DXCC currently going on and many with absolutely rock-solid opinions on what changes are needed, all we said was, "So? What else is new?" We quickly learned to be careful with questions such as that one.

Jim McCook, W6YA, of downtown Leucadia in far southern California told us what was new. The World Wide Century Club—the WWCC! This is a simple plan easily understood by most DXers, and the essential parts are:

1. Divide the world into squares 10° x 10° (648 squares).
2. Eliminate the water (183 squares), leaving 465 squares.
3. No distinction for band or mode. Any contact on any band but 10 MHz acceptable. Special interest groups such as RTTY, AMSAT, etc., can arrange for own awards.
4. Phase in WWCC at the same time DXCC is phased out (frozen, not lost).
5. Initial confirmations for 200 WWCC

### 5 Band WAZ

#### Standings as of October 1, 1986

New recipients of 5 Band WAZ with all 200 zones worked:

126. DF9ZP

The top 18 contenders for 5 Band WAZ are:

- |                |                 |
|----------------|-----------------|
| 1. JA1BWA, 199 | 10. W3GG, 199   |
| 2. JA3EWU, 199 | 11. G3GIQ, 199  |
| 3. N4WW, 199   | 12. SP6KTE, 199 |
| 4. K5YRA, 199  | 13. SP6JCY, 199 |
| 5. W8UVZ, 199  | 14. LU6GV, 198  |
| 6. F6BEE, 199  | 15. W2YY, 198   |
| 7. JA0CWZ, 199 | 16. K7UR, 198   |
| 8. W6GO, 199   | 17. K9GX, 198   |
| 9. K4CEB, 199  | 18. DJ9ZB, 198  |

387 Stations have attained the 150 zone level.







# THE Short Wave Listener FOR RECEPTION OF MORSE CODE & RADIO TELETYPE SIGNALS.

Plug the SWL cartridge into your Commodore "64" Expansion Port, connect a shortwave radio and you'll be watching text readout from weather stations, news services, ships and HAM radio operators all over the world. A whole new use for your home computer. The SWL contains both program in ROM and radio interface circuit to copy Morse code and all speeds/shifts of radio teletype. Plus the on screen tuning indicators mean you never have to take your eyes off the video for perfect tuning. Housed in a small 3" x 2-1/2" x 7/8" enclosure, with speaker in/out and practice hand key jacks, it needs no other computer connection or power supply. Unshift on space, word wrap around, real time clock, and keyword or manual printer control for permanent paper copy, so that you won't miss a single bit of the action. For about the price of another "Pac-Zapper" game, you can tie into the exciting world of digital communication with the Microlog SWL.

**\$64**

**MICROLOG**

INNOVATORS IN  
DIGITAL COMMUNICATION

18713 MOONEY DRIVE  
GAITHERSBURG, MD 20879 • (301) 258-8400

## LEARN MORSE CODE THE RIGHT WAY WITH THE Morse Coach.

**\$4995**



A complete Morse code tutor in a convenient plug-in cartridge for your Commodore "64." The Morse Coach means business. It's not a toy program or a simple random code generator. Originally developed jointly by Microlog and several government agencies experienced in Morse instruction. Four years of extensive service prove it's the quickest way to Morse proficiency. The method works! You start from absolutely no knowledge of Morse, progress through the alphanumeric symbols, and on to any speed desired. The "alphabet" part of the program introduces new characters and plots the progress on a bar-chart. The speed/test section correlates the input, analyzes mistakes and provides a printout of the analysis/test results on your Commodore screen or printer. As a bonus, it also boosts typing skill. You've never seen any tape or program do that! In fact, there's never been a system so thorough, so efficient and so effective as the Microlog Morse Coach.

CIRCLE 61 ON READER SERVICE CARD

## AMATEUR TELEVISION

### NEW 70 CM ATV TRANCEIVER

ALL YOU NEED IN ONE BOX



**\$299 delivered**  
**TC70-1**

- **FULL COLOR, SOUND, & LIVE ACTION** just like broadcast TV. Get on this exciting amateur video mode at our affordable ready to go price.
- **WHAT IS REQUIRED FOR A COMPLETE OPERATING SYSTEM?** The TC70-1s downconverter outputs to any TV on ch 3 for receiving. Connect a good 70 cm antenna and low loss coax. Plug in any composite video source you want to transmit: Camera, VCR, computer, etc. Plug in any low Z dynamic mic or use color camera mic for Standard 4.5 MHz TV sound. Connect to 13.8 vdc for base, mobile, or portable. See chapt. 20 1985 ARRL Handbook. That's it!
- **WHAT CAN YOU DO WITH THE TC70-1 ATV TRANCEIVER?** Show the shack, projects, computer program listings, home video tapes, repeat Space Shuttle audio and video if you have a TVRO, repeat SSTV or RTTY, Weather Radar, do public service events such as parades, marathons, races, CAP searches and rescues... the list goes on. DX depends on antennas and terrain, typically 1 to 40 miles. We have video compensated RF linear amps for 20 (\$119) or 50 (\$189) watts pep for greater DX.
- **FEATURES:** Small 7x7x2.5". Push to Look (PTL) T/R switching. GaAsfet downconverter tunes whole 420-450 MHz band. Two switch selected video & audio inputs... RCA phone jacks and 10 pin color camera jack. Xmit video monitor output. Over 1 watt pep RF output on one or two (add \$15) selected crystal controlled frequencies. 439.25, 434.0, or 426.25 MHz.

CALL OR WRITE FOR OUR CATALOG for more info or who is on in your area. We stock antennas, modules, and everything you need on ATV.

**TERMS:** Visa, MC, or cash only UPS CODs by phone or mail. Checks must clear bank before shipment. Price includes UPS surface shipping in cont. USA, others add 3%. Transmitting equipment sold only to licensed Tech class or higher amateurs, verifiable in 1985 call book or copy of new license.

(818) 447-4565 m-f 8am-6pm pst.

**P.C. ELECTRONICS**

Tom W6ORG Maryann WB6YSS



2522 Paxson Lane  
Arcadia CA 91006

CIRCLE 60 ON READER SERVICE CARD

Say You Saw It In CQ

## RJM ELECTRONICS

AMATEUR RADIO • SOFTWARE

4204 OVERLAND ROAD • BOISE, ID 83705

MASTERCARD... VISA... DISCOVER... UPS... COD



### PS-25 Power Supply

- Current and Volt Meters
- Variable From 4.5 to 15 Volts
- 25 Amps Output
- Short Circuit Protection
- Low Cost ... **\$79.95**

### Portasol \$27.95 Portable Butane Soldering Iron

Make Those Repairs Right  
on the Tower

- Safe, No Open Flame
- Only 7" Long
- 10-60 W Power
- No Cords or Batteries
- Heats and Cools in Seconds



### World Radio TV Handbook

- The Bible for SWL'ing
- Lists Stations, Countries, Frequency, Time, Addresses
- Over 600 Pages ... **\$19.95**



### Radio Database International

- Loaded with information in a Chart Format
- Buyers Guide with Prices and Comparative Ratings
- Informative Articles
- More than 350 Pages ... **\$12.95**



### The Encyclopedia Of Electronic Circuits

- Over 1,300 Useful and Versatile Electronic Circuit Designs, Alphabetically Arranged in Categories.
- 1,782 Illustrations ... **\$29.95**



### SOAR 3020 Pocket DMM

Pocket Sized Digital  
Multimeter Measures  
Volts and Ohms in a 3.5  
Digit Format

- Battery Operated
- Excellent Performance
- Low Cost ... **\$34.95**



### ORDER TOLL FREE:

1-800-225-2502 wait for the tone and dial 343-4018  
or Call Local (208) 343-4018

ALSO: ARRL • BENCHER • CALLBOOK • DAIWA  
• HUSTLER • JSC WIRE & CABLE • KLM • LARSEN  
• MIRAGE • TEN-TEC • VALOR

CIRCLE 16 ON READER SERVICE CARD

Liechtenstein Amateur Radio Association (LARA) this last summer. In a notice by HB0CZS, the advice was given that from now on only the true-blue locals will sign HB0. Those swarms of summer visitors will have to sign their own call plus /HB0. As noted in the word passed, "... we decided to form a national organization to protect our interests ... there being times when more than 200 HB0 calls were on with those foreigners (also the Swiss) pouring into the principality on a weekend.

The group has a club station, HB0FL, the FL standing for "Fürstentum Liechtenstein." They have the first HB0 repeater going. They will issue the Liechtenstein amateur radio award and will apply for IARU membership. The address of the Liechtenstein Amateur Radio Assn. is P.O. Box 103, FL-9493 Mauren, Principality of Liechtenstein, Europe.

### 3G9SBY

This call was signed during December by Alex, CE8ABF, at the sub-base Yelcho in the Chilean Antarctic. There are a number of Chilean operators at the Yelcho Station on the Palmer Peninsula, and they are operating from 160 to 10, RTTY, CW, AMTOR, and SSB, plus satellite. Look for them most days, all this via LU8DPM, Mario Raul Andraca, LU8DPM, who often in contests has signed the special call LU2E.

### ZF Grand Caymans

Being a resident in a popular vacation and resort area can be a problem for indigenous amateurs, and perhaps even more so when the local society get queries about spurious calls and missing QSLs. Sometimes it is even worse.

Roger Corbin, ZF1RC, notes that a ZF1 callsign is only valid in the Cayman Islands, nowhere else. Roger says it is not good for a portable operation or for a maritime mobile activity. Once in awhile there is operation with a bogus callsign. There was an operator giving the

handle "Ron" and signing ZF1RC who was active in November 1985. This was Cayman Slim, as the call ZF1RC was not officially issued until December 21, 1985. Thus, any hope for a QSL for a contact before that date must be considered somewhat nebulous.

Grand Cayman does have a reciprocal agreement with the United States and a number of other countries. If you are headed that way, you might drop a line to the Secretary of the Cayman Amateur Radio Society, Box 1549, Grand Cayman. If you worked that November ZF1RC and are still wondering about a QSL, Roger Corbin, the local club secretary there, notes that the ZF1RC callsign was not issued by the authorities until a month later, and it was issued to Roger Corbin. That should solidify things. It is noted that it would be helpful if transient visitors to Grand Cayman who do some ZF1 operating could take the time to advise the local radio club how they want their QSLs handled.

### HZ1AB

The station was put back on the air in September, eight of the locals turning out to move the gear from storage into a spacious apartment to be used for the new QTH. The full apartment has the operating position in the bedroom, the living room for club meetings, and the kitchen for the gourmet meals at the monthly meetings.

The initial activity of HZ1AB was with the Yaesu 902 barefoot, the landlord asking that they be cautious about pulling too much power over the available wiring. This was anticipated to be a passing condition, and possibly by now they will have the linear on line and the beam flying. Plans were to be on in the CQ WW DX Tests in the fall with regular contest operating as well as other activity planned for this year.

Some of the former operators at HZ1AB such as Bob Walsh and Bill Gary have returned to the States, and even the number of operators with ARAMCO has dwindled. Bob Walsh returned to the States for schooling, while Bill Gary left in October headed for the Houston area. There will still be enough operators in downtown Dhahran to keep HZ1AB on the air, and when you work them, QSL to Leo W. Fry, K8PYD, 5740 No. Meadows Blvd., Columbus, OH 43229.

### Some Tail-End DX Notes

CP1AT, Phil Urquiola, spent 18 years doing missionary work in Bolivia, but currently is home in Missouri signing WB0GFV. While there, Phil also signed CP3BY, CP3BY/1, and CP0AT. These can still be QSLed to his present address: Box 174, Hallsville, MO 65255, SASE or SAE/IRC. Phil notes that CP1GP and CP6EL are usually found in the major contests, with CP1IL jumping in when he knows a contest is on. The CP1AT callsign was renewed recently, and Phil anticipates using it again.

Some months back TV6JUN was on from Utah Beach to mark the Normandy landing in 1944. The station was manned by F6EAS, F1LDX, F6IIL, F5AM, and F6EYM. It was established at the 1944 site of the U.S. military hospital on the shore, between the beach and the Madeline Church. QSL to Morio Andre, F5AM, 631 rue de Carentan, 50000 St. Lo, France, or via the French QSL Bureau. They plan to be back in 1987 again, CW and SSB. Listen for them on June 6th. Utah, Omaha, Gold, Juno, and Sword Beaches—old DXers will remember the names as well as St. Lo,



Bob Callahan, KB1AU, recently paid a visit to South Dublin Radio Club when on a trip to Ireland. Bob, from Boston, is a regular on the A.T.C. net and has built up a large but special friendship with many EI stations. He's pictured here with S.D.R.C. members holding the club callsign EI2SDR at their regular Tuesday night meeting in Ballyroan Community Center, Rathfarnham, Dublin.

Caen, and St. Martin. Listen for TV6JUN this year again, June 6, 1987.

Kerguelen to a DXer may be but a sub-antarctic island good for a DXCC counter, but it may develop into a leading maritime location. The French government has been considering plans to allow French ship owners to register their vessels in the Kerguelen Islands. The islands, at 49°S, may be the home port for the Louis Dreyfus Maritime Company, and that prospect has already brought strikes which have paralyzed five of the company vessels. Why the Kerguelens? The idea is that it would allow non-union seamen by the company. All this from Ron Hill, K6OZL, who is a marine radio operator on a vessel traveling the North Atlantic on the European run.

The Colvins departed for the Indian Ocean a couple of months back, off on another high-QSO trip, and they were making their first stop at Mauritius. They plan to work the Indian Ocean area. They did have a Reunion/FR7 authorization, but no luck early on with Mozambique. As their trip will depend on getting license authorizations, listen to W6TI at 0200 at 14001 kHz on Mondays for late information.

Ralph Dage, W8PHZ, was working in China last year as a consulting engineer for a new telecommunications network for VHF/UHF and microwave. Ralph got a chance to visit the Tsing-hua University club station, BY1QH, in Beijing, the station running a TS180S with a German linear and a four-element monobander on the roof. Ralph has been DXing since things started again after WW II and currently is at the 358 level. That's not only the top of the heap, but Ralph has been there for 15 years.

GM0CFK, Chris Knight of Edinburgh, moved to ZS6 in late August and when settled expected to do some operating not only from ZS6, but from the available nearby countries. These include 3D6 Swaziland with Lesotho and Mozambique as hopefuls. Any of Chris's operations will be QSLed by K1MZB, Robert Howe, at 52 Pine Street, South Portland, ME 04106. The Marion Island activity of a couple of months back apparently will not be valid, as the operators failed to get needed authorization. South African ZR-VHF licensees can receive special permission for HF Marion Island activity, but the last operators did not ask.

As of October things did seem to be moving in the right direction, but no one had yet fired

### CQ DX Awards Program

#### SSB

1499 ..... KD5ZD 1500 ..... DU9RG

#### CW

682 ..... KA2AOT 684 ..... PY1MAG  
683 ..... DL1PM

#### SSB Endorsements

300 ..... WB4UBD/302 275 ..... K4LR/289  
275 ..... I1POR/298 275 ..... K2JF/287  
275 ..... I0SGF/296 250 ..... PY2DBU/254  
275 ..... DU9RG/291 3.5/7 MHz ..... I1POR

#### CW Endorsements

300 ..... DL1PM/308 3.5/7 MHz ..... PY1MAG  
275 ..... EA2IA/298

Total number of active countries is 316. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

the evening cannon to mark the end of Sunspot Cycle 21 and the start of Cycle 22. The monthly mean was 13.1 in May, 0.8 in June, 17.8 in July, 7.4 in August, and 3.9 in September. The 12-month running smoothed figure in January 1985 was 20; in January 1986 it was 14, and by this January there should be definite figures to indicate whether the bottom was in last mid-summer as many expected. Some spots have been showing in higher latitudes, this an indicator they are from the new cycle. The flux figures have been good at times. Be patient, check the forecasts of George Jacobs, and expect only the best. It is coming!

Dave Fox, KC3VU, is in Norway for a year with the American Scandinavian Student Exchange Program for high school students. During his stay he will be staying with DRØBAK and will be heard on the air signing LAØFH, mostly CW with some SSB. QSL to WA3YJA.

SU1MB is reported to have not been a legal operation last summer. The operator now at Ft. Lewis, Washington advised an inquirer that he is not an amateur and was only operating the station to fill in some leisure time. K4UEE and N4PN were signing CP4Ø from Aruba over the first of December, aiming for a big score in the great CQ WW CW Test as an SEDXC effort.

Dick Dorrance, PP2ZDD, once out of New Jersey singing W2LEJ, enjoys sending QSLs from his Brazilian QTH of Goiania, but finds the cost of postage from Brazil a burdensome factor even though he also has a statement QSL

manager, W4BAA. Often it is heard that PP2ZDD is "... my first Brazilian contact" when they come without IRCs or equivalent. Dick feels the cost consideration necessitates reply via the bureaus. The unfortunate part is that at times it is obvious that a good many do not know about QSL Bureaus or even QSL Managers. A check over a year's time showed outgoing postage running better than \$50.00 a month. In the Goias Province Dick is putting up tall towers and big antennas on the ten acre plot and says when he comes on line with the whole array this year he will be heard. And very easily!

KX6DX, Dave, was in the Eastern Carolinas signing the KC6 prefix during the CQ WW Test, operating at KC6JCs QTH, and using some of his visit to help upgrade the antenna system at KC6JC, including 160 and 75 meter antennas for bigger power capabilities. Dave has been on Kwajalein for three years now and has made over 51K QSOs for 240 DXCC counters. On 160 he has 1500 QSOs with 62 countries. All his QSLs go via the North Alabama DX Club, Box 4563, Huntsville, AL 35815-4563. SAE/2 IRCs or SASE needed.

Akito Nagi, JA5DQH/NN7S, was in Macao and Hong Kong during the CQ WW CW weekend and signed both XX9XX and NN7S/VS6. He also signed XX9/VS6 on one day, November 25th. If you caught any of these, QSL to Akito's home QTH, 2552-2 Ishii Ishiicho, Myozai Tokushima 779-32, Japan. The Radio Club Maldo-

## 5 Band WAZ No. 55

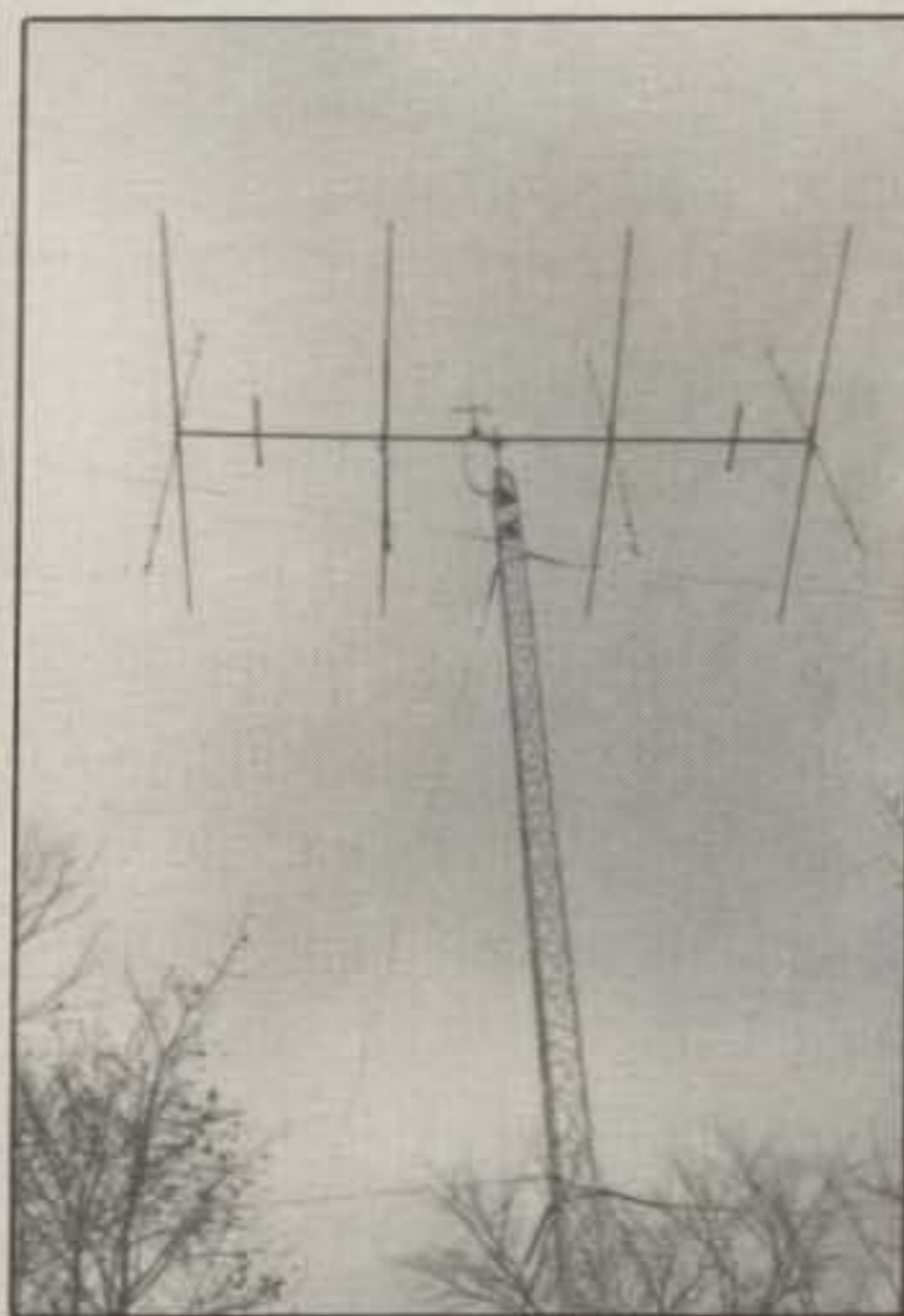
Reynolds A. Sylvester, WA1AER, of Reading, Massachusetts hold the always hard to get 5 Band WAZ plaque, #55. First licensed in 1961, WA1AER says that it was the suffering XYL who put up with four years of madness which made it all possible. The casual DXer passing the Sylvester QTH might suspect that the multitude of antennas on two towers such as monobanders and a four-element two-band quad might have helped.

