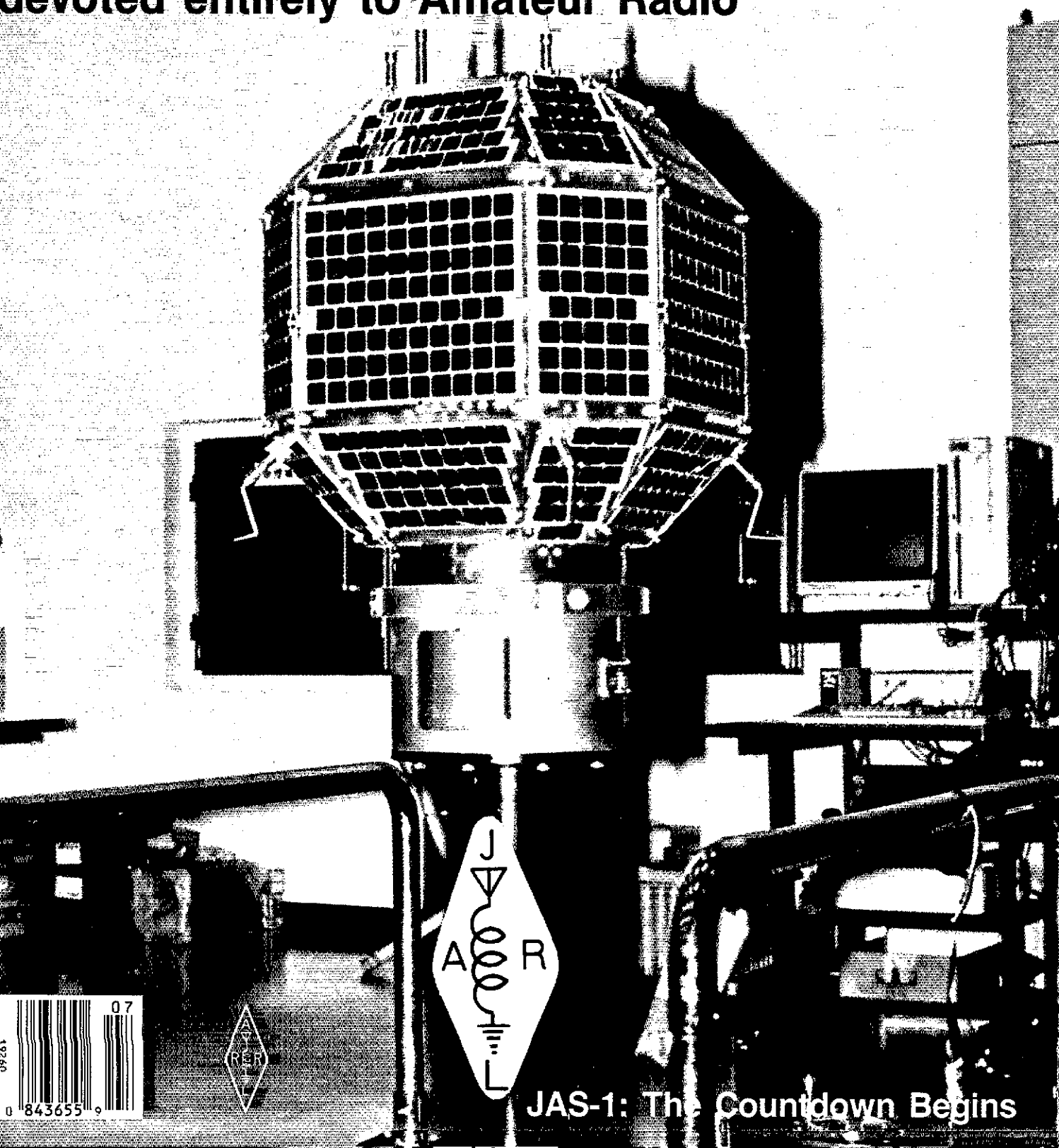


# QST

devoted entirely to Amateur Radio



JAS-1: The Countdown Begins

# We have a wonderful world of RF at Henry Radio

Many Amateurs are professional electronics engineers. This message is for them.

In the beginning Henry Amplifiers were for communications. Many still are. Amateur, commercial, MARS, military, short wave broadcast, FM broadcast, VHF link, domestic, foreign. . . Henry amplifiers go everywhere for diverse services. HF point-to-point, VHF, UHF, SSB, AM, FM, RTTY, packet, meteor burst, digital, marine shore station. . . are you beginning to get the idea? If you need a special purpose vacuum tube amplifier for a specific frequency from

2 MHz to 500 MHz at power levels up to 10,000 watts, we invite your inquiry.

But communications is only the beginning. Think about plasma generation, sputtering and etching, thin film deposition, laser excitation, nuclear magnetic resonance (NMR), photo-emissions and mass spectrometry, scientific research, industrial production. . . Henry equipment is used in all of these applications. We have always been customer driven and still are.

## Recent projects include:

- |   |   |
|---|---|
| <b>10,000 watt 41 MHz Meteor Burst</b><br>U.S. Air Force  | <b>4,000 watts 145 MHz VHF</b><br>Point-to-Point — Indonesia                                  |
| <b>10,000 watts 60 MHz</b><br>U.S. Air Force  | <b>3,000 watts 320 MHz</b><br>Pulse for Satellite Test station, Hughes Aircraft               |
| <b>2,000 watts 45 MHz</b><br>numerous customers including SHAPE Headquarters,<br>U.S. Dept. of Interior, The Mitre Company, M-A Com, Etc. | <b>5,000 watts 400 MHz</b><br>Pulse for Laser Excitation, University of California            |
| <b>2,000 watts 13.5 MHz</b><br>Plasma generator for vacuum etching, many customers  | <b>2,500 watts 27.12 MHz</b><br>Ignite Argon Torch Photo-Emissions Spectrometry — Switzerland |
| <b>1,000 watts 13.5 MHz</b><br>Same application as previous listing   | <b>1,500 watts 40 MHz</b><br>same application as above — The Baird Corporation                |
| <b>5,000 watts 13.5 MHz</b><br>Same application as previous listing   | <b>2,000 watts 27.12 MHz</b><br>Mass Spectrometry, VG Isotopes, England                       |
| <b>5,000 watts various Marine HF frequencies</b><br>Shore stations  | <b>2,000 watts 13.56 MHz</b><br>Sputtering — Munich, Germany                                  |
| <b>10,000 watts 90 MHz</b><br>Laser Excitation, Aluminor Co.  | <b>5,000 watts 6 MHz</b><br>Shortwave AM — Broadcast, Iraq                                    |
| <b>2,000 watts 110 to 150 MHz</b><br>United Technology  | <b>5,000 watts 70 MHz</b><br>Airborne Radar Research, England                                 |
| <b>3,000 watts 450 MHz</b><br>Western Research  | <b>5K Classic Amplifiers</b><br>Japan   |

If you have a requirement for high power RF, please call Ted Shannon, Mary Silva or Ted Henry (Los Angeles office). And don't forget, Henry Radio still produces the world's broadest line of fine Amateur amplifiers!



## Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025  
Butler, Missouri 64730

(213) 820-1234  
(816) 679-3127

# KENWOOD

...pacesetter in Amateur radio

**NEW!**  
Computer Interface!

## "DX-cellence!"

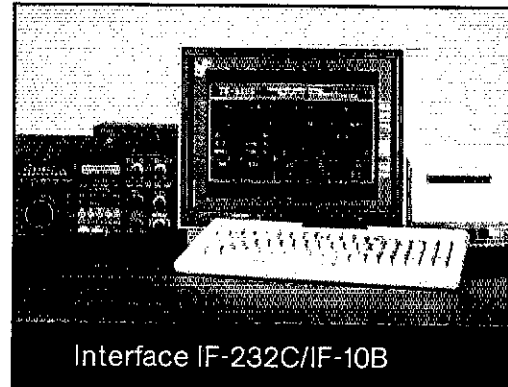
### TS-940S

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-

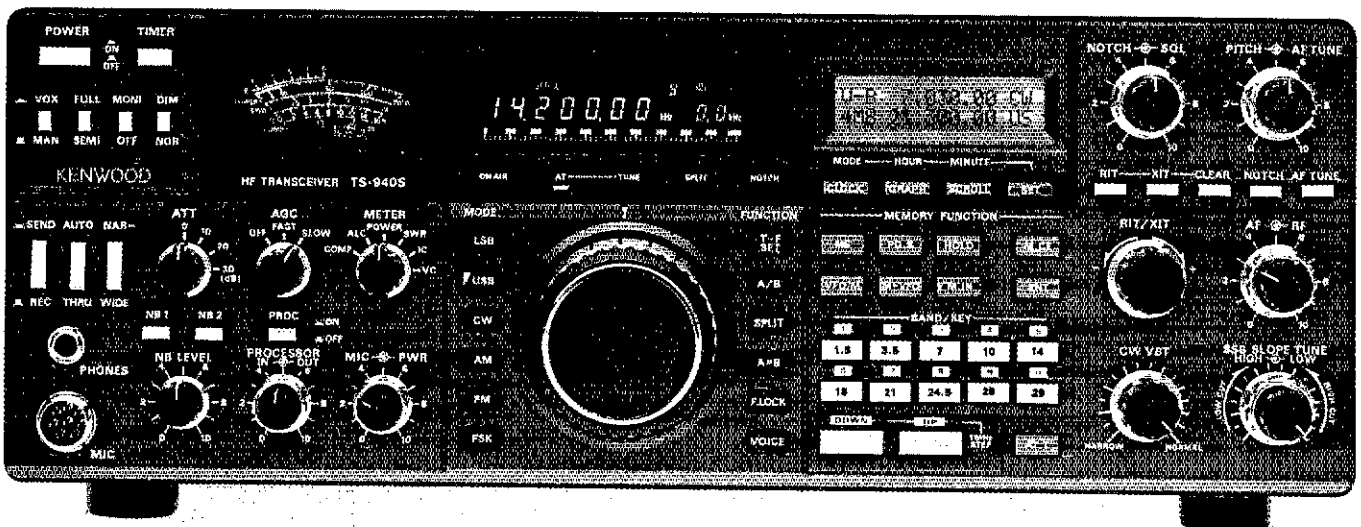
display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.

- **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-42S 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



# ICOM IC-745

## THE WISE CHOICE

- All HF Band Transceiver/General Coverage Receiver
- Fully Protected Finals for Continuous Transmit
- Passband Tuning and IF Shift
- Optional Internal or External Power Supplies
- Wide Selection of Optional Filters and Filter Combinations

The IC-745 is a versatile HF base station transceiver with a 100dB dynamic range receiver and a 100 watt transmitter. PLUS it has features usually found in more expensive units...more features for your dollars.

**All Amateur Band Coverage.** Plus general coverage reception from 100kHz to 30MHz. MARS operation is easily accomplished with a simple modification.

**16 Memories.** Sixteen tunable memories are available to store your most used frequencies which allow you to quickly QSY.

**Scanning.** The IC-745 enables you to scan all the memories or to scan between programmable limits.

**More Premium Features.** Included as standard is an adjustable noise blander (width and level) for reducing impulse noise, adjustable AGC, receiver preamp, and adjustable transmit power from 10 - 100 watts. The IC-745 also has 10Hz, 50Hz and 1kHz tuning rates. There's also an adjustable RF speech processor, tunable notch filter, all-mode squelch and VOX. An IC-HM12 scanning mic is also provided.



**Filter Flexibility.** A variety of filters are available depending upon your specific requirements.

Filter	Type	-6dB Width	Center Freq. MHz
FL-45	CW/RTTY	500Hz	9.0115
FL-54	CW	270Hz	9.0115
FL-44A	SSB	2.4kHz	0.4550
FL-52A	CW/RTTY	500Hz	0.4550
FL-53A	CW	250Hz	0.4550
FL-70	SSB/W	2.8kHz	9.0115
FL-80	SSB	2.4kHz	9.0115

**Options Available.** Options for the IC-745 include the IC-PS35 internal power supply, IC-PS30 external AC system power supply, IC-AT500 antenna tuner, EX-241 marker, EX-242 FM module, EX-243 electronic keyer, SM-8 or SM-10 desk mics, IC-2KL linear amplifier, SP-7 or SP-3 external speakers, AH-2 mobile automatic antenna system and GC-5 world clock.



ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3150 Premier Drive, Suite 126, Irving, TX 75030 / 3071 - #5 Road, Unit 9, Richmond, B.C., V6X 2T8 Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 745

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, CT USA. Official organ of the Canadian Radio Relay League.

David Sumner, K1ZZ  
*Publisher*

Paul L. Rinaldo, W4RI  
*Editor*

E. Laird Campbell, W1CUT  
*Managing Editor*

Joel P. Kleinman, N1BKE  
*Assistant Managing Editor*

Andrew Tripp, KA1JGG  
*Editorial Supervisor*

Paula McKnight, N1DNB  
*Editorial Assistant*

Charles L. Hutchinson, KBCH  
*Technical Editor*

Gerald L. Hall, K1TD  
*Associate Technical Editor*

Paul Pagel, N1FB, Mark J. Wilson, AA2Z  
*Senior Assistant Technical Editors*

Larry D. Wolfgang, WA3VIL, Robert Schetgen, KU7G,  
 Bruce O. Williams, WA6IVC, David Newkirk, AK7M  
*Assistant Technical Editors*

Maureen Thompson, KA1DYZ  
*Technical Editorial Assistant*

John F. Lindholm, W1XX  
*Operating News*

Phillip M. Sager, WB4FDT  
*Happenings, League Lines*

John C. Hennessee, KJ4KB  
*Correspondence, Washington Mailbox*

Michael R. Riley, KX1B  
*Public Service*

Michael B. Kaczynski, W1OD  
*Contests*

Donald B. Search, W3AZD  
*DXCC*

Leo D. Kluger, WB2TRN  
*Affiliated Clubs in Action*

John Foss, W7KQW  
*In Training*

Robert J. Halprin, K1XA, Richard K. Palm, K1CE  
*Editorial Associates*

Ed Tilton, W1HDQ, John Troster, W6ISQ,  
 William A. Tynan, W3XO, Stan Horzepa, WA1LOU,  
 Harry MacLean, VE3GR0, Bob Atkins, KA1GT,  
 Ellen White, W1YL4, Richard L. Baldwin, W1RU,  
 John Huntton, W1RW, Doug DeMaw, W1FB/8,  
 Scott Springate, N7DDM, Vern Riportella, WA2LQQ,  
 Joan Gibson, KG1F  
*Contributing Editors*

Michelle Chrisjohn, WB1ENT, *Production Supervisor*  
 Deborah J. Sandler, *Assistant Production Supervisor*  
 Sue Fagan, *Graphic Design Supervisor*  
 David Pingree, *Technical Illustrator*  
 Jodi McMahon, KA1JPA, *Layout Artist*  
 Rose Cyr, *Typesetter*  
 Leslie K. Bartoloth, KA1MJP, *Production Assistant*  
*Production Staff*

Stefhe Nelson, KA1IFB  
*Proofreader*

Lee Aurick, W1SE  
*Advertising Manager*

Sandy Gerli, AC1Y  
*Deputy Advertising Manager*

Lory Evans, KA1KQY, *Circulation Manager*  
 Debra Chapor, *Deputy Circulation Manager*

**Offices**  
 225 Main St. Newington, CT 06111 USA  
 Telephone: 203-666-1541  
 Telex: 650215-5052 MCI

Subscription rate: \$25 per year postpaid in the US and Posses-  
 sions and \$33 elsewhere. All payments must be in US funds.  
 Foreign remittances should be by International postal or express  
 money order or bank draft negotiable in the US and for an  
 equivalent amount in US funds. Individuals may apply for  
 membership at the rates shown. Canadians apply to CRRL  
 Headquarters, address on page 9. Licensed Amateur Radio  
 operators over 65—\$20 US, \$28 elsewhere, plus proof of age.  
 Persons age 17 or under may qualify for special rates. Write for  
 application. Membership and QST cannot be separated. Fifty per  
 cent of dues is allocated to QST, the balance for membership  
 Single copies \$3.00.

Second-class postage paid at Hartford, CT and at additional  
 mailing offices. Postmaster: Form 3579 requested.

Copyright © 1986 by the American Radio Relay League, Inc.  
 Title registered at US Patent Office. International copyright  
 secured. All rights reserved. *Quedan reservados todos los  
 derechos.* Printed in USA

QST is available to blind and physically handicapped  
 individuals on flexible discs from the Library of Congress,  
 National Library Service for the Blind & Physically Handicapped,  
 Washington, DC 20542

Indexed by Applied Science and Technology Index, Library of  
 Congress Catalog Card No: 21-9421.

**OUR COVER**

If you're confused when someone runs up to you saying "AOS is coming up!" you should get into satellites. Your timing would be ideal, since JAS-1, the first Japanese amateur satellite, is scheduled for launch in early August, to be followed later this year by another AMSAT-OSCAR bird. May QST, page 11, and June QST, page 71, contain details on JAS-1. (photo courtesy Japan Amateur Radio League)



## CONTENTS

### TECHNICAL

- 14 The ARRL Microcontroller *Jon Bloom, KE3Z*
- 20 Aerials—A Lost Art *George Murphy, VE3ERP*
- 23 Adventures in Satellite DXing—Part 4 *Dick Jansson, WD4FAB and Mark Wilson, AA2Z*
- 30 A VHF/HF Remote-Base Station *Bob Heil, K9EID*
- 34 *Under Construction—Part 9: The SWR Twins—QRP and QRO*  
*Doug DeMaw, W1FB*
- 38 ALC for Class AB<sub>1</sub> Amplifiers *Mark Mandelkem, KN5S*
- 40 *Product Review: Spider™ HF Mobile Antenna*
- 43 Technical Correspondence

### NEWS AND FEATURES

- 9 *It Seems to Us: Novice Enhancement Moves a Step Forward*
- 11 Up Front in QST
- 46 Field Organization Call-Sign Badges *Steve Place, WB1EYI*
- 48 Ham Radio in China *David E. Peterson, WD0EOI*
- 49 Ham Radio Spends a Weekend at the Boston Museum of Science  
*Elizabeth Karpiej, KA1DTU and Robert Salow, WA1IDA*
- 51 IMRA: Amateurs with a Mission *The Rev Michael Mullen, CM, WB2GQW*
- 53 *Happenings: HR 3378 Passes Subcommittee*
- 65 *IARU News: Regional Administrative Radio Conference*
- 77 *Public Service: "Trial by Flood"—A New EC Gets His Feet Wet*
- 80 *Preparing for the Unexpected* *Steven Ewald, WA4CMS and Kim Hemmis*

### OPERATING

- 83 Results, 1985 ARRL 10-Meter Contest  
*Michael B. Kaczynski, W1OD and Billy Lunt, KR1R*
- 86 Rules, 1986 ARRL UHF Contest