An auto mechanic, Reynolds is 34 with two daughters plus the patient XYL. He is on the DXCC Phone Honor Roll, has the 5BDXCC, and has the CW DXCC. He also has a six-band WAS. He started out working primarily SSB, but in the last couple of years has moved to CW mostly, working this mode about 90% of the time. The feeling has developed that the operating tactics (ethics) are a bit better in the CW bands. A member of the QRA Radio Assn., most of the needed cards for 5 Band WAZ were gained on straight searching, Reynolds spending most of his spare time scouting and patrolling on the bands looking for the last handful of elusive zones.

Getting back to the antennas, there is a two-element wire beam at 95 feet for 80 meters, a two-element beam at 105 feet for 40, a four-element over four-element 20 meter beam at 110 feet, a four-element quad for 15 and 10 meters at 80 feet.

If the antenna system looks impressive, the station set up must take up a good portion of the QTH—Drake T4XC/R4C plus a 4-1000A linear for 80 meters, a Drake T4XB/R4C plus a 4PR1000B for 40 meters, a Drake TR4C/R4C plus a 3CX2500A3 linear for 20 meters, and an FT901DM with an Alpha 76A linear for 15 and 10 meters.

Some say that finding the last needed QSL in the mail box is the most difficult part of 5 Band



Part of a familiar landmark in downtown Reading Massachusetts. This is the four-element quad that is part of the antenna system that Reynolds Sylvester used to earn 5 Band WAZ #55. The antenna system is matched by the station lash-up. Full bore on all bands.

WAZ. Some even say finding the last zone is the one which brings gray to the dome. Reynolds says it was sorting out all the cards to cover the 40 zones on five bands. But then again, some may worry about the house lot turning turtle in a high wind with all the leverage against the towers and antennas.

# PETER DAHL CO. HAS Conversion Kits



With a 516F2 Solid State Conversion kit from the Peter Dahl Co., your power supply will run cooler and have full protection against line transients. For only \$19.95 you get solid state replacements for the 5U4 and 5R4 tubes, a silicon diode to replace the selenium bias rectifier, meter protection and a selenium line transient suppressor.

FOR INFORMATION, write or call:

**PETER W. DAHL CO., INC.**

5869 Waycross Ave. • El Paso, TX 79924  
(915) 751-2300 Telex No. 763861 PWD CO

CIRCLE 45 ON READER SERVICE CARD

## Where's my CATALOG?



What? You haven't seen the FREE DICK SMITH ELECTRONICS catalog? Or did someone steal your copy again? After all, who can resist 148 colorful pages crammed with 1000's of electronic goodies ranging from kits & components to computers & radio-controlled cars. The selection is incredible, the values are even better! Top it all off with our exclusive 15-page electronic data section, and you'll have more than a catalog, more than a reference: it's a totally entertaining experience for the electronic enthusiast, and it's FREE! All we ask is your name, address and \$1.00 for first-class postage. What are you waiting for? Order yours today!

**YES!** Send my copy of the 1986/87 DSE catalog today! Enclosed is \$1.00 for postage!

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

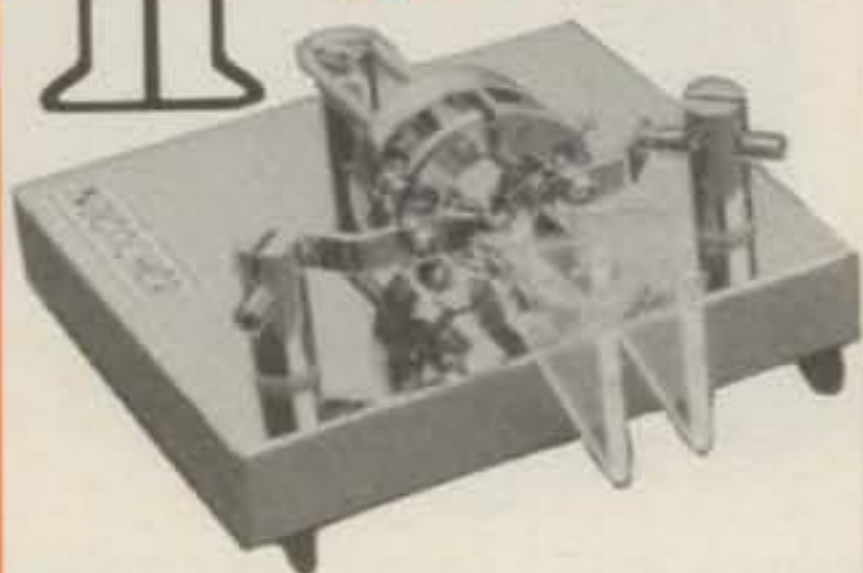
Zip \_\_\_\_\_

DICK SMITH ELECTRONICS, INC.  
P.O. Box 2249, Redwood City, CA 94063

701F



# TAKE THE CURE!



for boring QSO's and blah operating habits. A new Bencher paddle with the amazingly smooth response and perfect tracking that Bencher paddles are famous for is a sure cure for the blahs. Discover the joy that CW can be - see your dealer for one of the excitement machines.

At Bencher, we didn't invent CW— But we perfected it.

**BENCHER, INC.**

333 W. LAKE ST., CHICAGO, IL 60606—(312) 253-1808

CIRCLE 53 ON READER SERVICE CARD

nado was heard with CV1R from the Isla de Lobos a few months back, this one to mark the 25th anniversary of the club. QSL to Casilla Postal #1, Maldonado, Uruguay.

A couple of months ago there was hope for a 4W Yemen operation, EXXON doing some development work in the area. But the amateur who was supposed to go there did not, and the one who did go was not an amateur. However, things may improve in the near future as EXXON's development work expands. And if you are looking for any of the countries in the Southern Ocean of Antarctic, remember that this is the season for resupply and other honorable endeavors in that area, and though it may be chilly here, it is summer there. Listen.

As of October there had been 16 qualifying for the 50th Anniversary WAZ Award. Those added to the list published last month are Franco Benenato, IK8DYD, who got award #15, and Betty Reich, WD9GQV, #16 and the first YL to earn the award. Up until October there had been no Africa or South America station qualifying for the award, the breakdown being W/K nine awards, Europe three awards, JA three awards, and YB Indonesia the remaining one.

Ron Wright, ZL1AMO, was signing VK9X1 from Christmas Island during October; QSL to Ron's home QTH. Some plans are going for a Revillagigedo-XF4 operation along about March, this including XE operators plus some of the veterans from the Clipperton efforts. Some of the unusual ZF calls heard in October during the week of the CQ WW phone test were special prefixes to mark "Pirates Week" in the Caymans. You may have suspected it was Slim, but they were remembering the real thing. QSL to the Cayman Amateur Radio Soci-

ety if you seek the route. ZD9BV should be found on from Gough Island. The island in itself may not be a new country, but it does count for Tristan da Cunha. The operator is Andy.

Ending with a flourish, or something, we note again our deadline is three months in advance of the cover date on CQ. The floor is soaked with our tears every time an item arrives too late. Brighten our day! Mail early— awfully early.

## DX Ten Years Back

Even in January 1977 the Deserving were scanning the skies for the return of the sunspots. Keep hope alive; they did return for Cycle 21. The Colvins were in Sint Maarten, and SM0AGD was planning a Tokelaus effort. Some Transkei stations were starting to be heard, and W4JBZ was trying to put Southern Sudan on the air. Wayne Warden, W9MR, was headed for the Pacific and planned to put Western Samoa and possibly the Tokelaus or Niue on the air. There was talk of possible Bouvet activity, and ZK1BA was headed for Manihiki. WB6FUV arrived in Arabia and was putting HZ1AB on the air, a PY-group was headed for Fernando de N., and PY0ZAE continued active from Trinidad. EP2VW was on from Iran and CR8 Timor was deleted, and the recommendation by the Communications Manager was not to add to the country list the Finnish/Swedish Sovereignty Island, the Probi-lofs, and the Israeli-occupied areas in Jordan, Syria, or the Sinai. The ARRL was conducting a DX survey, there being 24 questions, and you had the option to range all the way from "Strongly Disagree" to "Strongly Agree." Subjects ranged from whether a reef should be dry at high tide to qualify for country status to whether the DXCC should be restarted every ten years. What sort of a year was it? A year like all years, full of those events which alter and illuminate our time.

## QSL Information

All of this has been compiled with the help of W9LNQ/N9ALC and K1MZB, watchers of the lonely night.

A35JF to G4AAL  
C30CAX to DL4VB  
C30BBC to F6EGG  
C02HQ to XE1XF ('85 CB)  
CP1AT to WB0GFV  
DJ4SN/CP8 to DJ4SN  
EJ5EP to ON5KL  
EK1AQ to UZ1WWA  
FO0ASJ to N5DD  
FO0FB to WB6GFJ  
GJ0/K2BZS to KA2BZS  
H44RO to W6CNA  
HG19HB to HA5WA  
HL9LB to N4GNR  
HP1XX0 to W0ANZ  
HS0C to JA8ATG  
HZ1AB to K8PYD  
KH9AC to WK6T  
LAFH to WA3YJA  
OE5JTL/YK to OE5BA  
PA6VSS to PA0DIN  
PP2ZDD to W4BAA  
SJ9WL to SM4FTF  
SV1JG/SV5 to SV1JG  
SX1MBA to SV1YF  
TV6JUN to F5AM  
TL8BA to SM2NOO  
TZ6LPY to I0LPY  
UA8BD to UA3LAR  
VP5DG to KA5RGE  
NN7S/VS6 to JA5DQH  
VS5CT/KP2 to KA6V  
XX9/VS6 to JA5DQH  
V44KAR to WB2LCH  
XX9XX to JA5DQH  
YN3ACZ to WD4KOO  
YN8RC to WB8SSR  
YS9JY to NF5J

YZ0U to YU2BHI  
ZF2JU to KV9S  
ZK1XP to G4AAL  
ZK3RW to ZL1AMO  
1A0KM to I0MGM  
3C1MB to EA7KF  
3D2CW to DK7PE  
4N3E to YU3HAM  
4N0IARU to YU4FRS  
5H3LE to LK6BOB  
5H3Z0 to K0LST  
5W1FK to G4AAL  
7S1FRO to SM5AHK  
9H3DX to DF2UU  
CV1R to Casilla Postal 1,  
Maldonado, Uruguay  
C53FB to POB 273, Banjul, The  
Gambia  
CE8RY to POB 2, Easter  
Island, via Chile  
EA9MY to Box 412, Melilla,  
Spanish North Africa  
GB4CGW to P.O. Box 20,  
Motherwell, England  
KC6TO to Box 4563, Hunts-  
ville, Alabama 35815-4563  
KX6DX to Box 4563, Hunts-  
ville, Alabama, 35815-4563  
KG4X0 to GARC, Box 73,  
FBPO, Norfolk, Virginia  
23593  
KH6OU/TF to POB 14-108,  
Keflavik, FPO New York  
09571  
TA1P to Box 33, 34432, Istan-  
bul, Turkey  
369SBY to Box 2000, Puntas  
Arenas, Chile

73, Cass, WA6AUD

## A LOWER COST TUNING INDICATOR FOR RTTY, FAX, SSTV and CW!

The SPT-1 SPECTRA-TUNE Multi-Mode Tuning Indicator provides the accuracy and versatility of a tuning scope at a most affordable price. Compare the features offered by the most versatile tuning indicator available today!



- Modes of operation:  
RTTY-High Tones  
RTTY-Low Tones  
Facsimile (FAX)  
Slow-Scan Television (SSTV)  
Morse Code (CW)
- Instantaneous display of the RTTY shift in use, level of black and white in a FAX or SSTV signal, and CW signal position in audio passband
- Accurate spectral display of received signal
- Visual indication of which direction to turn the transceiver VFO for proper tuning
- Works with ANY demodulator, converter or interface
- No scope outputs required on demodulator or interface
- Easy connection to transceiver audio output - all connecting cables included
- Quick and accurate tuning of SITOR/AMTOR signals
- Operates on 12-15 VDC @ 90 ma
- 1 year limited warranty



Call your HAL dealer today...Suggested retail \$169.00

**HAL COMMUNICATIONS CORP.**

Box 365, Urbana, IL 61801 Phone: (217) 367-7373

CIRCLE 52 ON READER SERVICE CARD

New for **KENWOOD**  
TH21AT, 31AT, 41AT  
a **FAST CHARGER**



**SPECIAL SALE!**

~~\$54.95~~

Save \$15.00 when ordering  
charger with accessories kit. **Now \$49.95**

+ \$3.00 shipping and handling  
FL res. add 5% sales tax

**Features:**

- Charges in 15 minutes
- Automatic Voltage cut-off
- Battery doesn't heat-up
- Modification to charge PB21H on request at no extra charge
- 12v-14vdc input
- No memory
- Proven in daily use

Optional AC adapter with DC and mobile cords available ~~\$19.95~~ \$9.95

**Charge-Rite**

Call and talk with  
Dr. "S", WA4DRV

P.O. Box 4175, Vero Beach, FL 32964  
(305) 476-8580

**NEW ANNOUNCING THE DIGITAL VOICE KEYS**

DVK-100



\$349.00 Suggested  
Amateur Net Price

**Now! Enjoy the truly unique operation of a Digital Voice Announcement System.**

Create your own natural voice contest calls, CQ's, etc. Your voice is stored in digital memory, ready to be played back at the touch of a key. The Digital Voice Keyer is not a tape recorder or robotic sounding synthesizer, but a true full fidelity natural voice record/playback system.

**FEATURES**

- Superior natural voice quality
- Micro-processor controlled
- 32 seconds of message time
- PTT/VOX operation
- Dynamic/condensor mic input
- Selectable monitor amplifier with preset level controls
- Selectable audio compressor
- Sealed membrane keyboard
- 4 Independent voice memories
- Positive/negative keyed PTT
- ESD/EMI/RFI shielding
- Selectable end of transmission tone generator

Contact your local Amateur Radio dealer or NTL for further information.



Dealer Inquiries Invited

**NEL-TECH Labs Inc.**  
28 Devonshire Lane,  
Londonderry, NH 03053 (603) 434-8234

CIRCLE 74 ON READER SERVICE CARD

**JAYBEAM ANTENNAS**  
From  
**Spectrum International**

**900 MHz (900-930 MHz)**  
DY20-900 17dB \$79.95

**70 cm Multibeam (420-450 MHz)**  
For ATV, OSCAR, TROPO, EME, etc.

70/MBM28	11.5 dB	\$44.95
70/MBM48	14.0 dB	\$64.95
70/MBM88	18.5 dB	\$94.95

2-Way Phasing Harness	PMH2-70	\$17.95
4-Way Phasing Harness	PMH4-70	\$34.95
Vertical Pol. Mounting Kit	SVMK-48	\$19.95
	SVMK-88	\$29.95

2 way & 4 way Mounting Frames Available.

**2 Meter Twist**  
For OSCAR Operation

10XY-2M	11.3 dB	\$74.95
Circular Pol. Harness	PMH-2C	\$15.35

**Loop Yagis**

For OSCAR, ATV, TROPO, EME, etc.

1268-LY	20dB	\$54.95
1296-LY	20dB	\$54.95

For GOES Weather Satellite

1691-LY	20dB	\$64.95
---------	------	---------

2 way & 4 way Combiners Available

ALL ANTENNAS INCLUDE 50 ohms Balun  
Send 66¢ (3 stamps) for detailed specs on all  
VHF & UHF Products



Spectrum International, Inc.  
Post Office Box 1084Q  
Concord, MA 01742 USA

CIRCLE 75 ON READER SERVICE CARD

**Get Your Best Deal . . .**  
**Then CALL US . . . TOLL FREE!**

**1-800-238-6168** (In Tennessee, call 901-683-9125)

**KENWOOD**  **ICOM**

**WE TRADE!! CALL FOR FREE APPRAISAL!**

AUTHORIZED DEALER FOR: Kenwood, ICOM, Ten-Tec, MFJ, Astron, Mirage, B&W, Hustler, Cushcraft, Larsen, Hy-Gain, Butternut, Avanti, Van Gordon, Ameritron AEA and more . . . PLUS CURRENT USED GEAR

Send us your name and address...we'll put you on our catalog mailing list!

We are an Authorized Service Center for **KENWOOD**

After the sale, it's the service that counts!

**Memphis Amateur Electronics, Inc.**

1465 Wells Station Rd., Memphis, TN 38108

**Store Hours:**  
Monday-Friday, 9 to 5,  
Saturday 9 to 12  
(Central Time)

Send QSL card for FREE Catalogue



**NEW!**

# PAC-COMM TNC-220

## HF / VHF Terminal Node Controller

**\$124.95**  
KIT



**\$159.95**  
ASSEMBLED

The TNC-220 is a new, low-cost Packet Terminal Node Controller evolved from the Pac-Comm TNC-200 (TAPR TNC-2). It uses more large scale integrated circuits and fewer components to provide greater functionality, reliability and sensitivity with reduced size and cost. The single-chip modem used for both 300 baud HF and 1200 baud VHF operation has two radio ports. Switching between ports is done entirely in software and no cable changing, no switch setting and no retuning is required! The HF port has an active bandpass filter and provides either FSK or AFSK keying. An optional tuning indicator slides inside the cabinet. A standard modem disconnect header will connect accessory high-speed or satellite modems.

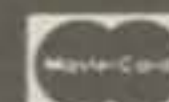
- Two radio ports
- 7910 single-chip modem
- 300 and 1200 bauds
- Enhanced command set
- Multi-color status LED's
- Supports RS-232 and TTL computers
- Active HF bandpass filter
- Tuning indicator option
- 12 volt DC operation
- Premium quality case
- 6" w x 2" h x 7" d

The TNC-220 has the familiar TAPR command set and AX.25 Level 2 Version 2 protocol running on a Z-80 processor with 32k bytes of EPROM and 16k bytes of battery-backed RAM. A Zilog 8530 SCC performs all packet HDLC in hardware. The terminal port can select either RS-232 or TTL for your C-64/128, VIC-20 or other TTL computer. Five large, color-coded LED's clearly indicate status at a glance. The power switch is now located on the front panel. The TNC-220 is enclosed in a rugged extruded aluminum cabinet with an attractive two-tone blue front panel. All indicators and controls have large, clear labels.

Tech Line (813) 874-2980  
Write For Free Packet Catalog

CIRCLE 82 ON READER SERVICE CARD

**ORDER DIRECT 800-223-3511 FREE UPS BROWN**



Pac-Comm Packet Radio Systems, 3652 West Cypress St., Tampa, FL 33607

## CQ BOOK SHOP

### The Shortwave Propagation Handbook, 2nd ed.

by George Jacobs, W3ASK, and Theodore J. Cohen, N4XX  
A new, revised edition of the popular guide to all your propagation needs. Contains up-to-the-minute information and charts, and guides you through producing your own propagation data. 154 pages, paperback, \$9.95. Order #C137

### The Radio Publications Group—The "Bill Orr Series"

These easy reading classics belong in the library of any active ham. Loaded with practical how-to information, with tables, charts, and formulas arranged for handy reference.

**Beam Antenna Handbook**, 200 pages, paperback, \$7.95. Order #R143.

**Wire Antennas**, 192 pages, paperback, \$7.95. Order #R144.

**Antenna Handbook**, 192 pp. paperback, \$7.95. Order #R145.

**Cubical Quad Antennas**, 112 pages, paperback, \$6.95. Order #R146.

**VHF Handbook**, 336 pp. paperback, \$11.95. Order #R147.

### Vertical Antenna Handbook, 2nd ed.

by Paul H. Lee, N6PL  
Out of print for several years, this classic has been reprinted with updates, including an addendum on antenna design for 160 meters. Other sections include feeding and matching, short verticals, ground effects, and much more. 139 pages, paperback, \$9.95. Order #C208.