### DEPARTMENTS

Affiliated Clubs in Action	76	Making Waves	71
Canadian NewsFronts	64	Mini Directory	65
Coming Conventions	74	New Books	19,45
Contest Corral	87	The New Frontier	68
Correspondence	56	New Products	42
DX Century Club	60	Next Month in QST	29
Exam Information	76	On Line	69
Feedback	43	QSL Corner	59
FM/RPT	70	Section News	89
Ham Ads	138	Silent Keys	73
Hamfest Calendar	74	Special Events	88
Hints and Kinks	44	The World Above 50 MHz	66
How's DX?	57	W1AW Schedule (see last month)	
Index of Advertisers	158	YL News and Views	72
League Lines	13	50 and 25 Years Ago	73

# TOO GOOD TO BE TRUE?

## PAKRATT™ Model PK-64

shown with enhanced  
HFM-64 option installed



★ MORSE ★ BAUDOT ★ ASCII ★ AMTOR ★ PACKET ★

### FIRST FIVE MODE DATA CONTROLLER

The Pakratt model PK-64 by AEA is the world's first computer interface that offers Morse, Baudot, ASCII, AMTOR and Packet all in one box (hardware and software included) at a price many competitors charge for Packet alone (from \$219.95 Amateur net). Do not let the low price fool you; coming from any other company but AEA it WOULD be too good to be true. The PK-64 works with virtually any voice transceiver. The Pakratt is the easiest of any to hook up and have operating in just a few minutes.

In Packet mode, the PK-64 offers virtually all the features of every other Packet controller on the market, plus many important features left out by others due to cost constraints. For example, we have included a hardware HDLC, true Data Carrier Detect (DCD), multiple connect with up to ten stations simultaneously and full implementation of version 2.0 of the AX.25 protocol.

Because the PK-64 was designed specifically for the Commodore 64 (or C-128 and SX-64) computer, we have been able to do many things not economically feasible with general RS-232 interface controllers. For ex-

ample, the Pakratt includes true split screen operation with on-screen status indicators and an on-screen tuning indicator.

### ENHANCED HFM-64 MODEM OPTION

The standard PK-64 will operate all modes with a phase-lock-loop (PLL) detector roughly equivalent to all popular packet modems in the marketplace (except we have included extra filtering). The enhanced HFM-64 modem option offers true independent dual channel filtering with A.M. detection (like the famous CP-100 Computer Patch™). The enhanced HFM-64 option also offers a hardware LED tuning indicator (like the CP-100) and a front panel variable threshold control for setting maximum sensitivity under various band conditions. We recommend the HFM-64 option for anyone keenly interested in weak-signal heavy-QRM HF operation. For anyone desiring to operate FM RTTY with the standard North American tone pair or CW receive, the HFM-64 is required. The HFM-64 is field installable with no soldering or test equipment required.

### WORKS WITH THE POPULAR C-64 COMPUTER

AEA designed the PK-64 around the

low-cost C-64 because of the special architecture features making it especially suited to Amateur Radio applications. The C-64 should not be viewed as a mainframe, but rather a very economical accessory to your data communications system. Many owners of expensive computers such as IBM, TANDY, APPLE, KAYPRO, ATARI, etc., are now buying the low cost C-64 and dedicating it to their operating position. They simply cannot find software for their machine that even approaches the power and user friendliness of the PK-64. Plus, think of the convenience of having only one controller and keyboard to go from one mode to another without having to redo cabling!

The PK-64 is so complete that all you need to do is wire up a microphone connector to the end of a cable (provided) and you are ready to go. There is no need to track down special terminal software, cabling or even a power supply. It all comes with the PK-64. So do not be the last on your block to own the most exciting new product in years. See the PK-64 at your favorite dealer or write for our specification sheet now.

*Prices And Specifications Subject To  
Change Without Notice Or Obligation*

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

**AEA** Brings you the  
Breakthrough!



A4, with wideband performance, easy installation, 4 band operation and moderate price will give you more enjoyment and satisfaction from your hobby. You'll like the 40 meter operating possibilities with the A744 add-on kit.

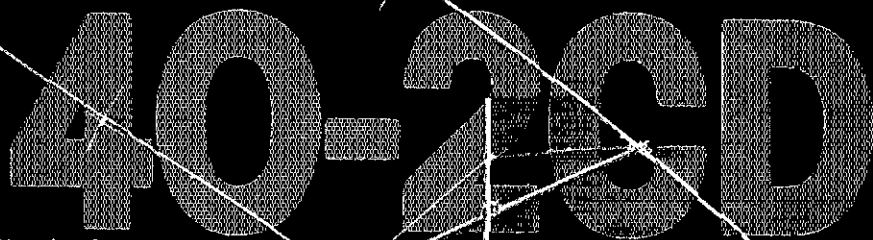
A4 is designed with you in mind because it has fewer parts to assemble, less weight and minimum wind load on your tower. With the 18 ft. boom, A4 gives excellent gain and front-to-back ratio. If your interest is rag chewing, DX-ing or contesting, A4 is the perfect 4 band beam for you.

**MODEL A4 10, 15, 20 METERS**

**MODEL A744 40 METER ADD ON KIT**

**SPECIFICATIONS** SWR 1.2-1 band-width 500 + KHz, boom 18 ft., longest element 32 ft., wind area 5.5 ft.<sup>2</sup>, turn radius 18.4 ft., weight 37 lbs. Excellent gain.

## MORE CONTACTS, MORE SATISFACTION WITH **CUSHCRAFT BEAMS**



# 40-2CD

More contacts, less interference and a better signal at the receiving end are yours with this 2 element 40 meter Skywalker Yagi. The computer design maximizes gain and reduces side lobes. The design also gives low SWR with excellent bandwidth.

Holder of the North American contact record. This compact two element antenna has quickly become "the most wanted" 40 meter beam. Make it your first choice.

**MODEL 40-2CD 40 METERS**

**SPECIFICATIONS** boom 23 ft., longest element 42 ft., beamwidth 70°, 1.5-1 bandwidth 180 KHz, turn radius 24 ft., windload 6.3 ft.<sup>2</sup>,

weight 40.7 lbs. Excellent gain.



P.O. BOX 4680 48 PERIMETER ROAD  
MANCHESTER, NH 03108 USA/603-627-7877  
TELEX 953-65 CUSHSIG MAN

# KENWOOD

...pacesetter in Amateur radio

Here Now!  
220 MHz

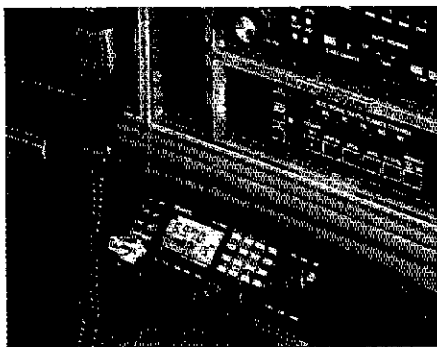
## 220: Kenwood Style!

### TM-3530A

The first comprehensive  
220 MHz FM transceiver

**TM-3530A—25 watts of 220 MHz FM—Kenwood style! Features include built-in 7-digit telephone number memory, auto dialer, direct frequency entry and big LCD. All this makes the TM-3530A the most sophisticated rig on 220 MHz!**

- **First** mobile transceiver with telephone number memory and auto-dialer (up to 15 seven-digit telephone numbers)
- Frequency range 220-225 MHz
- Automatic repeater offset selection—a **Kenwood exclusive!**
- Direct keyboard entry of frequency
- 23-channel memory for offset, frequency and sub-tone



- Big multi-color LCD and back-lit controls for excellent visibility
- Optional front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz**

- Frequency lock switch
- Digital Channel Link (DCL) option
- **Unique** offset microphone connector—relieves stress on microphone cord

### TH-31AT/31A

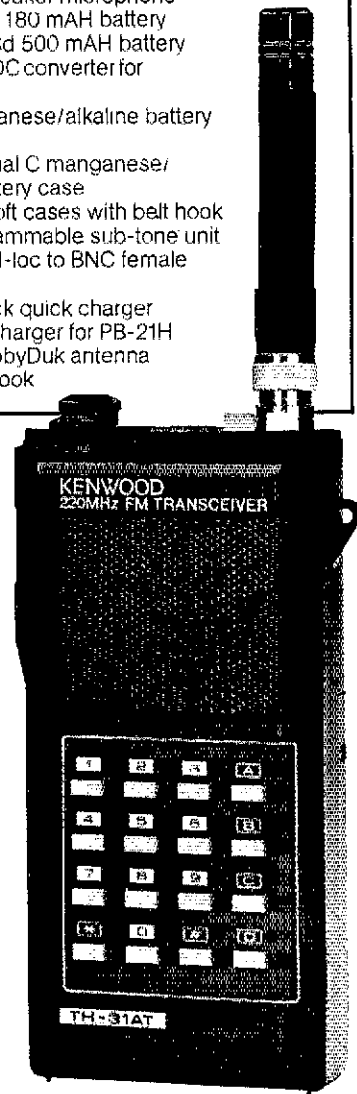
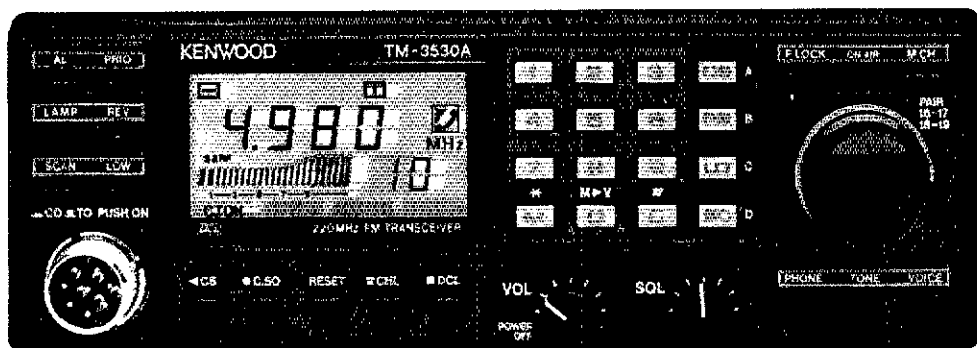
**Kenwood's advanced technology brings you a new standard in pocket/handheld transceivers!**