### Ameco Amateur Radio FCC Test Manuals

Each book contains the latest FCC VEC test questions, plus ARRL multiple-choice answers followed by a complete, simplified discussion of each question written in an easy-to-understand style.

**Novice Class**, 64 pages, paperback, \$3.50. Order #A221.

**General Class**, 128 pages, paperback, \$4.95. Order #A034.

**Advanced Class**, 128 pages, paperback, \$4.95. Order #A035.

**Extra Class**, 128 pages, paperback, \$4.95. Order #A220.

**CQ BOOK SHOP 76 North Broadway, Hicksville, NY 11801**

QTY.	ORDER #	TITLE	PRICE	TOTAL

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

Book Total

Shipping Charge

Grand Total

Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_  Check  MasterCard  VISA

Card No. \_\_\_\_\_ Expires \_\_\_\_\_

X \_\_\_\_\_ Signature required on all charge orders

**TSQ QSL**

**LASER PRINTED QSLs**

Top Quality - Low prices  
Write for Information

**THE LASER PRESS**

P.O. BOX 876  
MOUNDSVILLE WV 26041

**DOWN EAST MICROWAVE**

**MICROWAVE ANTENNAS AND EQUIPMENT**

- Loop Yagis • Power Dividers • Linear Amplifiers • Complete Arrays • Microwave Transverters • GaAsFET Preamps
- TROPO • EME • Weak Signal • OSCAR • 902 • 1296 • 1298 • 2304 • 2400 • 3456 MHz

2345 LY 45el loop Yagi 1296 MHz 20dBI \$93  
1345 LY 45el loop Yagi 2304 MHz 20dBI \$80  
3333 LY 33el loop Yagi 902 MHz 18.5dBI \$93

Above antennas assembled and tested. Kits available. All Aluminum and Stainless Construction. Add \$8 UPS S/H, \$11 West of the Mississippi.

2316 PA Linear Amp 1W in 18W out 1296 MHz 13.5V. \$245 ppd.  
2335 PA Linear Amp 10W in 35W out 1296 MHz 12.5V. \$295 ppd.

**NEW! MICROWAVE TRANSVERTERS BY LMW ELECTRONICS**

1296TRV8D 6W, GaAsFET, T/R Sequencer, Output Meter \$489  
2304TRV2D 2W, GaAsFET, T/R Sequencer, Output Meter \$589  
Add \$6 for shipping UPS/48

Stripped down version, kits also available  
Write For FREE Catalog

**DOWN EAST MICROWAVE**  
Bill Olson, W3HQT  
Box 1855A RFD #1, Burnham, ME 04922 U.S.A.  
(207) 948-3741

CIRCLE 30 ON READER SERVICE CARD

Say You Saw It In CQ

## MAKE CIRCUIT BOARDS THE NEW, EASY WAY



### WITH TEC-200 FILM

#### JUST 3 EASY STEPS:

- Copy circuit on TEC-200 film using any plain paper copier
- Iron film on to copper clad board
- Peel off film and etch

#### SATISFACTION GUARANTEED

convenient 8 1/2 x 11 size

5 Sheets for \$3.95 10 Sheets only \$5.95  
add \$1.00 postage NY res. add sales tax

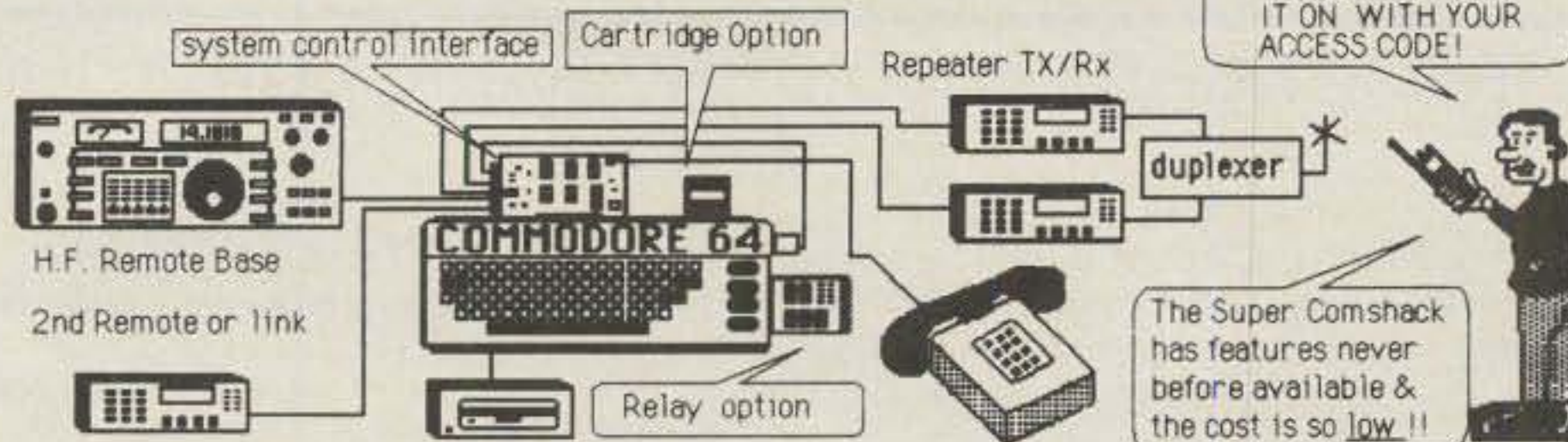
The MEADOWLAKE Corp.  
Dept. Q, P.O. Box 497  
Northport, New York 11768

CIRCLE 71 ON READER SERVICE CARD

NEW

## Super ComShack 64

Repeater Controller/Dual Remote/Autopatch



### Super Repeater Controller

- \* Remotely programmable with Touchtones/ change up to 9 sets of access codes & parameters from H.T!
- \* Synthesized speech consisting of high quality male or female digitized human voice
- \* Dual Remote base (H.F. and V.H.F.)
- \* Autopatch and Repeater Controller
- \* Programmable CW or voice ID and courtesy beep
- \* Automatic voice clock & activity timers
- \* Multiple commands can be executed at once (up to 16 digits per command string)
- \* Sub-audible tone compatible
- \* Alarm clock & auto-execute command string!
- \* Optional cartridge eliminates disk drive

### Special Club Features

- \* Generates random code practice @ any speed with voice readback after each 20 random code group!
- \* Set CW speed & pitch from your H.T.
- \* 5 touchtone defined voice ID tail messages!

### Autopatch Specifications

- \* 300 Touchtone loadable Autodial numbers plus 10 Emergency Autodial (quick access)
- \* 300 Reverse patch call signs uploaded from your H.T./general or directed page modes
- \* Incoming caller receives voice message & may select the station to be paged with 3 digit code
- \* Phone number memory readback
- \* Toll restrict-leading 1/0 and 3 digit prefix
- \* Full or half duplex (repeater on/off)
- \* Storage of MCI/Sprint access codes
- \* Call waiting allows switching to second phone line
- \* Touchtones are regenerated onto the tel./speed dial
- \* Touchtone or dial pulse mode
- \* Ring detected while in all remote modes
- \* Last number redial memory
- \* Single digit resets autopatch to dial tone

### Dual Remote Base Specifications

- \* H.F. remote supports: Yaesu FT-757/767, Kenwood TS-440/940, Icom IC-735
- \* 2nd remote or link supports: Yaesu FT 727 (VHF & UHF), Kenwood 7950/TS-2530/70 series with RAP1 (Remote-a-Pad)
- \* 10 H.F. Memory channels/enter or recall
- \* Automatic USB/LSB/FM mode select
- \* Scan up/down, fast/slow, or 100hz steps
- \* Control CS-8 relay/latch option with master reset & status announcement
- \* All control inputs are voice confirmed including frequency, mode, scan status, time, outputs on/off
- \* autopatch audible ring while in H.F. mode

### System Options

- \* 8 Relay control (CS-8) \$ 79.95
- + 3 DPDT 2A relays, 5 open collector outputs
- + user defined 2 letter function name
- + on/off position user defined
- + automatic PTT fan control option whenever repeater or any PTT line is enabled
- \* Optional CMOS auto-boot 72k EPROM Cartridge programmed with your system parameters \$ 99.95
- \* RAP1 Keypad controller for VHF remote \$ 149.95

model CS64S-\$349.95 (wired and tested)

includes: computer interface, disk, cables & manual, duplex & simplex versions are supplied (some features not applicable when in simplex mode) (add \$4.00 shipping / Ca. residents add 6%),  
MASTERCARD/VISA/CHECK/M.O./COD

## Engineering Consulting

583 Candlewood St.  
Brea, Ca. 92621  
tel: 714 671-2009

### 1-800-USA-9913 ORDER LINE

BELDEN 9913 low loss... \$185/500 ft. or .38/ft.  
BELDEN 8267 RG-213... \$195/500 ft. or .39/ft.  
BELDEN 8214 RG-8... \$149/500 ft. or .33/ft.  
BELDEN 8237 RG-8... \$145/500 ft. or .32/ft.  
BELDEN 9258 RG-8X... \$180/500 ft. or .17/ft.

#### VIBROPLEX KEYS/PADDLES

#### MFJ ANTENNA TUNERS ACCESSORIES

**AMPHENOL Connectors & Adaptors**  
UG-21D N-type Male Cable end \$3.00  
UG-21D Fitted for 9913 cable \$4.50  
PL-259 UHF Plug (silver) \$1.25  
UG-146 N plug to UHF jack \$7.50  
UG-83 N jack to UHF plug \$8.50  
UG-29 N-type barrel conn. \$4.75



SETH THOMAS 13-inch 24-hour station clock \$28.95

#### QEP's SAME DAY SHIPPING

110-4 Route 10, E. Hanover, NJ 07936, 201/887-6424

## SOFTWARE FOR THE C-64\*

RF KIT 1.0 disk includes over a dozen RF and DC formulas, programs for Beam Headings, Tower

$$F = \frac{10^6}{2\pi \sqrt{LC}}$$

Stress Calc and Noon Meridian to find True North. Also, instructions to add your own favorite formulas to the disk. Write for free data. Price \$14.95 + 1.00 postage.

RF KIT CO., P.O. Box 27127, Seattle WA 98125 USA  
Tel (206) 246-9522 \*Trademark of Commodore

CIRCLE 56 ON READER SERVICE CARD

## MORSE CODE Tutor \$29.95

A sophisticated Morse trainer program that makes Your PC/XT/Compat Computer a friendly and patient Tutor, while preparing You for the License Exam.

### Selectable Operating Modes

- Send random Letters, Words or conversational code from built-in Dictionary.
- Conversational mode generates logical sentences.
- Non-repetitive word patterns.
- Send code from YOUR text file.
- Selectable Speed & Time to send.

MS-DOS 2.0+ Visa/MC/Ck. Fl. Res + 5% tax

#### CYBER WARE CORP

4411 Bee Ridge Rd. S. 251, Sarasota, FL 33583  
1-800-237-8400 x 86  
In Florida Ph 1-800-282-1469 x 86

CIRCLE 57 ON READER SERVICE CARD



Remote Keypad Rows & Columns Controller Plus Two 4 digit sequence decoders (on/off)/Will control frequency of any keypad entry radio such as the Kenwood 7950/2530. The row & column switches will allow you to use the microprocessor already in the radio to gain control over all functions normally available via the keypad! Two decoders will control links, on/off, ect.

"REMOTE-A-PAD"

Model RAP-1 \$149.95



### Touchtone to RS-232 (300 baud interface)

Program your computer in basic to decode multidigit "strings", sound alarms, observe codes, Simple to install! +12 VDC /audio; includes basic program for C64/VIC20/C128; all computers! "Decode-a-Pad"

Model DAP \$89.95

### Audio Blaster Module IC-02AT/IC-04AT/IC2AT

Module installs inside the radio in 15 Min. Boost audio to 1 watt! Low standby drain/Corrects low audio/1000's of happy users (Works in other H.T.'s too)

Used by Police, fire, Emergency, when it needs to be loud!

Wow! that's loud!!!  
What a difference  
Now I can hear it!

Model AB1-\$19.95

## Touchtone 4 Digit Decoder & on/off latch

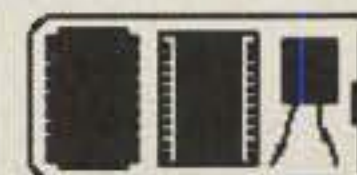
50,000 combinations



### Repeater on/off Master control

Wired and tested +5 to +12 Volts/ User programmable to 50,000 codes/ All 16 digits/Send code once to turn on, again to turn off/ Momentary & Latching output/drives relay/LED latch indicator/Optional 4 digit extra custom latch IC's \$8.95 each/add as many latches as you want to your external board

Model TSD \$59.95



### Touchtone Decoder Kit

M957 Teltone 15 ma.5 to 12v. (SSI-201 compatible) includes 3.58 Mhz Crystal/ 22 pin IC socket, Data Sheet, Sample circuits, decoder specs, BCD/HEX, all 16 touchtones

Model TTK \$22.95

CIRCLE 83 ON READER SERVICE CARD

## THE SCIENCE OF PREDICTING RADIO CONDITIONS

The question that I continue to be asked most these days is "When will the new sunspot cycle begin and when will HF conditions begin to improve again."

I still can't give an "official" answer, since we won't know when the minimum of Cycle 21 actually occurred until six months after the event has taken place. It takes six months of additional sunspot data in order to look back and establish the date.

I can say this, however: If the beginning of Cycle 22 did not occur during the last three months of 1986, it is almost certain to do something during 1987, and most probably during the first three months of the New Year. If this comes to pass, 1987 should be a year of slowly rising solar activity. By the end of the year we can expect a noticeable, albeit slight improvement in propagation conditions on the HF bands.

### Outlook For 1987

It now looks almost certain that 1987 will be the year of a new solar cycle and rising solar activity! But it probably won't be until the end of the year before some improvements will be noticeable.

A few more DX openings can be expected on 10 meters during 1987, with the best bet for openings towards southern and tropical areas during the daylight hours. It probably won't be much before 1988, though, before this band begins to really open up again.

Expect an increase in 15 meter DX openings during 1987, with fairly regular openings towards southern and tropical regions during much of the daylight hours. Expect occasional openings towards Europe and Asia this winter and early spring, and a somewhat greater number of openings next fall and winter.

Twenty meters will continue to be the best band for daytime DX during 1987. The band should continue to peak for DX during a two-to-three hour "window" just after sunrise, and again during the late afternoon, with DX possible during most of the daylight hours as well. During the spring and summer months expect the band to remain open well into the hours of darkness, and often until midnight and later, particularly towards southern and tropical regions.

On 40 meters expect good worldwide DX openings from about an hour before to an hour or two after sunset and again

### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for January 1987

Propagation Index .....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 10-11, 24	A	A	B	C
High Normal: 7, 9, 12, 14, 18, 21, 23, 25-28	A	B	C	C-D
Low Normal: 3-6, 8, 13, 15, 19-20, 22, 27, 30-31	A-B	B-C	C-D	D-E
Below Normal: 2, 16-17, 28-29	B-C	C-D	D-E	E
Disturbed: 1	C-E	D-E	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

### HOW TO USE THIS FORECAST

1. Find propagation index associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the propagation index, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a propagation index of 3 will be poor-to-none (D-E) on Jan. 1, fair-to-poor (C-D) on the 2nd, good-to-fair (B-C) on the 3rd through the 6th, good (B) on the 7th, etc.

from an hour or two before to an hour or so after sunrise. During the late spring, summer, and early fall months the band often should remain open throughout most of the hours of darkness. During the winter months expect the band to close for DX from an hour or two after sunset until an hour or so before sunrise, except for openings towards the more favorable southern and tropical areas.

Expect DX conditions on 80 and 160 meters to be about the same during the New Year as they were during 1986. Eighty meters should open for DX shortly before sunset and remain open to many areas of the world throughout most of the hours of darkness and until shortly after sunrise. During the late fall, winter, and early spring months 80 meters should be the best band for nighttime DX. During the summer months the optimum nighttime DX band should be 40 meters, with 80 not too far behind.

There should be fairly good DX conditions on 160 meters throughout the hours of darkness and into the sunrise period. Conditions should be best during the early spring, late fall, and winter months. Signals usually peak on 160 meters from about an hour or so before sunrise to just

after sunrise at the eastern end of a DX path.

During January 20 meters should be the best band for DX propagation during most of the daylight hours, with some openings also possible on 15 meters, especially when conditions are High Normal or better. During the hours of darkness 80 meters should be the optimum DX band, with 40 meters not far behind when conditions are High Normal or better. Be sure to also check 160 meters for some interesting DX openings during the hours of darkness and the sunrise period. Check for the occasional 10 meter opening during the daylight hours when conditions are High Normal or better.

### Sunspot Cycle Progress

The Royal Observatory of Belgium re-

### HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An \* indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate standard time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to standard time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

11307 Clara Street, Silver Spring, MD 20902



## CQ Short-Skip Propagation Chart January & February, 1987 Local Standard Time At Path Mid-Point

Band (Meters)	Distance Between Stations (miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	Nil	10-15 (0-1)	10-15 (1) 15-16 (0-1)
15	Nil	10-16 (0-1)	09-10 (1) 10-15 (1-2) 15-16 (1) 16-18 (0-1)	09-10 (1) 10-12 (1-2) 12-15 (2-3) 15-16 (1-2) 16-18 (1) 18-19 (0-1)
20	Nil	09-10 (0-1) 10-12 (0-2) 12-14 (0-3) 14-16 (0-2) 16-20 (0-1)	07-08 (0-1) 08-09 (0-2) 09-10 (1-4) 10-12 (2-4) 12-14 (3-4) 14-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-22 (1)	07-08 (1) 08-09 (2-3) 09-11 (4) 11-14 (4-3) 14-16 (4) 16-17 (3-4) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-11 (3) 11-15 (3-4) 15-16 (3) 16-18 (1-2) 18-20 (0-1)	07-08 (1-2) 08-09 (1-3) 09-11 (3-4) 11-15 (4-3) 15-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-02 (0-2)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-16 (4-2) 16-18 (3-4) 18-20 (2-4) 20-02 (2-3)	07-08 (2-1) 08-15 (1-0) 15-16 (2) 16-18 (4-3) 18-20 (4) 20-02 (3-4) 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-18 (4) 18-19 (2-3) 19-21 (1-2) 21-06 (0-1) 06-07 (0-2)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-19 (3-4) 19-21 (2-3) 21-06 (1-3) 06-07 (2)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 18-19 (4-3) 19-21 (3-4) 21-06 (3) 06-07 (2)	07-08 (1) 08-16 (0) 16-18 (1-0) 18-19 (3-2) 19-21 (4) 21-03 (3) 03-06 (3-2) 06-07 (2-1)
160	17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1) 09-17 (1-0)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1) 07-08 (1-0)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

	09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-03 (3) 03-04 (2) 04-06 (1)	22-01 (3) 01-03 (2) 03-05 (1) 23-03 (1)*
Western USA	11-14 (1)** 07-08 (1) 08-10 (2) 10-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-08 (1)	19-20 (1) 20-22 (2) 22-04 (3) 04-05 (2) 05-07 (1) 22-05 (1)*

\* See time conversions for use in other time zones in "How To Use Short-Skip Charts," appearing in the box at the beginning of this column.  
\* Indicates best time for 160 meter openings.  
\*\* Indicates best time for 10 meter openings.  
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

ports a mean sunspot number of 4 for September 1986. The highest daily level recorded was only 13 on September 7, while the sun was completely spotless from September 12th through the 28th! The 10.7 cm solar flux median level observed at the Algonquin Radio Observatory in Ottawa was 68.7.

September's mean sunspot number results in a 12-month running smoothed sunspot number, upon which the cycle is based, of 13 centered on March 1986. This is the same level as observed during February. A smoothed sunspot number of approximately 9 is forecast for January 1987.

As discussed in last month's column, the location and magnetic polarity of sunspots can be used to estimate the end of one cycle and the beginning of a new cycle. During September and October an increasing number of "new cycle" spots were identified. It is possible that during November the number of new cycle spots was equal to the number of old cycle spots, marking the end of Cycle 21 and the start of Cycle 22. But as I mentioned previously, we won't know this for sure for several more months.

There was a strong surge in solar activity during the last week of October, with the 10.7 cm solar flux level rising into the 90s. It is too soon to know whether this was due to the birth of the new cycle or one of the final sighs of Cycle 21. Fortunately, this increased level of solar activity coincided with the CQ World-Wide DX Phone Contest weekend, providing world-wide DX propagation conditions much better than were expected. We will have more to say about the Phone Contest weekend in next month's column.

### 160 Meter DX Contest

DX propagation conditions generally peak on 160 meters during periods of very low solar activity. Conditions on this band during early 1987 may be better than they will be again during the next ten years. Don't miss the 1987 CQ 160 Meter WW DX Contest. The CW weekend is scheduled for January 23-25; the SSB weekend from February 20-22. Check

in to "top band" during the contest. Conditions may be a lot better than you expect.

### Short-Skip Charts

This month's column contains a Short-Skip Propagation Chart for use between distances of approximately 50 and 2300 miles. Special charts for use between the mainland and Alaska and Hawaii are also included. Instructions for use of these charts are given elsewhere in this column. DX charts for January appeared in last month's column.

### VHF Ionospheric Openings

There is a fairly good chance for some meteor-scatter-type openings during the first week of January when the *Quadrantids* meteor shower is expected to take place. This is usually a major shower, and it should peak on the 1st and 2nd with about 30 to 40 meteors entering the earth's atmosphere each hour.

January is generally a poor month for VHF ionospheric propagation. Auroral activity is usually at a low seasonal level, and there is little sporadic-E activity expected. Best bet for ionospheric openings are on those days when HF conditions are expected to be Below Normal or Disturbed. These appear in the Last Minute Forecast at the beginning of this column.

73, George, W3ASK

### ALASKA January & February, 1987 Openings Given in GMT #

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	21-23 (1)	18-22 (1) 22-00 (2) 00-01 (1)	03-10 (1) 10-12 (2) 12-13 (1)	07-11 (1)
Central USA	20-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-11 (1) 11-13 (2) 13-14 (1)	07-11 (1)
Western USA	20-21 (1) 21-23 (2) 23-00 (1)	17-18 (1) 18-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	02-03 (1) 03-04 (2) 04-06 (3) 06-14 (1) 14-15 (2) 15-16 (3) 16-17 (1)	05-12 (1) 12-14 (2) 14-15 (1) 12-14 (1)*

### HAWAII January & February, 1987 Openings Given in Hawaiian Standard Time #

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	07-10 (1) 10-12 (2) 12-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1)	19-21 (1) 21-01 (2) 01-03 (1) 23-02 (1)*
Central USA	11-13 (1)** 07-09 (1)	06-07 (1) 07-10 (2)	17-19 (1) 19-20 (2)	19-20 (1) 20-22 (2)

## DEN-TRONICS

**Amateur Radio & Computers**  
6102 Deland Road • Flushing, MI 48433  
(313) 659-1776

### "YOUR PACKET CONNECTION"

**Kantronics • Microlog • AEA • Merlin**  
Software for popular computers:

AEA Software		Kantronics Software
MBA-TOR		Hamssoft
Apple	SWL TEXT	Amtar
H-89	IBM	Hamflex
DDX-64	DQ-64	Amtorsoft
		Suptetap

CIRCLE 51 ON READER SERVICE CARD

### START COPYING CW THE EASY WAY!

\*\*Start copying words instead of letters!\*\*  
\*\*Master the standard exchange  
in just a few evenings!\*\*  
\*\*Gain on-the-air confidence quickly!\*\*

**THE QSO-TRAINER™ Code Course** - For the ham who already knows the code. If you have been a ham for a while, tried the "traditional" random-letter approach to code practice, and still don't have the on-the-air confidence you'd like—this course may be exactly what you need.

Easy-to-learn lessons on two 60-minute audio cassettes.

Send \$14.95 + \$2.00 shipping and handling (IN residents add \$0.85) to:

**AVC INNOVATIONS, INC.**  
Dept. C, P.O. Box 20491  
Indianapolis, IN 46220-0491

BUSINESS SIZE SASE GETS DETAILS

# Contest Calendar

a monthly feature by  
FRANK ANZALONE, W1WY

## NEWS/VIEWS OF ON-THE-AIR COMPETITION

The below-normal conditions forecast by several DX bulletins fortunately did not materialize for the CQ WW DX Phone Contest. Early reports right after our contest in October indicated that there were good openings on 10 meters, and especially good on 15, with plenty of activity on all bands, 10 down through 160 meters. Record scores are predicted.

Is this an indication that we have finally hit the bottom and this is the start of a new upward cycle? I doubt it, but maybe W3ASK, N4XX, or KH6BZF will give us an explanation of what happened. Hope the same pattern prevailed for the CW weekend.

There were long lists of expected contest expeditions for both contests in the many bulletins, showing the great competitive interest generated by our World-Wide Contests in October and November. Without a doubt, it is the largest and most popular DX competition in the world.

There is a small item, however, that puzzles me. Why do some of these stations go to a lot of effort to get special calls to operate in the contest? There is no advantage, since the country is the multiplier, not the call. As a matter of fact, a call with an unknown prefix only creates confusion and a lot of questions. Reserve your special calls for the WPX Contests in March and May, when the prefix is the multiplier. Stick to the standard country call structure in the World-Wide Contest and avoid answering the many queries of "What's UR country?"

Of course, there were the inevitable errors and omissions in the 1985 World-Wide Contest results. I have two to report. G4UDU was listed in error as G3UDU in the Phone All-Band section for England, and K8HVT/1 with a sizable score of 551,733 points in the CW All-Band section was not listed at all. (*Sorry, fellows—ed.*)

That's about it for this month. If you have any activities for April, the deadline is January 15th, and February 15th for the May issue. Sending information to my home address will give you a few more days leeway. Hope you are enjoying the holidays.

73 for now, Frank, W1WY

### ARRL VHF Sweepstakes

1900Z Sat. to 0400Z Mon., Jan. 10-12

This is the 40th ARRL January VHF Sweepstakes. ARRL Headquarters rec-

14 Sherwood Road, Stamford, CT 06905

### Calendar of Events

* Jan. 1	AGCW Happy New Year Pty
* Jn.1- De.31	UBA SWL Competition
* Jan. 3-4	"73" 10 Meter SSB Champ.
* Jan. 10-11	"73" 15 & 20 SSB Champ.
Jan. 10-11	European YL-OM Contest
Jan. 10-12	ARRL VHF Sweepstakes
* Jan. 17-18	"73" 160 M SSB Champ.
Jan. 17-18	Hungarian DX Contest
Jan. 17-18	AGCW-DL QRP CW Contest
Jan. 17-18	Crazy 8's HF, VHF, UHF
Jan. 17-18	Texas QSO Party
Jan. 17-18	North Dakota QSO Party
Jan. 23-25	<b>CQ WW 160 M CW Contest</b>
* Jan. 24-25	"73" 40 & 75 SSB Champ.
Jan. 24-25	French CW Contest
Jn.31 - Fb.1	YL ISSB CW Party
Feb. 1-2	Classic Radio Exchange
Feb. 7-8	RSGB 7 MHz Phone Contest
Feb. 7-8	QCWA CW QSO Party
Feb. 7-8	Vermont QSO Party
Feb. 7-8	New Hampshire QSO Party
Feb. 14-15	Dutch "PACC" Contest
Feb. 14-16	YLRL YL-OM Phone Contest
Feb. 20-22	<b>CQ WW 160 M SSB Contest</b>
Feb. 21-22	ARRL DX CW Contest
Feb. 21-22	RSGB 7 MHz CW Contest
Fb.28 -Mr.1	French Phone Contest
Fb.28 -Mr.2	YLRL YL-OM CW Contest
Mar. 7-8	ARRL DX Phone Contest
Mar. 7-8	QCWA Phone QSO Party
Mar. 14-15	Maine QSO Party
Mar. 15	ZERO District QSO Party
Mar. 21-22	YL ISSB Phone Party
Mar. 21-23	BARTG Spring RTTY
Mar. 28-29	<b>CQ WW WPX SSB Contest</b>

\* Covered last month.

ommends 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.

### European YL-OM "Midwinter" Contest

CW: Sat., Jan. 10 Phone: Sun., Jan. 11  
0700Z to 1900Z each day

This contest is organized by four European YL Clubs—the English, Belgian, Dutch, and Italian.

**Bands:** All five bands, 3.5 through 29.7 MHz. Use sections according to IARU Region I recommendations.

**Exchange:** RS(T) plus QSO serial number and country. OM's start with 001; YL's start with 2001.

**Points:** Each QSO with a YL, 5 points. OM QSOs, 3 points. Stations may be worked once on each band.

**Multiplier:** Each DXCC country worked, counted once only, *not* once per band.

**Final Score:** Total QSO points from all bands times the DXCC countries worked.

**Frequencies:** CW—3510-3560, 7010-7040, 14025-14070, 21025-21070, 28025-28070. Phone—3600-3650, 3700-3775, 7050-7100, 14150-14250, 21200-21300, 28500-28700.

**Awards:** Certificates to the top YL and OM winners in each category in each country.

There is an SWL division. Score 5 points for each YL station heard. Multiplier same as above.

Use separate logs for CW and phone. Include a column for each new multiplier and QSO points. A summary sheet showing the scoring, a signed declaration that all rules and regulations have been observed, and your name and address in Block Letters are also required.

Mailing deadline to the contest manager is February 20th. They go to: D. Wildeboer, PA3CEB, Kettingweg 3, 8281 PN Genemuiden, The Netherlands.

### Crazy 8's HF, VHF, UHF Contest

1400Z Sat. to 2300Z Sun., Jan. 17-18

As the name implies, this is a crazy one organized by the Cuyahoga Falls ARC of Ohio.

Stations in the 8th call district can work everybody. Those outside the district work 8th district stations only.

Use all bands, all modes, and all types of transmission.

**Exchange:** State or province and grid locator.

**Scoring:** One point per QSO on each band and mode.


**Multiplier:** There are two groups of multipliers. Group 1—Bands used, grid squares worked, and states worked. Group 2—Number of modes and type of contacts made.

**Final Score:** Total QSO's times the Group 1 and 2 multiplier. There are 19 multipliers available.

(*As I said, this is a crazy one. You'll never make it without an official scoring sheet. Better send a large SASE to KA8NRC for details.—ed.*)

**Awards:** All entrants will receive a certificate of participation (enclose a 37¢ SASE). Plaques to the top scorers in and outside the 8th district, plus other various awards.

Send your logs and requests to: An-



## Finally, an HT that's built to take the realities of life.

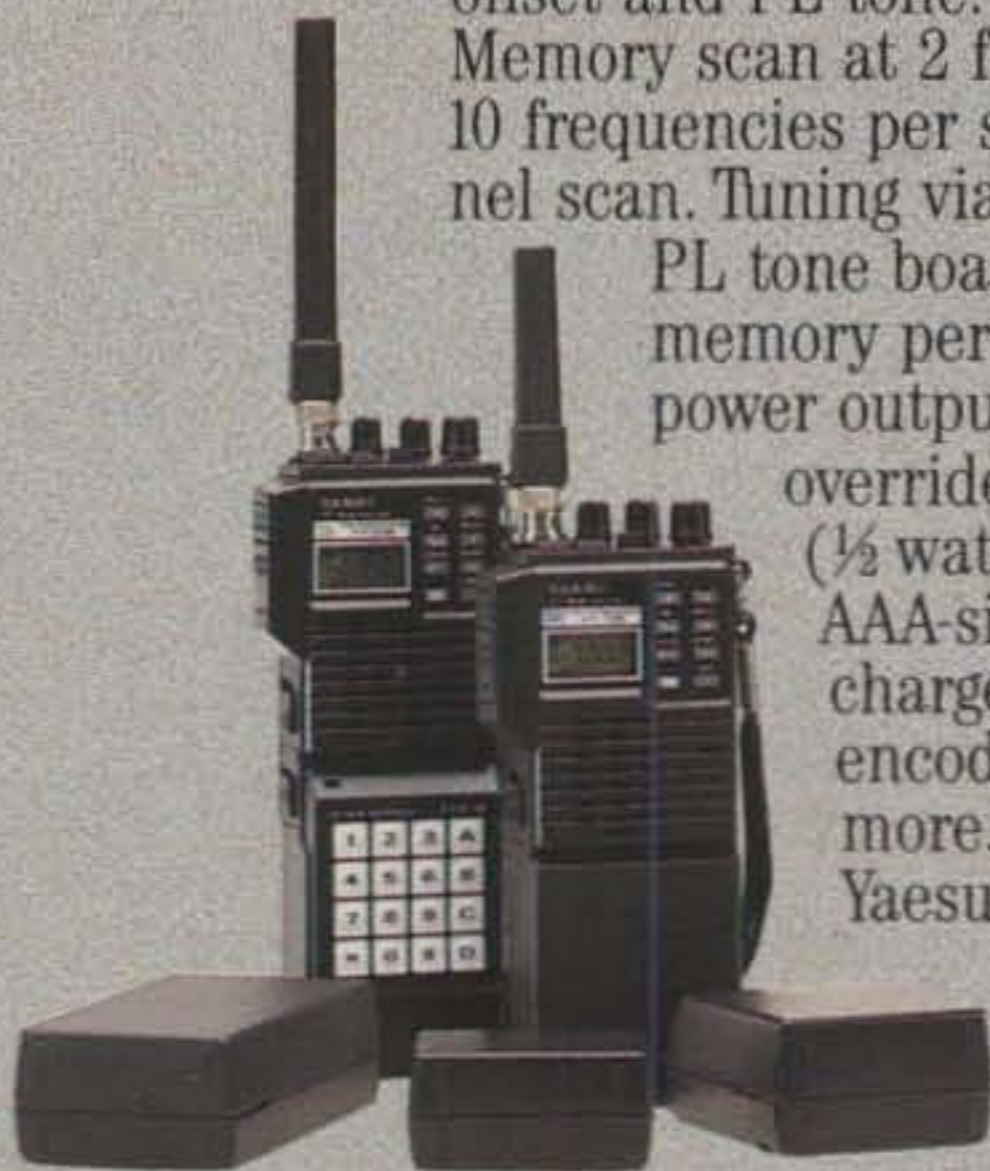
Let's face it. It's easy to bump, drop, or get rain on an HT. ■ But if your HT is Yaesu's mini 2-meter FT-23R or 440-MHz FT-73R, such mishaps are a lot less worrisome. ■ They're built to last, with rugged aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. Plus, their moisture-resistant seals really help keep the rain out.

**Built for the realities of operating.** Despite their miniature size, both radios have all the operating capabilities of larger microprocessor-controlled HTs. Yet operating them couldn't be easier. Consider: ■ You get a 7.2-volt, 2-watt battery pack. (Optionally, a 12-volt, 5-watt pack, or 7.2-volt miniature 2-watt pack.) 10 memories that store frequency, offset and PL tone. (7 memories can store odd splits.) Memory scan at 2 frequencies per second. Band scan at 10 frequencies per second. Tx offset storage. Priority channel scan. Tuning via tuning knob, or up/down buttons.



Radios above shown actual size.

PL tone board (optional). PL display. External PL selection. Independent PL memory per channel. PL encode *and* decode. Expanded Rx coverage.\* LCD power output and "S"-meter display. Battery saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch ( $\frac{1}{2}$  watt on low power.) ■ Options available: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And much more. ■ So get the intelligent mini HT that's built for life's realities. Yaesu's 2-meter FT-23R, or 440-MHz FT-73R.



# YAESU

CIRCLE 86 ON READER SERVICE CARD

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

\*Modification required. Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc.

thony Luscre, KA8NRC, 5441 Park Vista, Stow, OH 44224.

## Texas QSO Party

0000Z Sat. to 1800Z Sun., Jan. 17-18

There was no Texas QSO Party in 1986. However, the West Texas DX Association has reactivated the party and indicated it will continue in the future.

The same station can be worked on each band and each mode, and mobiles in each county change. Single operator only.

**Exchange:** QSO no., and QTH. County for Texas stations. State, province, or country for others.

**Scoring:** Texas stations score 1 point per QSO on phone, 2 points if on CW, fixed or mobile. (In-state contacts permitted for QSO and multiplier credit.) Non-Texans same as above. However, Texan phone mobiles are worth 5 points, CW mobiles 7 points.

**Multiplier:** Texans use states, VE provinces, DX countries, and Texas counties. Non-Texans use Texas counties (maximum of 254).

**Frequencies:** CW—3565, 7065, 14065, 21065, 28065. Phone—3940, 7260, 14280, 21370, 28600. Novice—3710, 7110, 21110, 28110.

**Awards:** Certificates to the top scorers in each state, VE province, and DX coun-

try, and top 10 Texas stations. There are also plaques for the overall winners in seven different areas: U.S., U.S. Novice, DX, VE, Texas fixed, mobile, and Novice stations.

All logs must be received by March 14th. This year they go to: Les Bannon, WF5E, 3400 Bedford, Midland, TX 79703.

## AGCW-DL QRP CW Contest

1500Z Sat. to 1500Z Sun., Jan. 17-18

This is the winter edition of this QRP contest organized by the AGCW-DL. It's a CW only on all 6 bands, 10-160 meters. The same station can be worked on each band for QSO and multiplier credit.

There are five classes as follows:

- Single Op.—3.5 watts or less.
- Single Op.—10 watts or less.
- Multi-Op.—10 watts or less.
- QRO stations, over 10 watts.
- SWL's.

Multi-operator stations may operate the full 24 hours. All other classes must take a 9-hour break.

**Exchange:** RST, QSO no., and power input. Add x if transmitter is crystal controlled (559001/5x, QRO stations 579002/QRO).

**Points:** QSO with own country, 1 point. Other countries own continent, 2 points. DX outside own continent, 3 points. Crystal-controlled stations are limited to 3

crystals for each band, and take double above points.

**Multiplier:** One for each country and one for each DX contact. For scoring purposes call areas in JA, PY, VE, VK, W/K, and ZS are counted as multipliers.

**Final Score:** Total QSO points times the multiplier on that band. Add the sum of scores from each band.

**Awards:** Certificates to the first three places in each class on each band. Use a separate log for each band.

All entries must be received no later than six weeks after the end of the contest. Include 1 IRC for copy of results.

Entries go to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Republic of Germany.

## Hungarian CW Contest

2200Z Sat. to 2200Z Sun., Jan. 17-18

This is an annual affair organized by the Hungarian Radioamateur Society to promote better relations between HA's and amateurs in other countries.

**Classes:** Single operator, both single and all band, and multi-operator all band (club stations).

**Exchange:** RST and QSO contact number starting with 001. HA stations will also add two letters to identify their county. There are 20 counties: BA, BE, BP, BN,

**★ QUALITY PARTS    ★ DISCOUNT PRICES    ★ FAST SHIPPING! ★**

**SEND FOR FREE CATALOG... 48 PAGES!**

**ALL ELECTRONICS CORP.**  
905 S. VERMONT • P.O. BOX 20406 • LOS ANGELES, CA 90006

---

**13.8 VDC REGULATED POWER SUPPLY**

These are solid state, fully regulated 13.8 vdc power supplies. Both feature 100% solid state construction, fuse protection, and L.E.D. power indicator. U.L. listed.

2 amp constant, 4 amp surge    \$20.00 each  
3 amp constant, 5 amp surge    \$27.50 each

---

**10 AMP SOLID STATE RELAY**

CONTROL: 3 - 32 vdc  
LOAD: 140 vac 10 amp  
SIZE: 2 1/2" x 3/4" x 1/2"

**\$9.50 EACH 10 FOR \$90.00**

**PHOTO-FLASH CAPS**

170 mf 330v 75¢ ea. Three sizes  
CAT# PPC-170

400 mf 330v 1.00 ea.  
CAT# PPC-400

800 mf 330v 1.35 ea.  
CAT# PPC-800

**48 KEY ASSEMBLY FOR COMPUTER OR HOBBYIST**

NEW! 1. KEYBOARDS. Originally used on computers, these keyboards contain 48 S.P.S.T. mechanical switches. Terminates in 15 pin connector. Frame 4" x 9"

CAT# KP-48 \$3.50 each  
10 for \$30.00

---

**RECHARGEABLE NI-CAD BATTERIES**

AAA SIZE 1.25V 500mAH \$1.85  
AA SIZE 1.25V 500mAH \$1.85  
AA with solder tab \$2.00  
C SIZE 1.2V 1200mAH \$3.50  
SUB-C SIZE solder tab \$3.50  
D SIZE 1.2V 1200mAH \$3.50

**FLASHER LED**

5 volt operation red jumbo T 1 1/4 size \$1.00 each

**NEW GREEN FLASHER**  
CAT# LED-4G \$1.00

**MINIATURE TOGGLE SWITCHES**

S.P.D.T. (on-on) Solder lug terminals. \$1.00 each  
10 for \$9.00

S.P.D.T. (on-off-on) Solder lug terminals. \$1.00 each  
100 for \$80.00

---

**8 OHMS 15 WATTS EXTRA SPECIAL VALUE**

C.T.S. MODEL BR3079

8" LOUDSPEAKER.....  
8 OHMS COIL 100 - 10,000 Hz  
Power rating 15 watts max  
3.0 oz ferrite magnet  
Typical response range:

CAT# SK-B15 \$3.50 each  
case of 8 \$25.00  
96 pcs \$ 27.75 each.

**XENON FLASH TUBE**

3/4" long X 1/8" dia. Flash tube designed for use in compact camera flash units. Ideal for experimentors.