- 1 watt high, 150 mW low
- Super compact and lightweight (about 8 oz. with PB-21!)
- Frequency range 220-224.995 MHz in 5-kHz steps
- Repeater offset:—1.6 MHz, reverse, simplex
- **Supplied accessories:** rubber flex antenna, earphone, wall charger, 180 mAh NiCd battery and wrist strap
- Quick change, locking battery case
- Rugged, high-impact case

#### TH-31AT/31A optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAh battery
- **PB-21H** NiCd 500 mAh battery
- **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
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- **New** 5-way adjustable mounting system
- High performance GaAs FET front end receiver
- HI/LOW power switch (adjustable LOW power)



TH-31AT with DTMF pad shown.  
Optional RA-9A attached

#### TM-3530A optional accessories:

- **PS-430** DC power supply
- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2K** extra DC cable
- **PG-3A** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48** extra DTMF mic. with UP/DOWN switch
- **MC-42S** UP/DOWN mic.
- **MC-55** (8 pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50** mobile speaker
- **SW-200B** SWR/power meter
- **SW-100** compact SWR/power meter

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



# KENWOOD

...pacesetter in Amateur radio

## “Dual-Band” Leader!

### TW-4000A 2-m/70-cm FM transceiver.

The first is still the best! The original FM “Dual Bander” TW-4000A delivers 25 watts output on both VHF and UHF in a single compact package.

2 m and 70 cm FM in a compact package.

Covers the 2 m band (142,000-148,995 MHz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440,000-449,995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).

Single-function keys allow easy operation.

Large, easy-to-read LCD display.

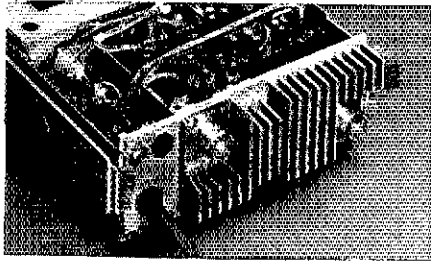
A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, “S” or “RF” level, VFO A/B, scan, busy, and “ON AIR.” Dimmer switch.

Front panel illumination.

10 memories with offset recall and lithium battery backup.

Stores frequency, band, and repeater offset. Memory 0 stores receive and

transmit frequencies independently for odd repeater offsets, or cross-band (2 m/70 cm) operation.



• **Rugged die-cast chassis.**

• **Two separate antenna ports.**

Use of separate antennas is recommended. This simplifies antenna matching and minimizes loss. However, mobile installations may require a single antenna. The optional MA-4000 dual band mobile antenna comes with an external duplexer.

• **Programmable memory scan with channel lock-out.**

Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.

• **Band scan in selected 1-MHz segments.**

Scans within the chosen 1-MHz segment (i.e., 144,000-144,995 or 440,000-440,995, etc.); The scanning direction

may be reversed by pressing either the “UP” or “DOWN” buttons on the microphone.

• **Priority watch function.**

Unit switches to memory 1 for 1 second every 10 seconds, to monitor the activity on the priority channel.

• **Common channel scan.**

Memories 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.

• **High performance receiver/transmitter.**

GaAs FET RF amplifiers on both 2 m and 70 cm, high performance monolithic crystal filters in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.

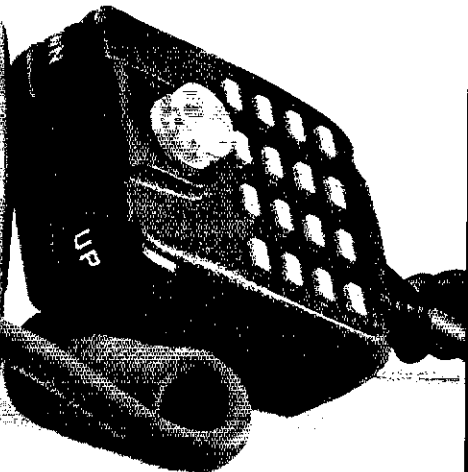
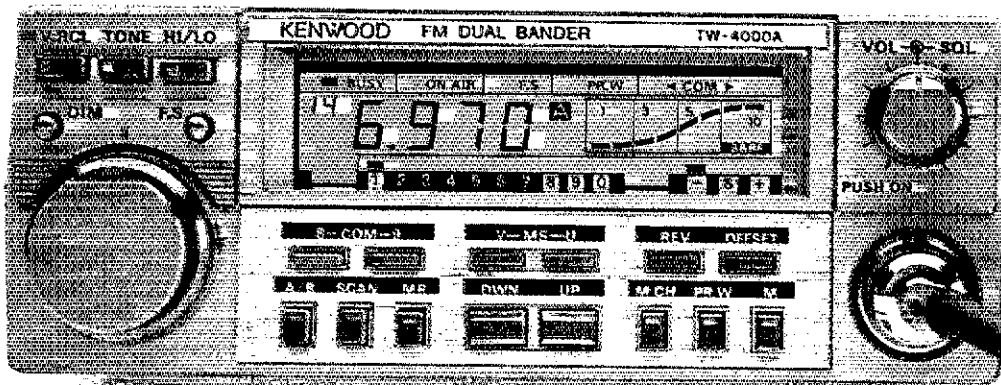
• **Optional “voice synthesizer unit”**

Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.

• **Repeater reverse switch.**



More TW-4000A information is available from authorized Kenwood dealers.



#### Optional accessories:

- VS-1 voice synthesizer
- TU-4C two-frequency CTCSS tone encoder
- PS-430 DC power supply
- KPS-7A fixed station power supply
- MA-4000 dual band mobile antenna with duplexer
- SP-40 compact mobile speaker
- SP-50 mobile speaker

- MC-42 UP/DOWN microphone
- MC-55 8-pin mobile mic. with time-out timer
- SW-100B SWR/power meter
- SW-200B SWR/power meter
- SWT-1/SWT-2 2 m/70 cm antenna tuners
- PG-3A noise filter
- MB-4000 extra mounting bracket

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation. Antenna mag mount is not Kenwood supplied.

## KENWOOD

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

## Directors

### Canada

THOMAS B. J. ATKINS, VE3CDM,  
55 Havenbrook Blvd, Willowdale, ON M2J 1A7  
(416-494-8721)

Vice Director: Harry MacLean, VE3GRQ,  
500 Riverside Dr, London, ON N6H 2R7  
(519-473-1668)

### Atlantic Division

HUGH A. TURNBULL, \* W3ABC, 6903 Rhode Island  
Ave, College Park, MD 20740 (301-927-1797)

Vice Director: James M. Mozley, W2BCH, 126  
Windcrest Dr, Camillus, NY 13031 (315-488-9051)

### Central Division

EDMOND A. METZGER, W9PRN, 1520 South  
Fourth St, Springfield, IL 62703 (217-523-5861)

Vice Director: Howard S. Huntington, K9KM,  
65 South Burr Oak Dr, Lake Zurich, IL 60047

### Dakota Division

HOWARD MARK, W8OZC, 11702 River Hills Dr,  
Burnsville, MN 55337 (612-890-9114)

Vice Director: Richard Whiting, W8TN, 4749 Diane  
Dr, Minnetonka, MN 55343 (612-870-2071)

### Delta Division

CLYDE O. HURLBERT, W5CH, PO Box 502,  
Biloxi, MS 39533-0502 (601-435-5544)

Vice Director: Lionel A. "Al" Oubre, K5DPG, Star  
Route A, Box 185-E, New Iberia, LA 70560  
(318-367-3901)

### Great Lakes Division

GEORGE S. WILSON, III, \* W4OYI, 1649 Griffith Ave,  
Owensboro, KY 42301

Vice Director: Allan L. Severson, AB8P, 1275 Ethel  
Ave, Lakewood, OH 44107 (216-521-1565)

### Hudson Division

LINDA S. FERDINAND, N2YL, Sunset Trail,  
Clinton Corners, NY 12514 (914-266-5396)

Vice Director: Stephen A. Mendelsohn, WA2DHF,  
318 New Milford Ave, Dumont, NJ 07628  
(201-384-0570/0680)

### Midwest Division

PAUL GRAUER, \* W0FIR, Box 190, Wilson, KS  
67490 (913-658-2155)

Vice Director: Richard Ridenour, KB0ZL,  
9 Lake Pembroke Dr, Ferguson, MO 63135  
(314-221-2520)

### New England Division

TOM FRENAYE, K1KI, 23 Pinehurst Rd,  
Box 62, Unionville, CT 06085 (203-673-5429)

Vice Director: Richard P. Beebe, K1PAD,  
6 Tracy Circle, Billerica, MA 01821

### Northwestern Division

MARY E. LEWIS, W7QGP, 10352 Sandpoint Way,  
NE, Seattle, WA 98125 (206-523-9177)