CAT# FLT-1 2 for \$1.00

**D.P.S.T. LIGHTED ROCKER SWITCH**

115 vac lighted rocker snap mounts in 7/8" x 1 1/2" hole. Orange lens. 16 amp contact. \$1.50

---

**ULTRA-MINIATURE 5 VDC RELAY**

Fujitsu # FBR211NED005M20  
High sensitivity COIL: 120 ohms \$1.25 each  
CONTACTS: 1 amp 10 for \$10.00  
Mounts in 14 pin DIP socket

**MINI-PUSH BUTTON**

S.P.S.T. momentary normally open 1/4" bushing. Red button. 35¢ each  
10 for \$3.00

---

**TOLL FREE ORDERS • 1-800-826-5432**  
(IN CA: 1-800-258-6666)  
INFO • (213) 380-8000  
TWX - 5101010163 ALL ELECTRONIC

• QUANTITIES LIMITED  
• MINIMUM ORDER \$10.00  
• USA \$3.00 SHIPPING  
• NO C.O.D.  
• FOREIGN ORDERS INCLUDE SUFFICIENT SHIPPING  
• CALIF. RES. ADD 6% TAX

**SPECIAL OUTSTANDING PRICES ON IBM™ XT COMPATIBLE SYSTEMS!**



**SYSTEM #1**  
**\$399.00**

Motherboard with BIOS and first 64K of RAM. Upgradable to a full 640K of RAM. Flip top case. K8XT (AT look alike) keyboard. 150 watt power supply with all the power needed to run extra drives and cards.

**SYSTEM #2**  
**\$699.00**

Motherboard with BIOS and first 256K of RAM. Upgradable to a full 640K of RAM. Flip top case. K8XT (AT look alike) keyboard. 150 watt power supply. Dual disk drive card with cables. One floppy drive DS DD 360K. A color graphics card with RGB and composite output. (All you need is a monitor)

**SYSTEM #3**  
**\$999.00**

Motherboard with BIOS and first 256K of RAM. Upgradable to a full 640K of RAM. Flip top case. K8XT (AT look alike) keyboard. 150 watt power supply. Color graphics card with RGB and composite outputs. Multi I/O card with two disk drive ports, one parallel port, one serial port and one serial port option, one game port, clock and calendar with battery backup. Two floppy disk drives DS DD 360K and a composite monitor.

**Upgrading Motherboard to a full 640K RAM**  
Upgrade from 64K to a full 640K — \$102.00  
Upgrade from 256K to a full 640K — \$ 70.00

(TM)\* IBM is a registered trade mark of International Business Machines Corp.

**SHIPPING INFORMATION: PLEASE INCLUDE 10% OF ORDER FOR SHIPPING AND HANDLING CHARGES (MINIMUM \$2.50, MAXIMUM \$10). CANADIAN ORDERS, ADD \$7.50 IN US FUNDS. MICHIGAN RESIDENTS ADD 4% SALES TAX. FOR FREE FLYER, SEND 22¢ STAMP OR SASE.**

**HAL-TRONIX, INC.**  
12671 Dix-Toledo Hwy  
P.O. Box 1101,  
Southgate, MI 48195

**(313) 281-7773**  
Hours  
12:00-6:00 EST Mon-Sat

"Hal" Harold C. Nowland  
W8ZXH



BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA.

**Points:** Contacts with HA stations count 6 points. With other stations outside own continent, 3 points. Same station may be worked on each band for QSO points.

**Multiplier:** Each different HA county worked on each band.

**Score:** Total QSO points from all bands times the sum of the multipliers from each band.

**Frequencies:** 3500-3590, 7000-7035, 14000-14090, 21000-21090, 28000-28090 kHz.

**Awards:** Certificates to the top scorers in each class in each country. Additional awards if returns justify.

Use a separate log sheet for each band and include a summary sheet showing the scoring, etc. The usual signed declaration is also requested.

Mail your entry within six weeks from the end of the contest to Hungarian Radioamateur Society, Contest Bureau, P.O. Box 86, H-1581 Budapest, Hungary.

### North Dakota QSO Party

0000-0800Z & 1600-2400Z Sat., Jan. 17  
0800-1600Z Sun., Jan. 18

Sponsored by the Red River Radio Amateurs of Fargo, North Dakota, this one will make one of the rarer states available for WAS and County Hunters.

The same station may be worked once on each band and each mode.

**Exchange:** RS(T), QSO no., and QTH. County for ND stations; state, province, or country for others.

**Scoring:** Count 10 points for phone QSO's, 20 points for CW, and 50 points for RTTY. ND stations add 250 bonus points for working 5 Novices.

**Final Score:** ND stations multiply total QSO points from all bands by sum of states, provinces, and countries worked per band and mode. Others multiply by total number of ND counties worked (maximum of 53).

**Frequencies:** CW—1810, 3540, and 35 kHz up from edges on other bands. Phone—1810, 3905, 7280, 14295, 21380, 28500. Novice—25 kHz up from edges of Novice bands.

**Awards:** None mentioned, but include a large SASE with your entry for a copy of the results to see if you won anything.

Mail logs by February 28th to Mike Beaton, KD0A, 2267 Flickertail Drive, Fargo, ND 58103.

### CQ WW DX 160 Meter Contest

CW: Jan. 23-25 SSB: Feb. 20-22  
2200Z Friday to 1600Z Sunday

Complete rules were published in the November issue and are the same as those used in previous years.

We are still advocating the use of the

DX Window and are very critical of those abusing this long-established and recognized "gentlemen's agreement."

Briefly repeating the rules, they are as follows:

**Classes:** Single and multi-operator.

**Exchange:** RS(T) and QTH. State for U.S., province or call area for Canada. Not necessary for DX to spell out their country, but it is recommended that only standard prefixes be used in their call.

**Scoring:** Contacts with stations within own country 2 points, with other countries but in same continent 5 points, with other continents 10 points.

**Multiplier:** Each U.S. state (48), each Canadian area (13), and each DX country (ARRL and WAE lists).

**Awards:** Certificate to top-scoring station in each state, Canadian area, and DX country.

The disqualification clause for excessive duplicate contacts and other violations is still very much in effect.

Include a summary sheet with your entry showing the scoring and other essential information, and a signed declaration that all rules and regulations have been observed.

Mailing deadline for CW entries is Feb-



**1-800-328-0250** IN MINN.: (612) 535-5050  
SERVICE: (612) 535-7533

## Ten-Tec Gives You More Watts Per Buck!



## TITAN 425 Linear Amp

CALL FOR QUOTE!

"BOOM BOX" EXTRAORDINAIRE! Remoted power supply makes possible, this compact, desk top linear amplifier. Puts out a solid 1500 watts SSB and CW, 1000 watts continuous power on RTTY, AMTOR or SSTV. Lightning fast QSK for "break-in" CW and super AMTOR performance.

## Watch for NEW Ten-Tec PARAGON All-Mode Gen. Coverage Digital HF XCVR!

### BENCH TESTED previously owned ham gear!

**KENWOOD**  
TS 930S w/AT \$1029  
TS 830S \$629  
TS 430S \$529  
TS 130SE \$429  
TS 120S \$369  
TS 530S \$519  
TS 820S \$499  
TS 520SE w/CW \$449  
TS 520S \$409  
TS 520 \$379  
TS 180S/DFC, CW \$449  
R600 \$239  
R2000 \$380  
VFO 240 \$139  
SP 230 \$59  
DFC 230 \$139  
VFO 820 \$109  
VFO 520 \$109  
MC 50 \$35  
TS 700A \$289  
TV 506 \$149  
PS-20 \$49  
TR 2400 \$119  
TR 2500 \$199  
TR 3500 \$199  
TR 2600 \$249  
HT ACCY CALL

**DENTRON**  
MLA 2500B \$695  
8040 AT \$49  
JR. MONITOR \$54

**ICOM**  
751 w/CW \$839  
745 \$699  
740 w/SUP \$629  
R71A/FL44 \$779  
SP3 \$43  
PS15 \$109  
IC02AT \$249  
2AT \$169  
BC35 \$59  
EX199 \$20

**TEN-TEC**  
CORSAIR w/CW \$799  
ARGOSY \$429  
CENTURY 21 \$175  
OMNI D w/CW & 55B \$599  
VFO 242 \$89  
247 TUNER \$99

**COLLINS**  
3253 w/PS, ROUND \$309  
75SI \$239  
75A SPKR \$25  
30LI \$549  
75A4 \$249  
75S3B w/CW, WING \$329  
3253 w/511F2, WING \$289  
312B4 WING \$169

**SWAN**  
CYGNET \$249  
500C w/PS \$289  
500 w/PS \$279  
ASTRO 102BX \$599  
w/PS & CW  
VX-2 \$15

**YAESU**  
FT901DM \$525  
FT101Z DMK III \$495  
FT301D/FP301 \$449  
R71A/FL44 \$779  
FT707/FV707DM \$469  
FT101E, FAN, CW \$439  
FT101EE, CW \$409  
FV101B \$99  
FTV250 \$179  
FT107DMS \$529  
FT480R, 780R, SCI \$849  
FV101DM \$199  
FT209RH \$249  
FT208R \$199  
FT207R \$119  
FT202 \$69  
HT ACCESSORIES CALL

**DRAKE**  
TR-7, P57, NB, AUX. \$849  
T4XC, R4C, MS4, AC4 \$699  
w/FOX TANGO  
R4C w/500 \$329  
MS4 \$45  
2C, 2CQ \$149  
CC1-W/2 & 6M \$179  
RV-1C \$69

**HEATH**  
SB220 \$529  
SB201 \$339  
HW16 w/VFO \$125  
HM2140 \$69  
HM102 \$29

**MFJ**  
949 \$89  
949C \$99

**MISCELLANEOUS**  
AUTEK QF1 \$49  
MORROW CM-1 \$20  
ATLAS 180 w/AC & DIG. \$299  
AMECO PT-2 \$75  
RFE 100 FREQ. DISP. \$100  
REDI-KILOWATT  
MEM KEYS \$129  
CW SENDIN' MACHINE  
MEM. KEYS \$109  
AEA KT-2 \$99  
AEA CP-1 \$139  
KANTRONICS  
INTERFACE \$79  
DOVETRON MPC  
1000R-II \$999  
HAL D5-3000  
w/MON \$199  
HAL ST5000 \$89  
HAL ST-6 \$149  
HAMMERLUND  
HXL-ONE \$239

FOR ABSOLUTE  
LOWEST PRICE  
BUSTERS!

TNT ... WHERE YOU  
GET THE SERVICE  
AFTER THE SALE!

VISA/MASTER CARD  
FREE SHIPPING  
ON MOST RIGS FOR CASH!



S.A.S.E. FOR OUR  
"BENCH-TESTED"  
USED EQUIPMENT LISTING

MON-FRI 9 AM - 6 PM CENTRAL TIME  
SATURDAY 9 AM - 5 PM

4124 West Broadway, Robbinsdale, MN 55422 (Mpls./St. Paul)

CIRCLE 22 ON READER SERVICE CARD

ruary 28th, and March 31st for the SSB section. They can be sent directly to the 160 Contest Director, Don McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32904. And, of course, they can be sent to the CQ office, 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. (Be sure to indicate CW or SSB on the envelope.)

### French DX Contest

CW: Jan. 24-25 SSB: Feb. 28-Mar. 1

This year's announcement from the REF showed no change from last year's format. It's still the world working the French Europeans as well as the other French departments and territories all over the world. The French areas can usually be identified by the letter "F" in the prefix.

**Classes:** Single operator and multi-operator. Multi stations must remain on the same band at least 15 minutes.

**Exchange:** RS(T) plus a 3-figure QSO number starting with 001. French stations will also include two figures or letters identifying their department.

**Points:** One point per contact between stations in the same continent, 3 points if with other continents.

**Multiplier:** Each French European department (95) and each overseas department and territory worked. Also DA1 and DA2 French Army, 2A and 2B Corsica, and the Club station F6REF.

**Final Score:** Total QSO points from all five bands (3.5-28 MHz) times the sum of the multipliers from each band.

**Awards:** Certificates to the top scorers in each country. European single operator must make at least 100 QSOs; multi-operators 250 QSOs. All other areas 50 QSOs for single operator, 100 QSOs for multi-operator.

Stations making over 250 contacts must include a dupe check list with their log. The usual disqualification rules for excessive duplicate contacts and other violations will be strictly enforced.

All entries must be postmarked no later than March 5th for CW and April 5th for SSB. This year they go to The REF Contest Committee, Att: Lucien Aubry, F8TM, 53 Rue Marceau, 91120 Palaiseau, France.

### YL ISSB QSO Party

CW: Jan. 31-Feb. 1 SSB: Mar. 21-22  
0001Z Saturday to 2359Z Sunday

The party is open to all, but the emphasis is on membership participation.

**Categories:** Single operator, DX-US Partners, and YL-OM Teams.

**Exchange:** Call, RS(T), QTH (state, prov., terr., dist. or country), name, ISSB number, YL-OM teammate, DX-US partner.

### 1986 French DX Contest U.S.A. and Canada Results

W1OPJ	507	K2SX	28,178
W3FQE	440	W3ARK	19,603
KA7FET	3	K1BV	9,492
VO1AW	18,156	W8KV	8,366
VE3XN	12,815	N8FU	7,434
VE3ST	7,560	KA1DWX	6,364
VE2EDK	4,958	KA0TVS	2,184
*VE2UMS	44,550	WA2UDT	1,005

#### SSB

KB0U	147
VE3XN	12,444
VE2AFC	120

\*Multi-opr.  
(Overseas logs received: CW 309, SSB 130.)

**Points:** One point for non-member contacts, 3 points for member contacts on the same continent, and 6 points if in a different continent.

**Multiplier:** Only contacts with member stations count as a multiplier. There are ten different categories. Get the list from WA9AEA.

**Frequencies:** The General portions of the CW and phone bands, 10 through 80 meters. Avoid 14332 used by ISSB Net. Check 40 and 80 hourly. VHF and UHF may be used simplex.

**Awards:** Category and QTH area winners.

**Logs:** Should be set up as outlined in the exchange and should indicate at least two 6-hour rest periods. A summary sheet showing the scoring and other essential information would be helpful.

Mailing for all entries is April 30th, and they go to: Bill Early, WA9AEA, P.O. Box 401, McHenry, IL 60050-0401.

(Note: Rules and logging format are much too lengthy and complicated to list here. Strongly suggest you send a large SASE to WA9AEA for more details.—ed.)

### Classic Radio Exchange

2100Z Sun. to 0400Z Mon., Feb. 1-2

This is the winter edition of this unusual event. The format is still the same as it has been for the past years. Object is to restore and operate older equipment with like-minded hams, not required in the exchange, but a distinct advantage in the scoring.

A classic radio is any equipment at least 10 years old.

The same station may be worked on each band and each mode, and with different equipment combinations. Non-contesters may be worked for credit also.

**Exchange:** Name, RS(T), QTH, receiver and transmitter type, and other interesting conversation.

**Scoring:** Multiply total QSOs by total number of receivers, transmitters, state/provinces/countries worked on each band and mode. Multiply that total by your Classic Multiplier, the total age of all receivers and transmitters used. Three QSOs minimum per unit. Multiply age by two if gear is a transceiver.

**Frequencies:** CW—60 kHz up from low edge of band. Phone—3910, 7280, 14280, 21380, 28580. Novice/Tech.—3720, 7120, 21170, 28120.

**Awards:** Certificates and appropriate memorabilia are awarded for highest scores, longest DX, exotic equipment, best excuses, and other unusual achievements.

This year send your log, comments, anecdotes, pictures to: Jim Hanlon, W8KGI, 5560 Linworth Road, Columbus, OH 43085. Include a large SASE for a copy of the "Classic Radio Newsletter" with the results.

### RSGB 7 MHz Contest

SSB: Feb. 7-8 CW: Feb. 21-22  
1200Z Saturday to 0900Z Sunday

It's the world working the British Isles on SSB 7.040-7.100 and CW 7.000-7.030 MHz. (How about the US on SSB, split frequency?)

Following rules are for areas outside the British Isles.

**Exchange:** RS(T) plus a serial number starting with 001.

**Scoring:** Europeans get 5 points for each B.I. contact. All other areas earn 15 points per contact.

**Multiplier:** All other areas count each different B.I. prefix worked (i.e., G2, GD3, GI4, etc.). Total of 49 available.

**Final Score:** Total QSO points times the total prefix multiplier worked.

Unmarked duplicate contacts will be penalized 10 times the number of points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

There is an SWL section. Only B.I. stations are to be logged. Scoring same as above. The same station may be logged only once, and the station being worked may only be repeated once in every three contacts logged.

**Awards:** Certificates of merit will be awarded to the first, second, and third place scores to European and to non-European stations.

Include a summary sheet showing the scoring and other essential information, including the usual signed declaration that all rules and regulations have been observed.

SSB logs must be received by March 30th, CW logs by April 20th. They go to: HF Contests Committee, P.O. Box 73, Lichfield, Staffs., WS13 6UJ England.

## "HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

### Novice Roundup



The Novice Roundup certificate.

The American Radio Relay League (ARRL) sponsors the Novice Roundup (NR) Contest each February. The Novice class of license came into existence in 1951, and the first Novice Roundup was held in 1952. This year's contest is the 36th Novice Roundup.

The name "Novice Roundup" was established many years before Technician licensees were granted code operating privileges in the so-called Novice bands. The name remains appropriate because operation remains confined to the frequency segments (sub-bands) available to Novice class licensees on a shared basis with all other classes of American amateur radio licensees.

#### Participants

This contest is primarily for American Novice and Technician class licensees, but General, Advanced, Extra, and foreign (DX) operators are also invited to operate in it. Novices and Technicians can work all amateurs (Novice, Technician, General, Advanced, Extra, and DX), but General, Advanced, Extra, and DX amateurs are only allowed to work Novices and Technicians in the contest. This is a good rule, because it guarantees that at least one Novice or Technician is involved in each NR contact.

#### Benefits

I advise you to operate in the NR even if you have a poor station and/or low code proficiency. This contest provides a great opportunity to contact amateurs in many counties, states, and countries. You

probably can work more contacts during one day of the NR contest than you normally work in a month. These contacts can help you qualify for hundreds of operating awards. Novice contacts remain valid after one upgrade, even if the call sign is changed.

NR operation will let you judge your operating skills and station performance against those of other operators. NR participation can also help you increase code receiving and sending proficiencies. You can benefit in many ways by operating in contests every week, and they are listed each month in the Contest Calendar of this magazine.

#### Competition and Awards

This contest provides a unique opportunity for Novices and Technicians to compete on the air against other Novices and Technicians in their own ARRL sections, plus against those who operate from other ARRL sections. Novices just compete against Novices, and Technicians only compete against Technicians; Novices and Technicians do not compete against each other in this contest.

The ARRL issues a certificate to each Novice and Technician who sends in a valid entry. Even if you only make one contact, you will receive a participation certificate. If you are an ARRL section score leader or national leader, you will receive the certificate with an endorsement stating such.

General, Advanced, Extra, and foreign (DX) amateurs are invited to take part in the NR contest, but they are not eligible for NR certificates. These operators provide contacts, cards, and code practice for Novices and Technicians.

Multi-operator stations (two or more operators using the same call sign at one location, including loggers) are also ineligible to win NR contest awards. The rule keeps it a one-on-one contest and prevents a group (such as a club) from competing directly against an individual Novice or Technician operator.

No certificates are awarded to DX Novices who operate in the NR. However, American Novices greatly appreciate opportunities to contact DX amateurs, and I hope many DX amateurs will be on the Novice bands during this contest.

#### Dates and Times

The NR contest starts at 0001 UTC on

the 30th of January, and it ends at 2359 UTC on the 8th of February. To state it more simply, it starts Friday evening January 30th (local time), and it ends Sunday evening February 8th. The NR starts one minute past 4, 5, 6, and 7 p.m. PST, MST, CST, and EST, respectively. Similarly, the NR ends one minute before 4, 5, 6, and 7 Pacific, Mountain, Central, and Eastern Standard Times, respectively.

The NR contest length is 215 hours and 58 minutes. Novices and Technicians are allowed to work a maximum of 30 hours in the NR. The NR log must show each time one goes on and off the air during the contest, and the minimum allowable time off the air is 15 minutes. Listening time on the air counts as contest operating time, and it must be shown as time on the air. I advise you to be completely honest in all contest matters; it helps you to accurately gauge your improvement in subsequent contests.

#### Operating

**Bands.** All NR contacts must be made in the 80, 40, 15, and 10 meter Novice bands. No crossband contacts are allowed, such as listening on 10 meters and calling or answering on the 15 meter Novice band. It does not help to work the



Here are 11-year-old Allen, KA7VIO, and 12-year-old Kari, KA7VIP, Wilcox of Kuna, Idaho. They are children of Ron Wilcox, KA7VIN, who is justifiably proud of them. All three have been licensed about a year and a half. Allen has upgraded to Technician. Their station includes a Yaesu FT-101 transceiver and a dipole antenna. They are enjoying amateur radio.

same station more than one time on a band, or on more than one band, since credit is just allowed for one contact with each different station worked. Keep up-to-the-minute dupe sheets (the dupe sheets are two-sided) of all stations contacted during the NR to help you avoid working the same station more than one time. It is fairly common to have DX amateurs call American Novices using voice (usually SSB) on the 10 and 15 meter Novice bands; these crossmode (voice-code) contacts do count in the NR, as long as both sides of the contact are within the same Novice band.

**Identification.** Novices add /N and Technicians add /T to their callsigns during this contest to indicate their eligibility to all amateurs participating in the NR. As examples, a Novice with a callsign such as KB6ABC uses KB6ABC/N, and a Technician with a callsign such as WA6FNM uses WA6FNM/T during the contest. Out-of-area operation is also indicated in callsigns to minimize confusion. As an example, if a Technician with an apparent California callsign, such as WA6FNM, is operating in the NR from Louisiana, he would identify as WA6FNM/5T to indicate that he is operating from the ARRL Louisiana (LA) section instead of the Los Angeles section (LAX).

General, Advanced, and Extra class licensees are not required to indicate class of license as part of the callsign used in the NR. However, many of us use /G, /A, or /E to make it very clear to other General, Advanced, Extra, and DX amateurs that we are not valid NR contacts

for them; we are only valid NR contacts for Novices and Technicians. This additional identification is particularly useful in cases in which callsigns such as KA6CUT and WB6PNY are used. Such callsigns might lead one to believe that these amateurs are Novice or Technician licensees, whereas they were both Extra class amateurs.

**Objective.** The idea is to work as many amateurs as possible in all the countries and ARRL sections you can contact. It is very helpful to maintain a check sheet to let you see at a glance which countries and ARRL sections you still need to multiply your NR score as you operate in the contest. It is simple to start with a list that shows all ARRL sections grouped by callsign areas and to cross out each section as it is worked, to show that it is no longer needed as a contest multiplier. The accompanying list of ARRL sections can be reproduced to serve as an aid.

Each time a new section or country is worked, it must be indicated (in sequence) in the NR log. Simply start with number one and continue up as you earn multipliers, including countries other than Canada and the United States.

More than one section abbreviation is shown in the ARRL sections list, if more than one is known to be commonly used. Very few foreign amateurs are usually contacted during this contest, and it is common practice to simply add the callsign of the first amateur contacted in each country to the check-off list to show that country is no longer needed for NR multiplier credit.

**Typical Contact.** As is true in all contests, NR contacts should be as brief as possible. A typical good NR contact between KB6ABC and W6JEP in the first few days of this contest could be as follows:

```
CQ NR CQ NR CQ NR CQ NR CQ NR DE
KB6ABC/N
CQ NR CQ NR CQ NR CQ NR DE
KB6ABC/N KB6ABC/N
CQ NR CQ NR CQ NR DE KB6ABC/N
KB6ABC/N KB6ABC/N K
KB6ABC KB6ABC DE W6JEP W6JEP
NR K
W6JEP DE KB6ABC BT 579 LA 579
LA BK
BK R 589 LA 589 LA DE W6JEP BK
BK R 73 CQ NR CQ NR CQ NR DE
KB6ABC/N KB6ABC/N NR K
```

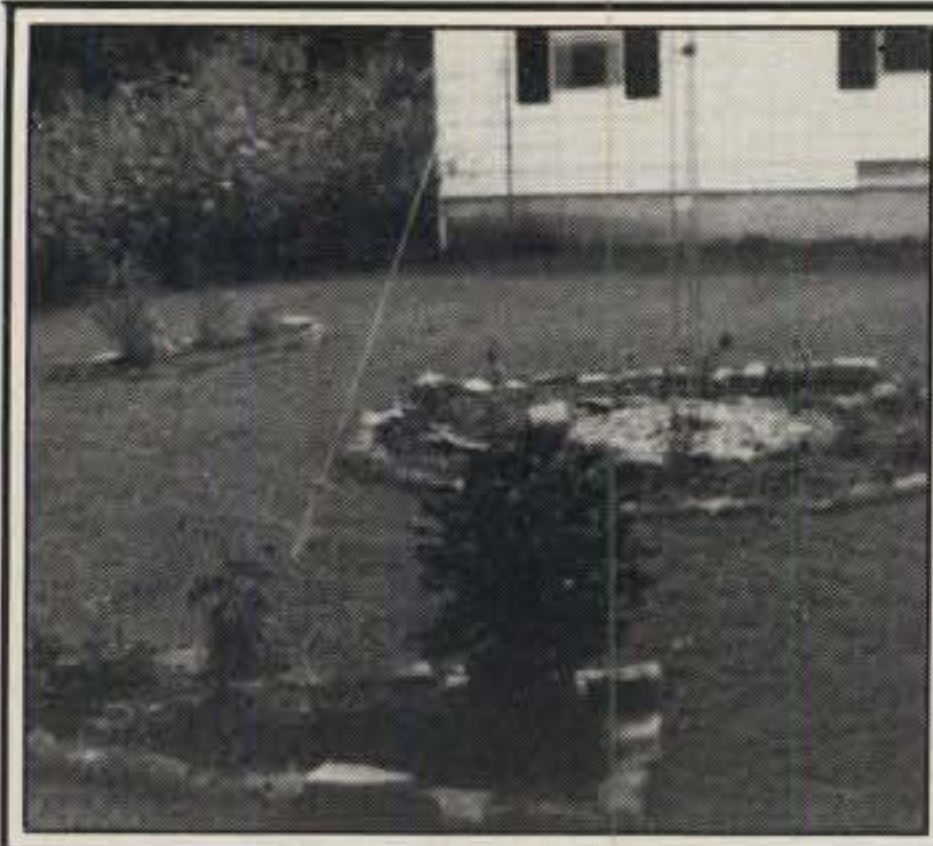
Look at the preceding typical exchange and evaluate it very carefully with regard to the comments in the rest of this paragraph. In the initial call, KB6ABC included the /N each time with his callsign to indicate contest eligibility to all other amateurs. Notice also that the number of CQ NR transmissions decreased from five to three and station identification increased from one to three during the calling sequence, and the NR contact activity was again indicated prior to the invitation to transmit (K) at the end of the third CQ NR sequence. When W6JEP answered the call, she just identified both stations twice, left off the /N, and indicated contest participation by sending NR before the invitation to transmit. Once the two-way contact has been established, there is no need to continue using /N or /T.

#### ARRL 74 Sections Check-Off List

(1) CT	CONN	Connecticut	VA	Virginia	(8) MI	MICH	Michigan
EMA	E MASS	Eastern Massachusetts	WIN	West Indies (KG4, KP4, KV4, etc.)	OH		Ohio
ME		Maine	(5) AR	Arkansas	WV	W VA	West Virginia
NH		New Hampshire	LA	Louisiana	(9) IL	ILL	Illinois
RI		Rhode Island	MS	Mississippi	IN	IND	Indiana
VT		Vermont	NM	New Mexico	WI	WIS	Wisconsin
WMA	W MASS	Western Massachusetts	N TX	Northern Texas	(0) CO	COLO	Colorado
(2) ENY		Eastern New York	OK	Oklahoma	IA		Iowa
NLI		New York City and Long Island	S TX	Southern Texas	KS	KANS	Kansas
NNJ		Northern New Jersey	(6) EB	East Bay	MN	MINN	Minnesota
SNJ		Southern New Jersey	LAX	Los Angeles	MO		Missouri
WNY		Western New York	ORG	Orange	NE	NEBR	Nebraska
(3) DEL	DE	Delaware	PAC	Pacific (KH6, etc.)	ND	N DAK	North Dakota
E PA	E PENN	Eastern Pennsylvania	SB	Santa Barbara	SD	S DAK	South Dakota
MDC	MD or DC	Maryland or District of Columbia	SCV	Santa Clara Valley			
W PA	W PENN	Western Pennsylvania	SDG	San Diego			
(4) AL	ALA	Alabama	SF	San Francisco			
GA		Georgia	SJV	San Joaquin Valley			
KY		Kentucky	SV	Sacramento Valley			
NC	N CAR	North Carolina	(7) AK	Alaska			
N FL	N FLA	Northern Florida	AZ	Arizona			
SC	S CAR	South Carolina	ID	Idaho			
S FL	S FLA	Southern Florida	MT	Montana			
TN	TENN	Tennessee	NV	Nevada			
			OR	Oregon			
			UT	Utah			
			WA	Washington			
			WY	Wyoming			

Canadian Provinces		
MAR	VE1/V0	Maritimes or Newfoundland
PQ	VE2	Quebec
ON	VE3	Ontario
MB	VE4	Manitoba
SK	VE5	Saskatchewan
AB	VE6	Alberta
BC	VE7	British Columbia
NWT/	VE8	Northwest Territories or Yukon
YU		





Greg Compton, KA8ZAF, erected this homebrew vertical antenna in the front yard of his Lucasville, Ohio home. He added flower-herb beds to make the installation look nicer. In addition, the basil, chives, doublemint, oregano, parsley, peppermint, sage, spearmint, tarragon, and thyme grown are used in meals.

The KB6ABC reply to W6JEP is very brief; the callsigns are just sent one time each and only at the beginning of the reply. The RST report and ARRL section are sent twice to minimize possible requests for repeats. Neither the term *RST* nor the word *section* precedes the report and League section, since it is obvious what both are, and the break sign (BK) is used to eliminate unnecessary identifications. During contest activity a series of short transmissions is not likely to extend past 10 minutes, and the identification shown in the sample exchange suffices. Note that the W6JEP response is short; the R advises that the KB6ABC contest data has been received. W6JEP then sends the report (RST) and her section twice, identifies with just her callsign to give KB6ABC assurance that he is copying the correct signal, and sends the break sign to invite KB6ABC to respond.

When KB6ABC answers, he sends R to indicate the contest data has been received, he may send best regards (73), and he then sends a short contest call in case another station is waiting for a contest contact. When the short call is sent, the /N is again added to indicate contest eligibility to all amateurs. This indicated brief exchange is further abbreviated after the first few days the contest has been in progress, but the sample exchange is suitable at the start of each year's NR.

After the first few days of NR activity, shorten the call to a single 3 by 3 or 2 by 2 (CQ NR CQ NR DE KB6ABC/N KB6ABC/N NR K, as an example) and listen carefully (above and below your transmitting frequency) for answers before repeating this call. The rest of the previous explanation holds true when using this preferred shorter calling procedure.

**Brevity.** Do not routinely exchange nor-

## Measure Up With Coaxial Dynamics Model 81000A RF Directional Wattmeter

Model 81000A is a thoroughly engineered, portable, insertion type wattmeter designed to measure both FWD/RFL C. W. power in Coaxial transmission lines.

81000A is comprised of a built-in line section, direct reading 3-scale meter protected by a shock-proof housing. Quick-match connectors, plus a complete selection of plug-in elements, gives the FRONT RUNNER reliability, durability, flexibility and adaptability with a two year warranty.

Contact us for your nearest authorized Coaxial Dynamics representative or distributor in our world-wide sales network.



**COAXIAL  
DYNAMICS,  
INC.**

15210 Industrial Parkway  
Cleveland, Ohio 44135  
216-267-2233  
1-800-COAXIAL  
Telex: 98-0630



*Service and Dependability...A Part of Every Product*

CIRCLE 41 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

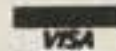
Name \_\_\_\_\_ Call \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Prov./State \_\_\_\_\_ PC/Zip \_\_\_\_\_

\$25 in U.S. \$33 elsewhere (U.S. funds) Licensed amateurs, or age 65 or over, upon submitting proof of age, may request the special dues rate of \$20 in the U.S. \$28 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.



Expires \_\_\_\_\_

Bank No. \_\_\_\_\_ Expires \_\_\_\_\_

**The American Radio Relay League**

225 Main St. Newington, CT. 06111 USA

CQ

mal contact information during contest contacts. In other words, do not send your name, location (QTH), rig, antenna, weather (WX), or mailing address information as parts of contest contacts. Keep each contact brief. Do not send faster than you can receive accurately; let the other fellow slow down to a speed you can copy. If the other operator sends too fast, tell her/him to send more slowly (QRS).

If you contact a county, state, or country you need to have confirmed, simply request a QSL when you send your card. I send a card to each amateur contacted for the first time, which is not a common practice among most amateurs. However, most amateurs send a QSL in response to each card received. If all amateurs just responded to cards received, none would be exchanged. Nevertheless, if received cards initiate completion of the QSL exchange, that is okay; the person who wants the other amateur's card is simply the one who begins the exchange.

## Logging

**Required Entries.** Your NR log must show the time each contest contact started. It is preferable to use Universal Time Coordinated (UTC) when logging radio contacts, since it eliminates possible time zone confusion. Most experienced amateurs only use UTC. UTC is still called Greenwich Mean Time (GMT), Greenwich Civil Time (GCT), Zebra time, or Zulu (Z) time by many amateurs, and they are all meant to indicate the same time. However, UTC has been the correct term since 1 January 1974 and it should be used. The other amateur's callsign (/N and /T indicators not required) and ARRL section (or country) must be logged for each contact. Received and sent signal (RST) reports must both appear in the NR

log. Your station callsign, frequency, and dates of contest operation are also required.

**Forms.** Special NR contest log sheets can be requested from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111.

The NR logs do not have to be mailed to the ARRL until one month after the contest ends, so you have time to request logs from the ARRL, fill them in, and mail them. If you transcribe NR contest entries from your original log, be sure to repeat all contact information on the forms to be turned in. ARRL entry forms and summary sheets should also be requested to accompany your contest logs. Send a self-addressed and stamped envelope (SASE) with your request for these ARRL forms and send your request without delay. The ARRL also has contest check sheets. You should request the ARRL forms immediately so that you will receive them in time for this contest.

**Submitted Material.** The contest material submitted to the ARRL is not returned, so do not send your only (original) log sheets. It is a simple matter for most of us to duplicate material before mailing it to the ARRL. Take your time and try to submit correct material that is easy to read. Checking contest entries is a tough job, but you can make it easier for League checkers by turning in good material. The League appreciates receiving check logs from General, Advanced, Extra, and DX operators who take part in the NR.

## Scoring

**Contact Points.** One point is earned for each station contacted while on the air in the NR, whether or not contacted amateurs are participating in the contest, as long as the report and ARRL section are obtained.

**Code Proficiency Points.** If you have an

ARRL code proficiency certificate, your stated receiving speed (words per minute) is added to your point total for the stations you contacted. If you do not hold an ARRL code proficiency certificate, or if you want to increase the rate shown on your certificate, you can submit your January or February W1AW or W6OWP qualifying copy with your NR material to claim these extra points.

**Multipliers.** The total number of points derived from your contest contacts and your ARRL (not FCC) certified code proficiency rate are multiplied by the number of foreign countries and ARRL sections you contacted during your NR contest operation. Remember that Alaska, Canadian Provinces, Hawaii, and the West Indies (Guantanamo Bay, Puerto Rico, and Virgin Islands) are ARRL sections, and they do not count as countries in this contest.

## Summary

I hope to contact you on one of the Novice bands. I work about 1,000 Novice band contacts every year, and I have participated in each Novice Roundup. When the NR contests were held in the 1952 through mid-1970 era the Novice license was just valid one year, it could not be renewed, and it was not available to anyone who had previously held any class of amateur radio operator license. In that time frame no Novice could compete in more than one NR as a Novice, and newer Novices seldom participated at all. Novice licenses are now valid a maximum of ten years and they can be renewed, which means that Novices can be experienced in previous NR contests, and improved scores should result. Similarly, it is a relatively recent change that allows Technicians to use the Novice code bands. Enjoy this contest by putting your station in top condition and reserving adequate good operating time during the NR.

NR contest activity has always been slow at the start, and it is common to have other operators request an explanation of contest rules. I advise you to direct them to the NR coverage in this column or in other magazines, which is simpler and better than trying to give all this information to each amateur who requests it. NR activity continues to build as the days pass and more amateurs become aware of it. By the last day of the contest, activity is excellent. If you get this issue before the contest starts, please mention the Novice Roundup to every amateur you contact to let each of them prepare for this excellent contest.

As usual, the cooperation of the ARRL has been excellent during the preparation of this contest announcement. I particularly appreciate the help provided by Mike Kaczynski, W1OD, the NR Contest Manager.

73, Bill, W6DDB

# NEMAL ELECTRONICS

## HARDLINE — 50 OHM

Nemal No.	Description	Per Ft.
FXA12	1/2" Aluminum Black Jacket	.89
FLC12	1/2" Corr. Copper (EQ Helix® LDF4) Blk. Jkt.	1.59
FLC78	7/8" Corr. Copper	3.92
NM12AL	N Conn., 1/2" Alum. (Male or Female)	22.00
NM12CC	N Conn., 1/2" Copper (Male or Female)	22.00
NM78CC	N Conn., 7/8" Copper (Male or Female)	54.00

## COAXIAL CABLES

Nemal No.	Description	100 Ft.	Per Ft.
1100	RG 8 95% Shielded Mil. Spec	28.00	.32
1102	RG8 95% Shielded Foam	30.00	.32
1110	RG8X 95% Shield (mini 8)	15.00	.17
1130	RG213/U Mil. Spec. 96% Shield	34.00	.36
1140	RG214/U Mil. Spec. - Dbl. Silver	155.00	1.65
1180	Belden 9913 Low Loss	46.00	.50
1705	RG142B/U Teflon/Silver	140.00	1.50
1310	RG217/U 5/8" 50 ohm Dbl. Shield	80.00	.85
1470	RG223/U Mil. Spec. Dbl. Silver	80.00	.85
1450	RG174 95% Shielded Mil. Spec.	12.00	.14

## ROTOR CABLE — 8 COND.

Nemal No.	Description	100 Ft.	Per Ft.
8C1822	2-18 Ga., 6-22 Ga.	19.00	.21
8C1620	2-16 Ga., 6-20 Ga. Heavy Duty	34.00	.36

\* Shipping \$3.00 — 100 Ft. / Conn. \$3.00 / C.O.D. \$2.00

## CONNECTORS — MADE IN U.S.A.

Nemal No.	Description	Each
NE720	Type N for Belden 9913	4.25
NE723	N Female Belden 9913	4.75
PL258AM	Amphenol Barrel	1.45
PL259	Standard Plug for RG8, 213	10/5.90 or .65
PL259AM	Amphenol PL259	10/7.90 or .89
PL259TS	PL259 Teflon/Silver	1.59
UG21D	Type N for RG8, 213, 214	3.00
UG83B	N Female to PL259	6.50
UG88C	BNC RG58	1.25
UG146	SO239 to Male N	6.50
UG175/6	Adapter for RG58/59 (specify)	10/2.00 or .22
UG255	SO239 to BNC Amphenol	3.75
KA51-18	TNC RG58	4.35
AM9501-1	SMA RG142B	8.95
SO239AM	Amphenol SO239	.89

## GROUND STRAP — BRAID

Nemal No.	Description	Per Ft.
GS38	3/8" Tinned Copper	30
GS12	1/2" Tinned Copper	40
GS316	3/16" Tinned Copper	15
GS316S	3/16" Silver Plated	35

## GROUND WIRE — STRANDED

Nemal No.	Description	Per Ft.
HW06	6 Ga. insulated stranded	.35

Call or write for complete price list. Nemal's 32-page Cable & Connector Selection Guide is available at no charge with orders of \$50.00 or more, or at a cost of \$4.00 individually.

**NEMAL ELECTRONICS, INC.**  
12240 N.E. 14 Ave., No. Miami, FL 33161

(305) 893-3924 • Telex 6975377  
24-Hr. FAX (305) 895-8178

# KENWOOD

...pacesetter in Amateur radio

NEW

## Hear it All!



## R-5000

### High performance receiver

**THE** high performance receiver is here from the leader in communications technology—the Kenwood R-5000. This all-band, all mode receiver has superior interference reduction circuits, and has been designed with the highest performance standards in mind. Listen to foreign music, news, and commentary. Tune in local police, fire, aircraft, weather, and other public service channels with the VC-20 VHF converter. All this excitement and more is yours with a Kenwood R-5000 receiver!

- **Covers 100 kHz-30 MHz in 30 bands, with additional coverage from 108-174 MHz (with VC-20 converter installed).**
- **Superior dynamic range.** Exclusive Kenwood DynaMix™ system ensures an honest 102 dB dynamic range. (14 MHz, 500 Hz bandwidth, 50 kHz spacing.)



- **100 memory channels.** Store mode, frequency, antenna selection.
- **Voice synthesizer option.**
- **Computer control option.**
- **Extremely stable, dual digital VFOs.** Accurate to  $\pm 10$  ppm over a wide temperature range.
- **Kenwood's superb interference reduction.** Optional filters further enhance selectivity. Dual noise blankers built-in.
- **Direct keyboard frequency entry.**

- **Versatile programmable scanning, with center-stop tuning.**
- **Choice of either high or low impedance antenna connections.**
- **Kenwood non-volatile operating system.** Lithium battery backs up memories; all functions remain intact even after lithium cell expires.
- **Power supply built-in.** Optional DCK-2 allows DC operation.
- **Selectable AGC, RF attenuator, record and headphone jacks, dual 24-hour clocks with timer, muting terminals, 120/220/240 VAC operation.**

#### Optional Accessories:

- VC-20 VHF converter for 108-174 MHz operation
- YK-88A-1 6 kHz AM filter
- YK-88S 2.4 kHz SSB filter
- YK-88SN 1.8 kHz narrow SSB filter
- YK-88C 500 Hz CW filter
- YK-88CN 270 Hz narrow filter
- DCK-2 DC power cable
- HS-5, HS-6, HS-7 headphones
- MB-430 mobile bracket
- SP-430 external speaker
- VS-1 voice synthesizer
- IF-232C/IC-10 computer interface.