Vice Director: Rush S. Drake, W7RM, 41385 Foul  
Weather Bluff Rd, NE, Hansville, WA 98340  
(206-638-2330)

### Pacific Division

RODNEY J. STAFFORD, KB6ZV, 5155 Shadow  
Estates, San Jose, CA 95135 (408-274-0492)

Vice Director: Kip Edwards, W6SZN,  
1928 Hillman Ave, Belmont, CA 94002

### Roanoke Division

GAY E. MILIUS, JR, W4UG,  
1416 Rutland Rd, Virginia Beach, VA 23454  
(804-481-5095)

Vice Director: John C. Kanode, N4MM,  
RFD 1, Box 73-A, Boyce, VA 22620 (703-837-1340)

### Rocky Mountain Division

LYS J. CAREY, K8PGM, 13495 West Center Dr,  
Lakewood, CO 80228 (303-986-5420)

Vice Director: Marshall Quiat, AG0X, 1660 Wynkoop,  
Suite 850, Denver, CO 80202 (303-333-0819)

### Southeastern Division

FRANK M. BUTLER JR, \* W4RH,  
323 Elliott Rd, SE, Fort Walton Beach, FL 32548  
(904-244-5425)

Vice Director: Mrs. Evelyn Gauzens, W4WYR,  
2780 NW 3rd St, Miami, FL 33125 (305-642-4139)

### Southwestern Division

FRIED HEYN, WA6WZO, 962 Cheyenne St,  
Costa Mesa, CA 92626 (714-549-9516)

Vice Director: Wayne Overbeck, N6NB, 900 Avenida  
Salvador, San Clemente, CA 92672 (714-492-8025)

### West Gulf Division

RAYMOND B. WANGLER, W5EDZ, 642 Beryl Dr,  
San Antonio, TX 78213 (512-733-9632 home,  
512-822-2221 business)

Vice Director: Thomas W. Comstock, N5TC,  
1700 Dominik, College Station, TX 77840  
(409-693-1181)

\* Executive Committee Member

## Section Managers of the ARRL

**Reports Invited:** The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

### Canada

#### Alberta

#### British Columbia

#### Manitoba

#### Maritime-Nfld

#### Ontario

#### Quebec

#### Saskatchewan

Bill Gillespie, VE6ABC, 10129 90th St, Edmonton T5H 1R5

H. E. Savage, VE7FB, 4553 West 12th Ave, Vancouver V6R 2R4 (604-224-5226)

Jack Adams, VE4AJE, 227 Davidson Ave E, Dauphin R7N 2Z4 (204-638-9270)

Donald R. Welling, VE1WF, 36 Sherwood Dr, St. John. NB E2J 3H6 (506-696-2913)

L. P. Thivierge, VE3GT, 34 Bruce St W, Renfrew K7V 3W1 (613-432-5967)

Harold Moreau, VE2BP, 80 Principale, St Simon Co, Bagot J0H 1Y0 (514-798-2173)

W. C. "Bill" Munday, VE5WM, 132 Shannon Rd, Regina S4S 5B1 (306-586-4963)

### Atlantic Division

#### Delaware

#### Eastern Pennsylvania

#### Maryland-DC

#### Southern New Jersey

#### Western New York

#### Western Pennsylvania

Harold K. Low, WA3WIY, Rte 6, Box 66, Millsboro 19966 (302-945-2871)

James B. Post, KA3A, 15 Monarch Rd, Wilkes-Barre 18702 (717-825-3940)

John A. Barolet, KJ3E, 108 Elliott Ct, California, MD 20619 (301-862-3201)

Richard Baier, WA2HEB, 1226 Audubon Dr, Toms River 08753 (201-270-9292)

William Thompson, W2MTA, RD 1—Rock Rd, Newark Valley 13811 (607-642-8930)

Otto Schuler, K3SMB, 3732 Colby St, Pittsburgh 15214 (412-231-6890)

### Central Division

#### Illinois

#### Indiana

#### Wisconsin

David E. Lattan, WD9EBQ, RR 1, Box 234, Makanda 62958 (618-529-1578)

Ronald J. Koczor, K9TUS, 2512 Glenwood Ave, Fort Wayne 46805

Richard R. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-282-0312)

### Dakota Division

#### Minnesota

#### North Dakota

#### South Dakota

George E. Frederickson, KC0T, RR #2—Box 352, South Haven 55382 (612-558-8312)

Mike Mankey, WB0TEE, 518 E. Columbia Dr, Bismarck 58501 (701-258-5114)

Roland Cory, W0YMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

### Delta Division

#### Arkansas

#### Louisiana

#### Mississippi

#### Tennessee

Joel M. Harrison, Sr., WB5IGF, Star Rte 3—Box 306, Judsonia 72081 (501-729-3301)

John M. Wondergem, K5KR, 600 Smith Dr, Metairie 70005 (504-837-1485)

Paul Kamp, KW5T, 3581 Beaumont Dr, Pearl 39208 (601-939-7612)

John C. Brown, NO4Q, PO Box 37, Eva 38333 (501-584-7531)

### Great Lakes Division

#### Kentucky

#### Michigan

#### Ohio

Dale Bennett, WA4JTE, 320 Loy St, Columbia 42728 (502-384-2839)

James R. Seeley, WB8MTD, 21615-29½ Mile Rd, Springport 49284 (517-857-2013)

Jeffrey A. Maass, K8ND, 9256 Concord Rd, Powell 43065 (614-873-3234)

### Hudson Division

#### Eastern New York

#### NYC-Long Island

#### Northern New Jersey

Paul S. Vydareny, WB2VUK, 259 N Washington, North Tarrytown 10591 (914-631-742)

John H. Smale, K2IZ, 315 Kensington Ct, Copiague 11728 (516-226-4835)

Robert R. Anderson, K2BJG, 69 Page Dr, Oakland 07436 (201-337-9644)

### Midwest Division

#### Iowa

#### Kansas

#### Missouri

Rollin J. Sievers, WB0AVW, Rte 3-Box 62, Storm Lake 50588

Robert M. Summers, K0BKF, 3045 North 72nd, Kansas City 66109 (913-299-1128)

Benton C. Smith, K0PCK, 3301 Sinclair, Rte 3, Box 196-A, Columbia 65203  
(314-443-5168)

Vern J. Wirka, WB0GQM, 3106 Vinton, Omaha 68105 (402-341-4572)

#### Nebraska

### New England Division

#### Connecticut

#### Eastern Massachusetts

#### Maine

#### New Hampshire

#### Rhode Island

#### Vermont

#### Western Massachusetts

Robert Koczur, K1WGO, 84 Whetstone Rd, Harwinton 06791 (203-485-0338)

Luck Hurdur, KY1T, PO Box LL, North Eastham 02651 (617-255-2029)

Clevis O. Laverty, W1RWG, 17 Fair St, Norway 04268 (207-743-2353)

William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-882-0021)

John Vota, WB1FDY, 41 Brookside Ave, Centerville 02911 (401-231-1934)

Frank I. Sultor, W1CTM, 727 North Ave, Burlington, VT 05401

R. Donald Haney, KA1T, RD 1—Box 237, Myrick La, Harvard 01451 (817-772-4126)

### Northwestern Division

#### Alaska

#### Idaho

#### Montana

#### Oregon

#### Washington

James L. Moody, Jr., NL7C, PO Box 102841, Anchorage 99510 (907-694-4077)

Lemuel H. Allen, W7JMH, 1800 S. Atlantic St, Boise 83705 (208-343-9153)

L. C. "Les" Belyea, N7AIK, PO Box 327, Belgrade 59714 (406-388-4253)

William R. Shrader, W7QMU, 2042 Jasmine Ave, Medford 97501 (503-773-8624)

Gene E. Sprague, KD7G, 10716 23rd Dr SE, Everett, WA 98204 (206-337-3459)

### Pacific Division

#### East Bay

#### Nevada

#### Pacific

#### Sacramento Valley

#### San Francisco

#### San Joaquin Valley

Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (415-537-6704)

Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)

Army Curtis, AH6P, PO Box 4271, Hilo, HI 96720 (808-959-8985)

Robert H. Watson, W6IEW, 10994 Clinton Bar Rd, Pine Grove, CA 95665 (209-223-01)

Robert Odell Smith, NA6T, 320 Park St—PO Box 1425, Fort Bragg, CA 95437  
(707-964-4931)

Charles P. McConnell, W6DPD, 1658 W Mesa Ave, Fresno, CA 93711 (209-431-2038)

Glenn Thomas, WB6W, 554 Simas Dr, Milpitas, CA 95035 (408-263-9450)

### Santa Clara Valley

### Roanoke Division

#### North Carolina

#### South Carolina

#### Virginia

#### West Virginia

Rae Everhart, K4SWN, PO Box 41, Lexington 27293-0041 (704-249-8734)

James G. Walker, WD4HLZ, Rte 1, Box 5395, Marion 29571 (803-423-3645)

Claude E. Feigley, W3ATQ, 135 The Main—RR #1, Williamsburg 23185 (804-253-065)

Karl S. Thompson, K8KT, 5303 Pioneer Dr, Charleston 25312 (304-776-4352)

### Rocky Mountain Division

#### Colorado

#### New Mexico

#### Utah

#### Wyoming

William "Bill" Sheffield, KQ0J, 1444 Roslyn St, Denver 80220 (303-355-2488)

Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-45)

James R. Brown, NA7G, 865 Manchester Rd, Kayesville 84037 (801-544-0056)

Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82003 (307-634-7385)

### Southeastern Division

#### Alabama

#### Georgia

#### Northern Florida

#### Southern Florida

#### West Indies

Joseph E. Smith, Jr., WA4RNP, 1211 13th St, N, Bessemer 35020 (205-424-4866)

Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2856)

Royal V. Mackey, WA4DI, 161 Shell Point W, Matland 32751

Richard D. Hill, WA4PFK, 3800 SW 11th St, Ft. Lauderdale 33312 (305-583-6932)

Alberto L. Valdejuell, WP4CSG, V-11 19 St, Berwind Estates, Rio Piedras, PR 00924

### Southwestern Division

#### Arizona

#### Los Angeles

#### Orange

#### San Diego

#### Santa Barbara

James E. Swafford, W7FF, 5906 W Miramar Dr, Tucson 85715 (602-298-7793)

Eugene R. "Bob" Poole, AJ6F, 2059 Reynosa Dr, Torrance, CA 90501 (213-326-280)

Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)

Arthur R. Smith, W6INI, 4515 Melissa Way, San Diego, CA 92117 (619-273-1120)

Byron W. Looney, K6FI, 6540 Buckley Dr, Cambria, CA 93428 (805-927-8733)

### West Gulf Division

#### Northern Texas

#### Oklahoma

#### Southern Texas

Phil Clements, K5PC, 1313 Applegate La, Lewisville 75067 (214-221-2222)

Dave Cox, N5BN, 1812 S Umbrella Ct, Broken Arrow 74012 (918-250-2885)

Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)

# THE AMERICAN RADIO RELAY LEAGUE, INC



The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1954. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

Of, by, and for the radio amateur, ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US and Canada.

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA.

Telephone: 203-966-1541 Telex: 650215-5052 MCI. MCI MAIL (electronic mail system) ID: 215-5052

Canadian membership inquiries and correspondence should be directed to CARRL, Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-225-2188.

## Founding President

Hiram Percy Maxim, W1AW

## Officers

**President:** LARRY E. PRICE,\* W4RA  
PO Box 2067, Statesboro, GA 30458

**First Vice President:** JAY A. HOLLADAY,\* W6EJJ,  
5128 Jessen Dr, La Canada, CA 91011  
(818-790-1725)

**Vice President:** LEONARD M. NATHANSON,  
W8RC, 20833 Southfield Rd, Suite 240,  
Southfield, MI 48075 (313-569-3191)

**Vice President:** WILLIAM J. STEVENS,  
W6ZM, 2074 Foxworthy Ave, San Jose, CA 95124  
(408-371-3819)

**International Affairs Vice President:** TOD OLSON,  
K0TO, 292 Heather Ln, Long Lake, MN 55356  
(612-931-8629)

**Executive Vice President:** DAVID SUMNER,\* K1ZZ

**Secretary:** PERRY F. WILLIAMS, W1UED

**Treasurer:** JAMES E. McCOBB JR, K1LLU

## Staff

**Washington Area Coordinator**

Perry F. Williams, W1UED

## Publications

**Manager:** Paul L. Rinaldo, W4RI

**Deputy Manager:** John Nelson, W1GNC

**Advertising Department:** Lee Aurick, W1SE,

Manager; Sandy Gerli, AC1Y, Deputy Manager

**Circulation Department:** Lorry Evans, KA1KQY,

Manager; Debra Chapor, Deputy Manager

**Production/Editorial Department**

Laird Campbell, W1CUT, Manager

Joel Kleinman, N1BKE, Deputy Manager

**Technical Department**

Charles L. Hutchinson, K8CH, Manager

Gerald L. Hall, K1TD, Deputy Manager

**Membership Communications Services**

**Manager:** John F. Lindholm, W1XX

**Deputy Manager:** Robert J. Halprin, K1XA

**Volunteer Resources**

**Manager:** Stephen C. Place, WB1EYI

**Volunteer Examiner Department**

Jim Clary, WB9IHH, Manager

**Club Services Department**

Curtis R. Holsopple, K9CH, Manager

**Field Services Department**

Richard K. Palm, K1CE, Manager

**Administrative Services**

**Controller:** Michael R. Zeigler

**Purchasing/Office Services Department**

Kathy McGrath, Manager

## Counsel

Christopher D. Imlay, N3AKD

\*Executive Committee Member

# “It Seems to Us ...”

## Novice Enhancement Moves A Step Forward

It was exactly one year ago that the League's proposals for enhancement of Novice privileges were unveiled on this page. While the main ideas presented at the time were hardly new—the original Novice license conveyed limited phone privileges, and the League has supported a return to Novice phone in one form or another since 1975—the concept was not uncontroversial. This was to be expected, since nothing seems to arouse the passions of our community more than does monkeying with the privileges of the various license classes.

What's happened in the intervening 12 months, though, has been something of a revelation. Support for the concept has grown tremendously, seemingly in direct proportion to the level of understanding of the need to attract more new blood into our ranks. As League officials and staff have discussed Novice Enhancement at dozens of forums around the country, we've seen suspicion and outright opposition evaporate time and again. Correspondence has run about four to one in favor, and at forums where there is an opportunity for give-and-take discussion the ratio at the end of a session is even greater, if not unanimous. The big question surrounding Novice Enhancement is no longer “why,” but “when.”

The FCC moved a step closer to answering that question in April, when it released a Notice of Proposed Rule Making fashioned after the League's proposals in RM-5038. Anyone who wishes to do so has until July 16 to file comments with FCC either supporting or opposing the proposed rules, or offering alternatives. Like all FCC rule making proceedings, this one is not a popularity contest; persuasive fact and logic will determine the outcome. To assist you in formulating comments, the complete text of the FCC Notice was printed in last month's *QST*.

Even among those who fully support Novice Enhancement as a concept, there is plenty of room for discussion of details. This is perhaps best illustrated by the fact that three other individuals and groups filed petitions seeking a somewhat different mix of Novice privileges. FCC staff on its own developed yet another alternative that is discussed in the NPRM.

As advocated by the League, the essential components of Novice Enhancement are:

- Voice and data privileges in a band where the same equipment can be used that a Novice or Technician would use for traditional HF CW operation, such as 10 meters.
- Voice and data privileges in a band where FM repeaters can be accessed by (but not licensed to) Novice operators, for exposure to local public-service communications, but not in a band which is so heavily occupied that new activity would create a problem of crowding.
- Selection of these new privileges in a way that will not reduce the likelihood that a Novice will want to upgrade to a higher class of license once he or she has had a taste of the wide range of opportunities that exist within Amateur Radio.
- Addition to the Novice examination pool of questions covering basic voice and data communications concepts, written at a level of difficulty similar to that of the present Novice question pool.
- Some modest tightening of the existing provisions for volunteer-administered Novice examinations in recognition of the fact that a Novice license will be considerably more attractive than it is at present.

While some hams are still a bit nervous that the Novice license may become a bit *too* attractive, it's important to bear in mind that the amateur community will still be in control of the licensing process. Perhaps even more important, if something similar to the present proposal is adopted, the new Novice will have some important choices to make. Should the first rig be an HF transceiver or transmitter-receiver combination, or for UHF FM (and perhaps other modes)? Should RTTY or packet radio come first, or later? Is hand-held convenience important, or would a rig designed for fixed station or mobile operation give better service? The answers will be different for different people and situations. Where will the newcomer turn for advice? To the same place he or she does now: you, the Elmer or fellow club member. If we do as well in providing guidance at this stage as we have done in maintaining the integrity of the examination process, our new Novices will rapidly become full-fledged, participating members of our fraternity—and just as rapidly will seek the greater rewards and challenges that await on the higher rungs of the licensing ladder.—David Sumner, K1ZZ

# EIMAC Tubes Provide Superior Reliability at radio station KWAV — over 112,000 hours of service!



Ken Warren, Chief Engineer at KWAV reports that their 10 kW FM transmitter went on the air in November, 1972, equipped with EIMAC power tubes. The original tubes are still in operation after over 13 years of continuous duty!

Ken says, "In spite of terrible power line regulation, we've had no problems with EIMAC tubes. In fact, in the last two years, our standby transmitter has operated less than two hours!"

Transmitter downtime means less revenue. EIMAC tube reliability gives you *more* of what you need and *less* of what you don't want. More operating time and less downtime!

EIMAC backs their proven tube

reliability with the longest and best warranty program in the business. Up to 10,000 hours for selected types.



Quality is a top priority at EIMAC, where our 50-year charter is to produce long-life products.

Send for our free Extended Warranty Brochure which covers this program in detail.

Write to:

Varian EIMAC  
301 Industrial Way  
San Carlos, CA 94070  
Telephone: (415) 592-1221

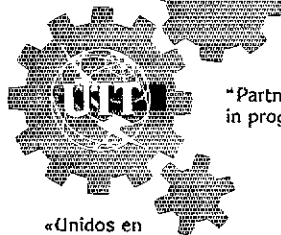




If you're involved in the League's public service field organization and communicate with local officials, you'll want to get a copy of the new **ARRL Amateur Radio Emergency Service brochure**. This publication is designed to be used by local radio amateurs in explaining to nonamateur government officials the benefits of including ARES in their community's emergency-preparedness plans. Special thanks go to the Emergency Communications Advisory Committee and especially Jerry Boyd, KC6LF, for their assistance on this project. Copies of the brochure are available from the ARRL Field Services Department for an SASE. Ask for FSD-25.

## World Telecommunication Day 17 May 1986

« Partenaires  
du progrès »



"Partners  
in progress"

« Unidos en  
el progreso »

# 4UØITU

4UØITU was the special call sign used by the International Amateur Radio Club (IARC) on this year's World Telecommunication Day, May 17, the day on which the International Telecommunication Union was founded in 1865. The QSL features a reproduction of the poster used by the ITU to promote the event. The IARC station is located in the ITU General-Secretariat building in Geneva and usually signs 4U1ITU.