More information on the R-5000 and R-2000 is available from Authorized Kenwood Dealers.

**R-2000** 150 kHz-30 MHz in 30 bands  
• All modes • Digital VFOs tune in 50 Hz, 500 Hz, or 5 kHz steps • 10 memory channels  
• Programmable scanning • Dual 24-hour digital clocks, with timer • 3 built-in IF filters (CW filter optional) • All mode squelch, noise blanker, RF attenuator, AGC switch, S meter • 100/120/220/240 VAC operation • Record, phone jacks  
• Muting terminals • VC-10 optional VHF converter (118-174 MHz)



Specifications and prices are subject to change without notice or obligation.

# KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
1111 West Walnut Street  
Compton, California 90220

# ARE YOU ACTIVE IN

PACKET, FAST OR SLOW-SCAN TV, FACSIMILE, OSCAR, RTTY, EME, LASERS OR COMPUTERS?

IF YOU ARE, THEN YOU NEED:

## THE SPEC-COM JOURNAL™

PUBLISHED MONTHLY, 10 TIMES PER YEAR

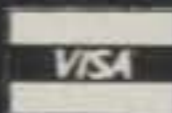
by WB0QCD

SERVING SPECIALIZED COMMUNICATIONS AMATEURS SINCE 1967! SAMPLE COPIES JUST \$1.50 18-YEAR MASTER ARTICLE SERVICES INDEX ISSUE \$2.00 SPECIAL TRIAL SUBSCRIPTION (1 YEAR) \$10.00 ppd FULL YEAR \$20.00 FOREIGN SLIGHTLY HIGHER PLEASE SPECIFY YOUR MODE OF PRIMARY INTEREST! TRS80C, COMMODORE-64, VIC-20, APPLE & IBM SOFTWARE

SEND ORDERS TO:

### THE SPEC-COM JOURNAL™

P.O. BOX H  
LOWDEN, IOWA 52255



CIRCLE 24 ON READER SERVICE CARD

## CB-TO-10 METERS

We specialize in CB radio modification plans and hardware. Frequency and FM conversions, books, kits, repairs, high-performance accessories. Our 11th year! 16-page catalog, \$2.

CBC INTERNATIONAL, P.O. BOX 31500CO  
PHOENIX, AZ 85046

# 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.

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

IMRA-International Mission Radio Assn. helps missionaries—equipment loaned; weekday net, 14.280 MHz, 2:00-3:00 PM Eastern. 1 Pryer Manor Rd., Larchmont, NY 10538.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! \$21.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504 brings data sheet.

TENNATEST \*\*\*\* ANTENNA NOISE BRIDGE. Out-performs others. Accurate. Costs less. Compare 1-40 MHz \$44.00, 1-150 MHz \$68.00. Satisfaction Guaranteed. Send stamp for details. W8URR, 1025 Wildwood Road, Quincy, Mich. 49082.

ANOTHER DAY with an empty mailbox? Improve your QSL returns with Secrets of Successful QSL'ing by Gerry L. Dexter. This complete guide to reception reporting and QSLing SWBC, Utility, ham, and medium-wave stations covers everything from basics to advanced techniques. Just \$9.95 plus \$1 s/h, \$2 s/h foreign orders, U.S. funds only. Order now from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

FCC EXAMS, NOVICE-EXTRA: Sunnyvale VEC ARC. Call (408) 255-9000 24 hours. 73, Gordon, W6NLG, VEC.

CONTEST AIDS: (1) Precise beam headings to 500 plus DX locations. (2) GRAYLINE printout and SUNRISE/SUNSET times for day of your choice worldwide. Specify date and QTH. \$9.95 including postage. K7KI, P.O. Box 36373, Tucson, Arizona 85740.

FOR SALE: Amateur Radio Wall Calendars at \$5 each, including USA postage. Excellent gift. Enclose shipping label. W6LS, 2814 Empire, Burbank, CA 91504-3297.

QSL CARDS, FREE SAMPLES. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072.

ATTENTION WRITERS: Manuscripts wanted on a wide variety of communications and monitoring subjects. SASE brings want list or send your suggestions, resume, credits. Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

DEALER  
INQUIRES  
INVITED

ANTENNES

# TONNA

ANTENNAS

# PORT



VHF/UHF  
EQUIPMENT

**THE "PX" SHACK**  
52 Stonewyck Drive  
Belle Mead, New Jersey 08502  
(201) 874-6013

Frequency	Description	Boom (Ft)	B/W (-1 dB MHz)	Weight (Lbs)	Price *
50 MHz	5 Element	11'3"	48.5-51.6	13.2	\$ 96.00
144 MHz	4 Element	3'8"	142-149	2.6	\$ 44.00
144 MHz	9 El Portable	11'4"	140-148	4.8	\$ 60.00
144 MHz	9 Element	11'4"	140-148	6.6	\$ 55.00
144 MHz	2 x 9 Cross	11'8"	140-148	7.0	\$ 86.00
144 MHz	13 El Portable	14'6"	139.5-148.5	7.7	\$ 78.00
144 MHz	17 Element	21'6"	138.0-148.7	12.3	\$119.00
432 MHz	9 Element	4'1"	409.3-440.2	2.6	\$ 59.00
432 MHz	19 Element	9'3"	415.5-442.3	4.2	\$ 68.00
432 MHz	21 Element	15'1"	416-440.6	6.8	\$ 81.00
432 MHz	2 x 19 Cross	9'6"	415.5-442.3	6.6	\$ 75.00
144/432 MHz	9/19 Oscar	9'10"		7.0	\$ 78.00
902 MHz	23 Element	8'3"	875.5-925.5	3.5	\$ 59.00
902 MHz	4 x 23 Quad Kit	8'3"	875.5-925.5	16.5	\$325.00
1296 MHz	23 Element	5'9"	1246.4-1324.2	3.0	\$ 59.00
1296 MHz	55 Element	15'1"	1252.7-1321.2	7.5	\$ 89.00
1296 MHz	4 x 23 Quad Kit	5'9"	1246.4-1324.2	15.6	\$325.00
1296 MHz	4 x 55 Quad Kit	15'1"		19.8	\$435.00
2M, 70 CM	2 - Port Power Divider (With 'N' Connectors)				\$ 68.00
35 CM, 23 CM	2 - Port Power Divider (With 'N' Connectors)				\$ 58.00
2M, 70 CM	4 - Port Power Divider (With 'N' Connectors)				\$ 76.00
35 CM, 23 CM	4 - Port Power Divider (With 'N' Connectors)				\$ 66.00

\* Call for monthly special sales

CALL FOR CATALOG AND OSCAR SYSTEMS. VISA MASTERCARD ACCEPTED. PRICES SUBJECT TO CHANGE WITHOUT ADVANCE NOTICE

CIRCLE 25 ON READER SERVICE CARD

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, Rt. 11, Box 499 #1201 South, Birmingham, AL 35210.

HAVE AM CAPABILITY? Join SPAM (Society for Promotion AM). Membership is free. For free info send SASE to: SPAM, c/o F. Dunlap, WA5TWF, 14113 Stoneshire, Houston, TX 77060.

HAM RADIO REPAIR! Tube through solid state. Robert Hall Electronics, Box 8363, San Francisco, CA 94128 (408-729-8200).

FIND OUT what else you can hear on your general coverage receiver. Join a radio listening club. Details on major North American clubs, sample newsletter \$1.00. ANARC, Box 462, Northfield, MN 55057.

YAESU OWNERS: Hundreds of modifications and improvements for your rig. Select the best from fourteen years of genuine top-rated Fox Tango Newsletters by using our new 32-page Cumulative Index. Only \$5 postpaid (cash or check) with \$4 Rebate Certificate creditable toward Newsletter purchases. Includes famous Fox-Tango Filter and Accessories Lists. Milt Lowens, N4ML (Editor), Box 15944, W. Palm Beach, FL 33416. Telephone (305) 683-9587.

WANTED: Old Western Electric, RCA, Cunningham, Telefunken, McIntosh, Marantz, Altec, Dynaco, tubes, speakers, amplifiers. Phone (713) 728-4343. Mauri, 11122 Atwell, Houston, Texas 77096.

MARCO: Medical Amateur Radio Council, Ltd. operates daily and Sunday nets. Medically oriented amateurs (physicians, dentists, veterinarians, nurses, physio-therapists, lab technicians, etc.) invited to join. Presently over 550 members. For information, write MARCO, Box 73's, Acme, PA 15610.

W5DPO: Tech & Instrument repair—selling out. All good stuff, most w/instruction books, by several sales as I can get equipment & parts together. 1920's to 1960's. Test equip., lotta good, new parts. All American. For more sale list and what's on first sale, send SASE to 11207 Morris Place N.E., Albuquerque, NM 87112.

HAM TRADER YELLOW SHEETS. In our 25th year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate—no long wait for results. Send #10 SASE for sample copy. \$12 for one year (24 issues), P.O.B. 2057, Glen Ellyn, IL 60138-2057.

Super Savings on electronic parts, components, supplies, and computer accessories. Free 40-page catalog for SASE. Get on our mailing list. BCD ELECTRO, P.O. Box 830119, Richardson, TX 75083, or call 214-343-1770.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model Number, SASE. Scaramella, P.O. Box 1, Woonsocket, RI 02895-0001.

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog \$2. CBCI, Box 31500CQ, Phoenix, AZ 85046.

CASA MARCONI, INC. Pre-owned communication equipment. We buy and sell. 7189 S.W. 8th St., Miami, FL 33144, phone 305-264-8443.

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.

BUY, SELL, COLLECT, and restore early tube equipment? Early receivers, tubes, and telegraph gear? Join AWA, which sponsors oldtime "meets," flea markets, museum, and journal with free want ads. Annual dues only \$8. Write: Bruce Kelley, W2ICE, Rte. 3, Holcomb, NY 14469.

CHASSIS AND CABINET KITS: SASE. K3IWK, 5120 Harmony Grove Road, Dover, PA 17315.

CABLE TV CONVERTERS & EQUIPMENT: Plans and parts. Build or buy. Send SASE for information. C&D ELECTRONICS, 626 Flowerdale, Dept. CQ, Ferndale, MI 48220.

ELECTRON TUBES: Radio & TV types 75% off list price. Huge inventory! Also industrial types. Send for the free catalog today or call toll free (800) 221-5802. Send for 80% off tube listing. Box CC, Transletronics, Inc., 1365 39th St., Brooklyn, NY 11218. See our display ad this issue.

CIRCUIT BOARDS, KITS, & ASSEMBLIES for OST Magazine Articles. For info SASE to: A & A Engineering, 2521 W. La Palma Ave., Anaheim, CA 92801, (714) 952-2114.

### Amateur Radio LICENSE PREPARATION Study Guides

Get the RIGHT study material! Manuals have all FCC Amateur Radio Operator multiple-choice questions, answers, distractors (wrong answers) and discussion as to why answer is right!

- FCC-NOVICE STUDY GUIDE.....\$3.50 (Element 2)
- FCC - TECH./GENERAL STUDY GUIDE..\$5.00 (Element 3)
- FCC - ADVANCE STUDY GUIDE.....\$5.00 (Element 4A)
- FCC - EXTRA CLASS STUDY GUIDE.....\$5.00 (Element 4B)
- THE FCC RULE BOOK.....\$4.00 (Use in conjunction with Study Guide)

Add \$1.50 each manual for first class postage. Same day shipment!

W5YI - VEC  
P.O. Box #10101-C, Dallas, TX 75207

CIRCLE 27 ON READER SERVICE CARD

### THIS MONTH'S GOODIE FROM THE CANDY STORE



Kenwood TH-205 AT  
Under \$240.00

Kenwood TR-3500 \$237.90 L.T.O.

Over 7500 Ham Related Items in Stock, All Prices FOB Preston. Send SASE for NEW HT Price List. More specials in classifieds.

ROSS DISTRIBUTING COMPANY  
78 South State Street, Preston, Idaho 83263  
Telephone (208) 852-0830. We Close at 2:00 on Mon. & Sat.



CALL US NOW!



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!

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 plug 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                 | BELDEN    | ICOM          | NYE            |
| ALINCO              | BENCHER   | JSC           | PALOMAR        |
| AMERITRON           | BIRD      | KANTRONICS    | RADIO CALLBOOK |
| AMPHENOL            | BUTTERNUT | KDK           | RITRON         |
| AMP SUPPLY          | CENTURION | KLM           | ROHN           |
| ANTEK               | CES       | LARSEN        | TELEX/HYGAIN   |
| ANTENNA SPECIALISTS | CUSHCRAFT | MFJ           | TEN-TEC        |
| ASTRON              | DIAWA     | MINI-PRODUCTS | TRIO-KENWOOD   |
| B & W               | ENCOMM    | MIRAGE        | UNADILLA/REYCO |
|                     | HUSTLER   | MOSELEY       | YAESU          |

Write today for our latest Bulletin/Used Equipment List.



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



P.O. Box 73  
208 East Kemp  
Watertown, SD 57201

YOUR HAM DOLLAR GOES FURTHER AT...



"AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER"

## SELL-TRADE

New & Reconditioned HAM EQUIPMENT

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

PHONE (605) 886-7314



NEW  
**Yaesu FT-727R**  
DUAL BAND TRANSCEIVER  
140-150 MHZ / 440-450 MHZ

CALL FOR PRICE

The FT-727R is a completely self-contained VHF and UHF FM hand portable transceiver providing up to 5W or 0.5W RF output on user-selectable channel steps across both the 2m and 70cm (FM) amateur bands. Twenty dual-function keys on the front panel give the operator 40 different commands for programming the CMOS microprocessor at the heart of the FT-727R, markedly simplified and improved over previous models. Ten standard memories are provided, four of which allow storage of independent transmit and receive frequencies, for odd repeater splits or cross band operation with touch-key reverse. An independent "dial" memory and call channel memory are provided for each band. User settable repeater shifts can be activated on the dial or recalled memories. Also features *Power Saver System* (now with digital display timer), which only activates the receiver to check the selected channel momentarily at programmable intervals.



# Get It *All* Together With K A M



## Kantronics All Mode

*KAM gives you CW, RTTY, ASCII, AMTOR, HF and VHF PACKET all together in one unit.*

We combined the features of our UTU-XT and KPC-2 to give you the true all mode unit you've been asking for, the Kantronics All Mode (KAM™).

KAM features bargraph tuning and user programmable MARK and SPACE tones for RTTY and HF packet, as well as limiter/limiterless operation on HF for weak signal operation.

KAM's CW demodulator is also programmable for both center frequency and bandwidth.

KAM's RS-232/TTL terminal interfacing provides universal compatibility to all computers, including Commodores and PC compatibles.

If you're looking for increased sensitivity and the greatest amount of flexibility in an all mode unit, look to Kantronics. We've got it all together in the Kantronics All Mode.

Suggested Retail \$319.00

### KAM's FEATURES

- Transmit and receive CW 6-99, RTTY/ASCII 45-300 baud, ARQ, FEC, SELFEC, Listen ARQ, VHF and HF Packet.
- HF and VHF radio ports.
- Command driven by your computer with over 100 software commands.
- User programmable baud rates for RTTY/ASCII—selectable in one-baud increments.
- User programmable MARK and SPACE tones on HF, you choose the tones.
- Selective RTTY Autostart operation.
- Separate CW demodulator filter with programmable center frequency and bandwidth.
- Separate CW keying relay for positive or negative keying.
- 12-pole programmable switched capacitance input filtering.
- Quartz synthesized AFSK or direct FSK operation.
- RS-232 or TTL level operation by jumper selection.
- 16K RAM (expandable to 32K), 256K EPROM, EEPROM for parameter storage.
- Compatible with any computer having an asynchronous serial I/O port.
- FCC Part 15 compliant.

2400 BPS Packet Video or Basic Packet Video  
VHS or BETA - \$25 (includes shipping)

**NEW  
PROGRAM**

UTU-TERM/PACTERM for IBM and compatibles.  
Works with UTU, UTU-XT, Packet units, & KAM.  
Disk - \$29.95 retail.

**Kantronics**  
RF Data Communications Specialists

1202 E. 23 Street Lawrence, Kansas 66046 (913) 842-7745

## Crystal Filters, 8 & 10 Pole for Kenwood, ICOM, and YAESU



NEW TS-440S SSB 2.1 kHz matched filter set: consists of one each 455kHz and one 8.8MHz 8 pole crystal filters - \$150.00

TS-440S/430 2 Crystal Filter Package consists of 2.1 or 1.8 kHz SSB, 400 Hz or 250 Hz CW filters - \$110.00; Individual crystal filters - \$60.00 each.

TS-940/930 CW 400 Hz or 250 Hz 8-Pole match set, mounted on printed circuit boards - \$150.00.

TS-940/930 SSB - 2.1 kHz 8-pole matched set. \$150.00

930/940 SSB - Electronic Switch Kit - Transmit through original filters - \$30.00

TS-430 - SSB 2.1 kHz Cascade Kit - \$75.00

### NEW FOR ICOM RADIOS

EXACT replacement for FL-44A, 2.1 kHz @6 db. .... \$ 99.00  
EXACT replacement for FL-52A, 400 kHz @6 db. .... \$85.00

### For ICOM 271/471

8 & 10 pole SS band filters ..... \$85.00/110.00  
CW 400 Hz ..... \$115.00  
FL30, FL32 & FL45 wire-in replacements ..... \$60

Check RS# for NEW filter selection guide covering many other radios.

## INTERNATIONAL RADIO INC.

747 SW South Macedo Blvd. Port St. Lucie FL 33452

(305) 879-6868



CIRCLE 39 ON READER SERVICE CARD

## MOBILE ANTENNA HOTLINE (919) 226-0496

Mobile 2M Antennas: 1/2 wave w/mag mount	\$22.50
1/2 wave w/mag mount	\$12.95
2M Base Station Antenna: 1/2 wave Ground Plane w/mast bracket	\$19.95
Mobile HF Antennas (less mount)	\$13.95 ea.
#9180—75M #9130—30M #9115—15M	
#9140—40M #9120—20M #9110—10M	
Mounts for Mobile HF #002 Bumper strap mount	\$13.95
& 2M Collinear: #240 Bumper clip mount	\$10.75
WD4BUM #081 Vert./Horiz. Bar mount	\$6.95
Antennas #274 Side bodymount for trucks and campers	\$6.95
#243 Mount for fiberglass body	\$13.95

### MOBILE ANTENNAS & ACCESSORIES

(Div. of AC/DC Electronics)  
Route 1 Box 406-C, Pond Road, Burlington, NC 27215

START THE YEAR Off Right—"something used". Atlas: 215 X160-15 meters with AC console, \$295. Bird: Model 43 watt-meter, new, \$150. Collins: 75A2 rcvr with mechanical filters, \$250. Drake: T4XC xmtr with AC-4, \$285. TR4CW, AC4 with RIT, mint, \$395; "C-Line" excellent, \$550 (VY late SN); MN-2000, \$200; MS4 SPKR, \$45; FS-4 freq syn, \$230; L4B amplifier with 10 meters, \$700; RV4C, VFO, \$125. FA-7 fan, \$35; TR-7 ser. man, \$35. Eimac: New 500 Z tubes @ \$79 ea. Hallicrafters: SX62A receiver, \$95. Hammarlund: HQ-170A, \$200; HQ-110A, \$99. Heathkit: HO-10 scope, \$89; DX-60 xmtr, \$75. Kenwood: TS-520S with CW filter, \$445; DG-5 digital readout for 520, \$180; R-2000 general coverage receiver, \$400. Ten-Tec: Argosy xcvr (analog version), \$339. Yaesu: Mobile amp, 160-10 meters 100 watts, \$230; FT-107 DM, \$600; FT-902 DM, \$650; FV-101 VFO, \$70; SP-101 PB, \$70; FR-101S rcvr with 2 & 6 meter converters, \$299; FRG-7 short-wave receiver, \$199. Tony Musero, K3YKW, 1609 So. Iseminger St., Philadelphia, PA 19148 (215-271-8898).

**LIQUIDATION SALE: Radar detectors \$69.00. Call B&B Inc. 10517 Upton Circle, Bloomington, MN 55431 (1-800-826-7626).**

**CABLE TV CONVERTERS. Scientific Atlantic, Jerrold, Oak, Zenith, Hamlin. Many others. Visa & M.C. accepted. Toll Free 1-800-826-7623. B&B Inc., 10517 Upton Circle, Bloomington, MN 55431.**

REVISED 1986-1987 AWARDS DIRECTORY of the World available for \$10. US airmail postage paid from VE3GCO/VE3XN Garry Hammond.

ICOM 751, like new, 250 Hz CW filter, power supply, desk mike, \$900. LA-1000 linear \$250. Call 215-445-5643.

WORLD TIME CLOCK LCD quartz battery movement. Benzel moves to tell time anywhere in the world. Send \$6.95 plus 55¢ shipping and handling to: N5JHD, P.O. Box 729, Monticello, MS 39654.

COMCO 144-150 MHz remote base, outside cabinet, perfect for ham repeater, \$75. Heath Grid-dip meter \$15. K6KZT, 2255 Alexander, Los Osos, CA 93402.

WANTED: KWM-2A. State price and condition, R.W. Parker, RD 2, Box 36C, Pipersville, PA 18947.

CANDLE POWER: New high efficiency solid-state thermo-electric generator module converts heat energy from candle, heat lamp, solar, etc., into current to operate QRP projects, charge ni-cad cells, and more. Send for complete details. Phoenix Electronics, 1334 West Arndale Ave., Stow, OH 44224 (216-686-1842).

ROSS'\$\$\$ NEW SPECIALS (January only): KENWOOD TM-2530A \$329.90. ICOM IC-21AT \$199.90. YAESU FP-757GX \$184.90, FV-101DM \$199.90. HY-GAIN 205-BA \$329.90, TH2MK3 \$149.90. All L.T.O. Over 7500 ham-related items, all major lines. Phone or send SASE for MORE SPECIALS and personal price quote. MENTION AD. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

HAM PROGRAMS for Plus/4, C-16, TI99/4A, VIC-20, C-64, C-128, Apple. Send SASE: EPO SOFTWARE, 7805 N.E. 147th Ave., Vancouver, WA 98662.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid; trade items available. James Steele, 160 West 77th Street, New York, NY 10024-6942.

POST CARD QSL KIT: Converts Post Cards, Photos, to QSLs! Stamp brings circular. K-K Labels, P.O. Box 412, Troy, NY 12181-0412.

FOREIGN AIRMAIL STAMPS. Many countries. Monthly bargains. SASE. William Plum, 12 Glenn Road, Flemington, NJ 08822.

REPLACE RUSTED ANTENNA BOLTS with stainless steel. Small quantities, free catalog. Elwick, Dept. 616, 230 Woods Lane, Somerdale, NJ 08083.

DIGITAL AUTOMATIC DISPLAYS for FT-101's, TS-520's, Collins, Swan, and all others. Six 1/2" digits. 5" wide by 1 1/4" high metal cabinet. Send \$2.00 for information and receive a \$30.00 discount. Includes comparisons of the simple "BCD" readouts found in new radios and our "Calculating Frequency Counter" readouts. Please be specific. GRAND SYSTEMS, Dept. D., POB 3377, Blaine, WA 98230.

HAPPY NEW YEAR from the Crew at Junior High School 22 on Manhattan's Lower East Side learning *English Thru Amateur Radio*. Be a winner in 87! Send us your QSL via WB2JKJ and we might send you our QSL OF THE WEEK AWARD.

TET ALUMINUM ROOF TOWER, never used. Ships compact in 6 1/2 ft. length, weighs only 135 lbs., H.D. thrust bearing. Puts antenna min. 35 ft. above any roof. \$750, make your offer! Will ship freight collect. VE7EHD, 604-265-3175.

WANTED: Kenwood TS-930S, TM-2570, Larsen TLM/2m ant, Ameritron ATR-15, 4CX-250B tube. Sell: Drake WH-7-\$65.00; Astron RS-20A-\$75.00. K0MK, 690 Vermillion Tr., Gilbert, MN 55741.

## DXing Armchair or Mobile, catch it with the NCG 10/160m Base Station or 15m Mobile.

### NCG 10/160 HF Transceiver



200 Watts PEP

4 Memories - 3 way auto scan, dual UFOs - If shift - all 9 bands - built in AC power, 3-Step tuning, 1 KHz, 100 Hz, 25 Hz. Includes narrow CW filter and hand microphone.

BOTH WILL GIVE  
YOU TIME  
FOR DXing.

NCG 10/160m \$885.00  
NCG 15m \$285.00

### NCG 15m Mobile



2 Watts/10 Watts

Built-in CW side tone audio, ALC gives distortion free TX. Precision Ball Drive VFO, top mounted speaker  
Rit offset  $\pm$  4 KHz  
Fine Tune  $\pm$  4 KHz  
Power 13.8 VDC-3 AMP neg. ground

AVAILABLE AT APPOINTED DEALERS OR DIRECT FROM NCG CO.



**NCG COMPANY**  
1275 N. Grove Street  
Anaheim, CA 92806

(714) 630-4541

NOTE: Prices and specifications subject to change without notice.

Mfg. by: Matsushita Electric Industries Co., Ltd.  
National, Panasonic and Technics are the brandnames of Matsushita Electric.



## BALUNS



For beams. 1.7-30 MHz. 6-Kw PEP 1:1 or 4:1 ratio. Model BA-2000 \$62.95.



For dipoles. 1.7-30 MHz. 6-Kw PEP 1:1 or 4:1 ratio. Model 2K \$57.50.



1.7-30 MHz. 1-Kw. 1:1 or 4:1 ratio. Model 1K \$39.95.



1.7-30 MHz. 350-w PEP. Ratios to match 50/75/100/150/200/250/300/375/450/600/800 ohms. Specify ratio. Model PB \$22.95.

Add \$4 shipping/handling in U.S. & Canada. California residents add sales tax.

## TUNER-TUNER™

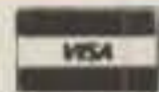


- Tune your tuner without transmitting!
- Save that rig!

Do you use an antenna tuner? Then you need the new Palomar Tuner-Tuner to tune it to your operating frequency without transmitting. Just listen to the Tuner-Tuner's noise with your receiver. Adjust your tuner for a null and presto! you have 1:1 SWR. It's as simple as that.

Easy to install. Works with all rigs. Eliminates tuneup damage. Your rig will love it!

Model PT-346 \$99.95 + \$4 shipping/handling in U.S. & Canada. California residents add sales tax.



Send for FREE catalog that shows our complete line of noise bridges, SWR meters, pre-amplifiers, loop antennas, VLF converters, audio filters, baluns, RTTY equipment, toroids and more.

## PALOMAR ENGINEERS

BOX 455, ESCONDIDO, CA 92025  
Phone: (619) 747-3343

Please send all reader inquiries directly.

Say You Saw It In CQ

## Advertiser's Index

AEA/Adv. Elec. Applications	5
ARRL	48, 99
AVC Innovations	91
Alinco Corp.	15
All Electronics	94
Amateur Electronic Supply	39
Amidon Associates	47
Astron Corp., California	60
Austin Custom Antennas	69
Barker & Williamson	51
Barry Electronics	67
Base 2 Systems	53
Bencher, Inc.	86
Britt's 2-Way Radio	51
Burghardt Amateur Center	103
Butternut Electronics	20
CBC International	102
CRB Research	69
Caddell Coil	104
Certified Communications	78
Charge-Rite	65, 87
Coaxial Dynamics	99
Colorado Comm Ctr.	56
C.O.M.B.	41
Computer Trader Magazine	78
Continental Education Service	61
Cushcraft Corp.	57
CyberWare Corp.	89
Dahl Company	85
Daiwa Electronics Corp.	70, 71
Dayton HamVention	8, 9
Denronics	91
Dick Smith Electronics	85
Digitrex	78
Doc's Communications	47
Down East Microwave	88
EGE, Inc.	21
ENCOMM, Inc.	7
Engineering Consulting	89
Falcon Communications	60
Fox Tango	78
GRE America, Inc.	27
Hal Communications	10, 86
Hall Electronics	30
Hal-Tronix	94
Ham Radio Outlet	12
The Ham Station, Inc.	53
Heaster, Inc.	30
Henry Radio	31
ICOM America, Inc.	Cov. IV
IIX Equipment	74
International Radio	106
Jeff-Co	104
Jensen Tools	74
Jun's Electronics	61
K2AW's Silicon Alley	62
Kagil	104
Kantronics	105
Kenwood	Cov. II, 1, 2, 11, 101
LaRue Electronics	29
Laser Press	88
MFJ Enterprises	22, 23
Madison Electronics	35
Martin Engineering	69
Maxcom Inc.	27
Meadowlake Corp.	89
Memphis Amateur Electronics	87
Micro Control Specialties	51
Microlog Corp.	83
Minds Eye Publications	71
Mirage/KLM	49, 77
Missouri Radio Center	108
Mobile Antennas & Accessories	106
Motron Electronics	78
NCG Co.	106
Nel-Tech Labs, Inc.	87
Nemal Electronics	100
Northeast Electronic Supply Co.	73
Nuts & Volts	61
Orlando Hamcation	70
Orion Hi-Tech	17
PC Electronics	83
PX Shack	102
Pac-Comm	88
Pacific Cable Co.	74
Palomar Engineers	107
Parsec Comm.	53
QEP	104
QSLs by W4MPY	56
RF Enterprises	24
RF Kit Company	89
RJM Electronics	83
Radio Amateur Callbook, Inc.	6
Radio Engineers	56
Radio Kit	60
Radio Works	53
Reno Radio	65
Ross Distributing	103
Shojiki Elec. Corp.	56
Smiley Antennas	43
Sommer Electric Co.	33
Spectronics	58
Spectrum International	87
Spi-Ro Distributors	104
Stone Mountain Engrg.	62
Surplus Sales of Nebraska	27
TNT Amateur Radio Sales	95
Texas Towers	54, 55
Texas Towers International	104
Transleteronic, Inc.	69
Tropical Hamboree	65
UPI Comm. Systems	61
Unadilla Antennas	73
W5YI-VEC	103
W9INN Antennas	78
Western Electronics	61
Wheaton Community R.A.	30
Wrightapes	62
Yaesu Electronics	16, 93, Cov. III

We'd like to see your company listed here too. Contact Arnie Sposato, KA2TYA, at 516-681-2922 to work out an advertising program tailored to suit your needs.

## PREAMPLIFIER

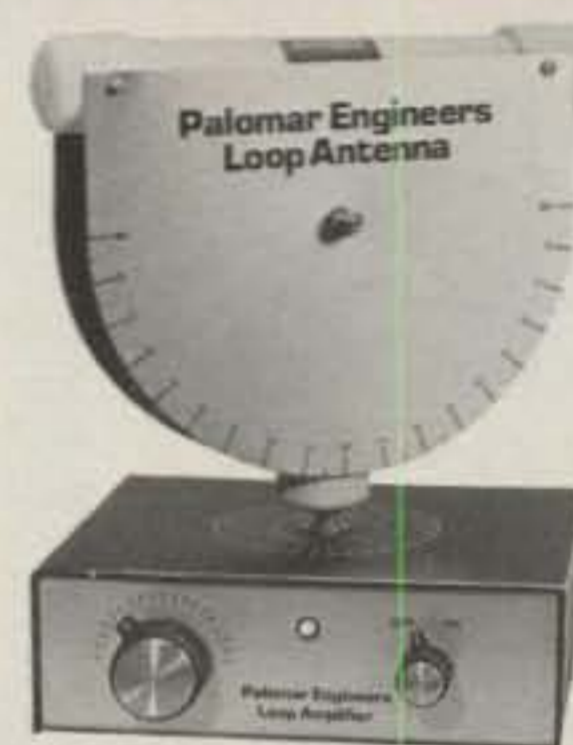


Can't hear the weak ones when conditions are bad? Receiver lacks sensitivity on 20, 15 or 10? Get the world famous Palomar pre-amplifier. Tunes from 160 to 6 meters. Gives 20 db extra gain and a low noise figure to bring out those weak signals. Reduces image and spurious responses too.

An RF sensing circuit bypasses the pre-amplifier during transmit. The bypass handles 350 watts.

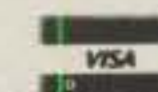
Model P-410X (for 115-v AC) or Model P-412-X (for 12-v DC) \$149.95. Model P-408 (SWL receive only for 115-v AC) \$129.95. Add \$4 shipping/handling in U.S. & Canada. California residents add sales tax.

## LOOP ANTENNA



Loops pick up far less noise than other antennas. And they can null out interference. Palomar brings you these features and more in a compact desktop package. The wideband amplifier with tuning control gives 20 db gain. Plug-in loops have exclusive tilt feature for deep nulls. Loops are available for 10-40 KHz, 40-150 KHz, 150-550 KHz, 550-1600 KHz and 1600-5000 KHz.

Model LA-1 Loop Amplifier \$84.95. Plug-in Loops (specify range) \$62.95 each. Add \$4 shipping/handling in U.S. and Canada. California residents add sales tax.



Send for FREE catalog that shows our complete line of noise bridges, SWR meters, pre-amplifiers, loop antennas, VLF converters, audio filters, baluns, RTTY equipment, toroids and more.

## PALOMAR ENGINEERS

BOX 455, ESCONDIDO, CA 92025  
Phone: (619) 747-3343

Please send all reader inquiries directly.

January 1987 • CQ • 107

# MISSOURI RADIO CENTER

102 N.W. Business Park Lane, Kansas City, MO 64150 816-741-8118

Call Toll Free — 9am - 6pm Mon. - Fri., 9am - 2pm Sat.  
In Missouri Call — 816-741-8118

## 1-800-821-7323

TRADE INS ACCEPTED  
MasterCard — VISA — COD Welcome

AEA  
ALINCO  
AMERITRON  
ASTRON  
AVANTI  
B & W  
BENCHER  
BUTTERNUT  
COMM SPEC  
CUSHCRAFT  
DAIWA

YAESU  
WEI  
VANGORDON  
SANTAC  
QUATRON  
SUSE  
WEL

**KENWOOD**



**TS940S "DX-celence"**

- Programmable Scanning
- High Stability, Dual Digital VFO's
- 40 Channel Memory
- General Coverage Receiver

**KENWOOD**



**TS440S "DX-CITING"**

- 100% Duty Cycle
- 100 memories
- Direct Keyboard Entry
- Optional Built-in AT

On Sale Now, Call For Price!

**KENWOOD**



**TM2570 "ALL NEW"**

- First 70 Watt FM Mobile
- First With Memory & Auto Dialer
- 23 Channel Memory
- Front Panel Programmable CTCSS

**KENWOOD**

**TR2600 "SPECIAL"**

- 2.5 W/300 MW 2 Meter HT
- LCD Readout
- 10 Memories
- Band And Memory Scan



**TH-21AT "THE Smallest HT"**

- Compact Pocket Size
- 1 Watt
- Optional 500mA Battery

**YAESU**



**FT-757GX "CAT SYSTEM"**

- All Mode Transceiver
- Dual VFO's
- Full Break-in CW
- 100% Duty Cycle

CALL FOR BEST PRICE!

**YAESU**



**FT-767GX HF/VHF/UHF BASE STATION**

- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

**YAESU**



**FT23/73R**

- Zinc-Aluminum Alloy Case
- 10 Memories
- 140-164 MHz, 440-450 MHz
- 600 MAh Standard Opt. 5w New "super handle"

**YAESU**



**FT-727R "DUAL BAND HT"**

- 5 Watts on Both 2m & 440 MHz
- 10 Memories
- Battery Saver
- Remote Computer Control Capability

**ICOM**



**IC-735 "NEW"**

Can you put a price tag on reliability? Now ICOM offers a **ONE YEAR WARRANTY** on its HF Transceivers & Receivers purchased after August 1, 1986.

**ICOM**



**IC-751A "NEW"**

- 100 KHz - 30 MHz
- FM Standard
- 32 Memories
- QSK (Nominal Speed 40 WPM)

**ICOM**



**IC-38A**

- Full 25W, 5W low
- 21 memories
- Subtones built in RX 215-230 MHz

CALL FOR BEST PRICE

**ICOM**



**IC-μ2AT**

- 140-163 MHz
- 10 Memories
- 1W, 1.5W optional
- 32 tones built-in



**IC-03AT**

- 220 to 224.995 MHz
- 2.5W, 5W Optional
- Built in subtone
- 10 Memories

**Kantronics**



**KPC-2400**

"ALL THE FEATURES OF KPC-2 PLUS 2400 BAUD"

- Easy Direct Interface to PC Compatibles or the VIC/C-64 Series
- AX .25 Version 2 Software
- Supports multiple connects
- Has both the KPC-2 modem for 300 Baud HF and 1200 Baud VHF work, and a new phase shift keying (PSK) modem for 2400 baud operation.



**MFJ 1270**

- TTI serial port
- Latest AX.25 version 2.0 software
- True Data Carrier detect for HF
- 16K Ram


**ASTRON CORPORATION**



**Power Supply**

• RS7A	.....	\$48
• RS12A	.....	\$68
• RS20A	.....	\$88
• RS20M	.....	\$105
• VS20M	.....	\$125
• RS35A	.....	\$133
• RS35M	.....	\$149
• VS35M	.....	\$165
• RS50A	.....	\$189
• RS50M	.....	\$215
• RM50A	.....	\$219
• VS50M	.....	\$229

**Happy New Year!**  
**From The Gang At Missouri Radio Center**



**Most orders shipped the same day.**

**ASA**



**PK 232**

- Make any RS-232 compatible computer or terminal a complete digital operating position.
- Morse, Baudot, ASCII, AMTOR, Packet
- Loaded with features.

HUSTLER    HYGAIN    ICOM    • MOST ORDERS SHIPPED SAME DAY •    J.I.L.    KANTRONICS    KDK

CIRCLE 171 ON READER SERVICE CARD

# Announcing the HF/VHF/UHF base station you'll hear about on the air.



Listen for Yaesu's FT-767GX everywhere you might hear it: HF, 6 meters, 2 meters and 70 cm.

You'll hear operators calling it the ideal HF/VHF/UHF base station for small ham shacks and apartments.

And they'll rave about its full-featured performance and highly attractive price.

You see, the FT-767GX continues the price/performance tradition of our popular FT-757GX. But with even more features.

When you're ready to expand beyond HF coverage, just plug in optional modules for 6-meter, 2-meter, and 70-cm operation.

As standard equipment, you get a built-in HF automatic antenna tuner, AC power supply, digital SWR meter, digital power output meter, electronic keyer, and CW filter.

And operation is smooth and intuitive with keyboard frequency entry. Dual VFOs that tune in 10-Hz steps. A digital display in 10-Hz steps. And ten memories that store mode, frequency, and CTCSS tone information.

The FT-767GX is ready to operate full duty cycle at full rated power

output for up to 30 minutes. And it listens from 100 kHz to 30 MHz.

Plus your station is really complete with full CW break-in, our patented Audio Peak Filter for CW operation, a CW TX offset variable 500/600/700 Hz, IF shift, an IF notch filter, a Woodpecker noise blanker, a VFO tracking system for slaved A/B VFO tuning, and optional CTCSS unit for repeater operation. And that's just a partial list!

But the best way to discover its full-featured performance is to visit your Yaesu dealer today.

Yaesu's FT-767GX. The affordable way to be heard on HF, VHF and UHF.

## YAESU

*Our 30th Anniversary.*

### Yaesu USA

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

### Yaesu Cincinnati Service Center

9070 Gold Park Drive, Hamilton, OH 45011  
(513) 874-3100

Prices and specifications subject to change without notice.

New IC- $\mu$ 4AT  
440MHz Version  
Now Available!



# ICOM MICRO

## ONLY ICOM COULD BUILD IT!

A new micro-sized 2-meter handheld with all the performance and reliability you've come to expect from an ICOM!

**The IC- $\mu$ 2AT.** A breakthrough that ends every amateur radio operator's quest for that one true, go-anywhere 2-meter handheld.

**Miniaturization.** The Micro gives you all the advantages and performance of a larger handheld, in a package so small, so refined, so well built that only ICOM could build it.

Measuring only 4.6" high by 2.3" wide, by 1.1" deep, the Micro fits in your pocket or purse as easily as a cassette tape. This miniaturization doesn't compromise ICOM quality. It's exactly what you'd expect from ICOM: high performance in a micro package.

**Full Featured.** And ICOM hasn't compromised features for size. The IC- $\mu$ 2AT DTMF version includes ten

programmable memories, odd offset capability, an LCD readout on the top



panel for easy readability, up to three watts of output (optional), 32 built-in subaudible tones AND wideband receive coverage from 138 to 162.995MHz in 5kHz steps for MARS/CAP operation and weather broadcasts. There's also a simple to use digital **TouchStep Tuning System** for fast shirt-pocket frequency adjustments. An IC- $\mu$ 2A version is also available without DTMF and PL tones.

**Accessories.** The Micro utilizes most existing ICOM handheld accessories plus it hosts a new line of battery packs, long life to alkaline battery cases.



**ICOM**  
First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 Customer Service Hotline (206) 454-7619  
3150 Premier Drive, Suite 126, Irving, TX 75063

ICOM CANADA, A Division of ICOM America, Inc., 3071-#5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.  $\mu$ 2AT1186-3

CIRCLE 70 ON READER SERVICE CARD