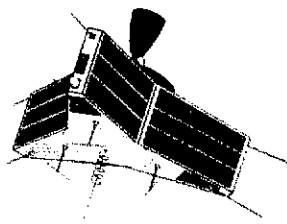
Thousands of amateurs and others around the world, many of them young people, not only heard or saw transmissions from space last summer, but also got this QSL card as confirmation of their involvement in the historic event. Thanks to the efforts of the Milwaukee Radio Amateurs Club, an ARRL Special Service Club, several thousand of these QSLs have been sent to listeners of transmissions from WØORE on board the Space Shuttle *Challenger*. The couple of hundred amateurs who were able to talk with Tony England and the rest of the *Challenger* crew received a QSL signed personally by Tony. The amateurs listed on the back of the QSL each played a significant role in making the event a tremendous success. For a full report on the WØORE/SAREX operation, see October and November 1985 QST.



After about a 20-year absence, Sam Pavone, W2DDN, got back into mobile operation in fine fashion—20-meter mobile kilowatt! Sam had to special order a 120-A alternator with his 1984 Dodge pickup, but the three-phase power supply was straightforward and simple to build. See this month's Hints and Kinks column for construction details. With this setup, the Boonton, New Jersey ham has worked VKs, ZLs, and many European and South American stations—with a 42-inch antenna. (K2BLA photo)

### Armadillo Run 1986: Going at a Record Pace!

The phone weekend of The Great Armadillo Run of 1986 was an unqualified success. As a result, the Texas DX Society's goal of activating all 3076 counties across the US in two weekends as part of the Texas Sesquicentennial Celebration is well within reach (see April QST, page 73). At press time, more than 2200 counties are known to have been on the air, eight states have all counties activated, and 12 others are within just three counties of being finished. The CW weekend is July 26-27. The Texas DX Society invites all amateurs to participate, but help is particularly needed in North and South Dakota, Nebraska, Iowa, Kansas, North Carolina, Mississippi, Georgia, Kentucky, Montana and Utah. For more information, contact Tom Taormina, K5RC, 12610 Barbizon, Houston, TX 77089, tel 713-481-3816.



### Participants Sought for Satellite Bulletin Tests

Repeater operators, gateway stations and individual amateurs are being sought by AMSAT to participate in a series of on-the-air satellite tests. Called Project Linkup, these tests are aimed at verifying the concept of easily accessible bulletins relayed by amateur satellite. If the tests are successful, regular bulletin service may be available this fall, according to AMSAT officials. A Project Linkup information packet is available for a 9- x 11-inch SASE (56 cents postage) to AMSAT, Project Linkup, PO Box 27, Washington, DC 20044. Details will also be supplied on AMSAT's HF nets. Donations to help defray project costs are welcome.

### New Repeater Rules Go into Effect This Month

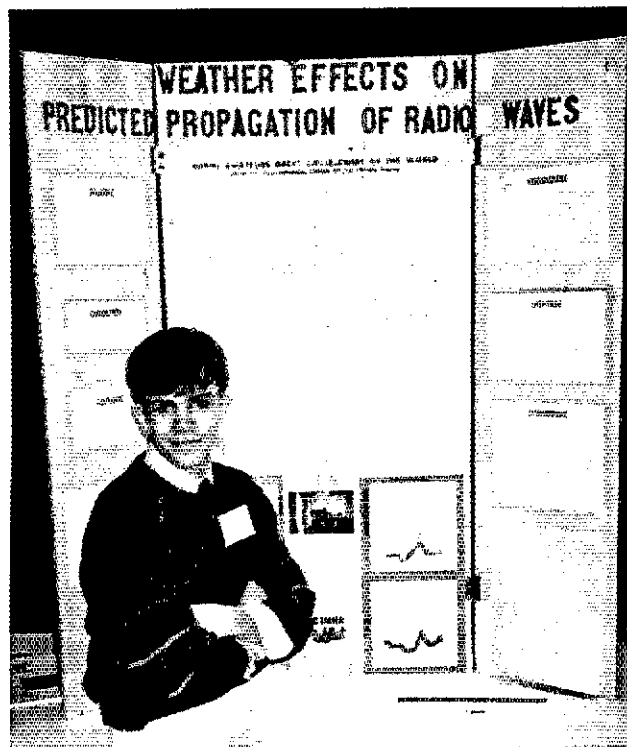
Not all repeaters are required by the FCC to be coordinated, but in a case of interference between a coordinated and an uncoordinated repeater, the noncoordinated repeater has the primary responsibility for resolving the in-

terference problem. This is one of the new rules concerning repeater operation that go into effect July 12 as part of PR Docket 85-22. See this month's Happenings for the actual text of the rules.

### K7UGA Receives Presidential Award

There isn't a more fitting way for retiring Arizona US Senator Barry Goldwater, K7UGA, to cap off his many years of public service than this: He recently received this nation's highest civilian

honor, the Medal of Freedom, from President Reagan. According to the citation, "his candor and patriotism have made him an American legend." Congratulations, Barry!



Doing his ham radio homework sure paid off for Mark McInfire, KB4MHA. He captured a First Place Award for his science project, which studied the effects of weather on propagation. Using propagation charts from QST, Mark looked for ways to improve communications based on low cloud cover and electrical activity from heavy weather. His project was also selected as winner of the Armed Forces Communications and Electronics Association's Communications Award, for which he received a \$100 savings bond. Mark, 13, is an eighth grader at the Eaton Middle School in Hampton, Virginia, and a member of the National Junior Honor Society and captain of a select traveling soccer team. He's been a ham since December 1984.

---

# League Lines

---

**AO-10 temporary spacecraft emergency:** AMSAT declared a temporary spacecraft emergency on AO-10 May 18 due to an onboard computer failure. It now appears certain that radiation damage to the computer's memory is to blame for the failure. AMSAT requests all stations not to use the transponder if it should be found on. Although the satellite is not now in immediate danger, AMSAT hopes that at least partial satellite functions can be restored during July. Monitor WIAW, AMSAT nets and packet bulletin boards for the latest status of AO-10. The next OSCAR, called (until launch) Phase 3C, is due for launch this fall.

**NY State tower legislation:** June League Lines and the May 9 issue of *The ARRL Letter* carried information concerning restrictive tower legislation introduced in the New York State Legislature. HQ now understands that the bill *will not be considered* and will be left to die in committee.

The FCC has released a Notice of Proposed Rule Making, in PR Docket 83-806, proposing *radiation standards of radio-frequency lighting devices* at frequencies below 30 MHz. This proceeding was originally initiated with a 1983 Notice of Inquiry to determine the regulatory requirements for the electromagnetic interference potential of RF lighting devices. While they were not mentioned in the NPRM, ARRL had filed extensive comments in the 1983 notice and recommended that a labeling requirement be adopted. Comment deadline is June 30.

The FCC has issued another Notice of Proposed Rule Making in PR Docket 86-207, in response to a petition filed by the Southern California Repeater and Remote Base Association (SCRRBA). The NPRM proposes to allow frequency-modulated complex emission, *F8E*, on *all amateur frequencies 1240 MHz and above*. F8E is a radio signal in which the carrier is frequency modulated by two or more analog voice channels. It is already allowed in the 902-928 MHz band. Comments may be filed prior to Aug 15, 1986.

**Hands Across America:** On May 25, over 4 million citizens, *coordinated by over 3500 radio amateurs*, joined hands for 15 minutes to promote public awareness of the homeless and to raise funds. Radio amateurs were assigned to each mile of the route, and provided primary communications for the event. It is estimated that the use of Amateur Radio volunteers saved the Hands Across America organization \$2 million that it would have cost to construct a commercial communications network to match the Amateur Radio operation.

**Having trouble with local zoning/tower height ordinances?** ARRL HQ has put together a "PRB-1" package that consists of a copy of PRB-1, model antenna ordinances, general information about Amateur Radio, names and addresses of local ARRL Volunteer Counsels and other information useful in the battle against unduly restrictive antenna ordinances. For a copy, send \$3 for postage to HQ and request the PRB-1 package.

**The WIAW rhombic antenna incurred extensive vandalism** over the Memorial Day weekend. The 50-foot tower support was damaged by vandals loosening up the turnbuckles. The antenna has been taken down and HQ is reviewing whether it should be put back up with increased protection from future vandalism or replaced.

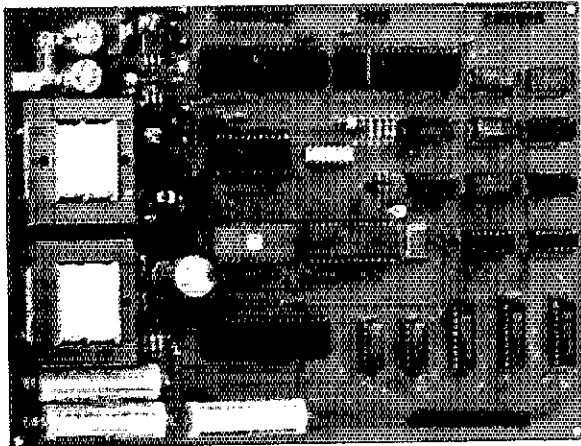
HQ has received a number of inquiries about renewing an amateur license and the grace period. If you have a license good for a five-year term, its grace period, should you fail to renew, is five years. After two years of the grace period has elapsed, you will lose your call sign and will be assigned a new one. (Note that the new 10-year-term licenses, which have been issued since January 1984, have a 2-year grace period.) To renew an amateur license, use FCC Form 610, which is available from FCC or ARRL HQ. There is *no* fee for renewing an amateur license.

The Korean Amateur Radio League (KARL) will be operating special-event stations on the occasions of the 1986 Asian Games and the 1988 Olympic Games, to be held in Seoul. *Look for 6K86AG during August and September* during the Asian Games. The station is authorized to conduct international third-party traffic on behalf of athletes. Athletes who are licensed amateurs in their home countries may also operate the station. KARL reminds amateurs planning to visit that it is illegal to bring any type of portable transceiver, including hand-held radios, into Korea.

**New Advanced class exams:** The FCC issued the new advanced class written element question pool in April 1986 and pursuant to the FCC's instructions to the VECs, ARRL VEC will be putting the new pool into use in tests beginning July 1, 1986. Also, the ARRL/VEC will be changing the tests for the Extra Class on October 1, 1986.

**Morse Code: The Essential Language**, by L. Peter Carron, Jr, W3DKV, is the latest book published by ARRL. The book tells of the history of telegraphy and details the evolution from the straight key to computers. The book gives practical advice on learning the code and explains its modern-day uses. The cost of the book is \$5 plus \$2.50 UPS shipping.

# The ARRL Microcontroller



Who says you can't build state-of-the-art equipment at home? This self-contained microcomputer will get you started building "high-tech" digital projects!

By Jon Bloom, KE3Z  
ARRL Laboratory Supervisor

There is little doubt that the microprocessor has carved itself a niche in Amateur Radio—several niches, in fact. These days transceivers with on-board microprocessor control outnumber those without it by a large margin. "Micros" are also showing up in many more shack accessories. We are getting used to the convenience they provide! But the microprocessor is still seen as an arcane device, one beyond the understanding of some amateurs. Although many amateurs consider a personal computer a key element of their station, few are using microprocessors as building blocks for homebuilt equipment. There are many applications of a microprocessor for which a personal computer is overkill, such as: repeater controllers, antenna controllers, automatic antenna-matching networks, QSO "robots" and logic-replacement tasks. (An excellent example of the latter is Langner's

Talking Frequency Display.) The problem with a homebuilt, microprocessor-based device is that the circuit complexity makes for an involved construction and debugging process. The purpose of this article is to present a path out of the microprocessor wilderness—the ARRL Microcontroller.

## Divide and Conquer

Roughly, a microprocessor project can be divided into two areas: the hardware and the software. Each area has its own complexities and requirements. The hardware can be further divided into the microcomputer and the application-specific circuitry. The microcomputer uses components that are common to nearly all self-contained microprocessor-based devices: the microprocessor, read-only memory

(ROM), read/write memory (RAM), basic I/O (input/output), control logic and power supplies. The application-specific circuits are the ones needed only in a specific device.

Since many of the circuit elements are common to all projects using microprocessors, it seems logical to design a board that contains the common circuitry and has the ability to accept connection to application-specific circuits. That, in brief, is a description of the ARRL Microcontroller. By using this board, the home builder can concentrate on the more experimental (and more interesting) aspects of the project and not have to "reinvent the wheel."

Fig 1 shows the major components of the microcontroller and how they interconnect. As you might expect, the microprocessor, the brains of the operation, connects to nearly every other functional block in the system. Nonvolatile program storage is

Notes appear on page 19.

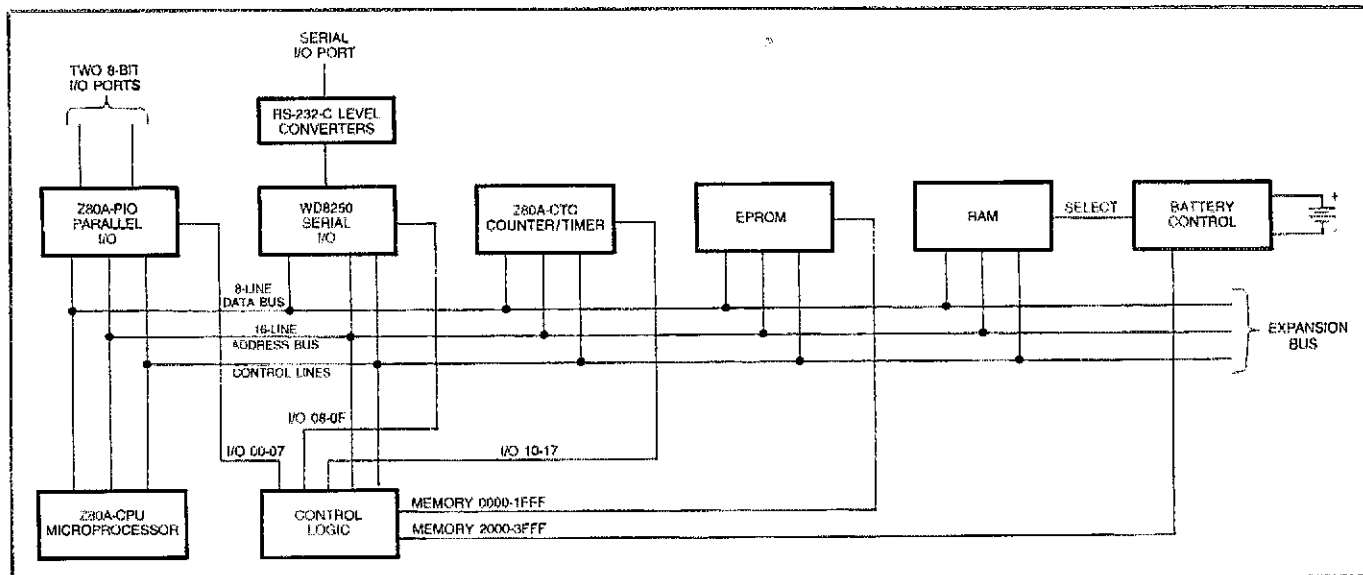


Fig 1—The major functional blocks of the microcontroller. Data signals can travel via the data bus between the CPU and any other device. Address data and control signals are generated only by the CPU.



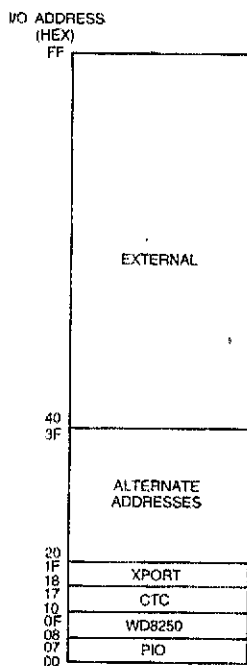


Fig 2—The memory map of the controller. When an address in the "external" area is read, the expansion-bus data is placed onto the microcontroller data bus. Although 8 kbytes of ROM space and 8 kbytes of RAM space are reserved, the 2716 ROM and 6116 RAM require only 2 kbytes. In these cases, the "image" of the ROM or RAM will appear in the other 6 kbytes of the reserved address space.

provided by a 2- or 8-kbyte ROM. Data storage is in a 2- or 8-kbyte RAM. Battery backup is provided for the RAM to maintain its contents while the device is turned off. Both parallel and serial I/O are on the board. TTL and RS-232-C serial I/O lines are provided.

The microprocessor used here is a Zilog Z80<sup>®</sup>, an eight-bit microprocessor. Although the Z80 is not the latest product from Silicon Valley, it has more than enough capability for most any project you may want to build. Also, the Z80 and its support chips are inexpensive and readily available. A 2716 or 2764 EPROM can be used to provide 2 kbytes or 8 kbytes of ROM, respectively. Similarly, a 6116 or 6264 can be used in the RAM socket for 2 kbytes or 8 kbytes of RAM. If the RAM battery backup is used, the low-power versions of the 6116 or 6264 should be used as they require much less current in the standby mode.

Serial I/O is provided by a Western Digital WD8250 IC. This device contains a baud-rate generator that produces the clock signal needed to set the speed of the serial I/O. Parallel I/O is performed by a Z80-PIO, which has two 8-bit bidirectional (input or output) ports. A Z80-CTC

counter/timer IC generates periodic interrupts for time keeping and is used to connect the 8250 to the Z80 interrupt system. An on-board power supply produces the voltages needed to operate the board and for external circuitry.

### The External World

Although there is a lot of computing capability on the microcontroller board, the board doesn't do anything very useful until it is connected to other devices or circuits. The serial port will usually serve to connect the board to a personal computer, although the serial port can connect a modem or packet-radio TNC to the controller for remote access. Application-specific circuits are connected to the board through the parallel ports and/or the expansion bus. Interfacing to the parallel ports is easier, but less flexible than using the expansion bus. Each of the two ports provided by the PIO can be used independently. The port can be configured as eight output lines, eight input lines or a combination of outputs and inputs. On output, data written to the port by the Z80 is latched; once set to a 0 or 1 voltage, an output signal remains at that level until the microprocessor writes to the port again. Input lines are sampled when the Z80 reads the port, and the PIO can be programmed to generate an interrupt when an input signal changes state.

Although the PIO lines can be used for many of the I/O needs, there are occasions when simple parallel I/O isn't enough. For this reason, an expansion bus is provided. This bus allows connection of an external circuit to the data, address and control lines of the controller board. An external circuit connected to the expansion bus can appear to the Z80 as either memory locations or I/O ports.

Fig 2 shows the memory map of the controller board. All of the memory address space shown as EXTERNAL is available. The external circuit is responsible for decoding the signals on the address and control busses to ensure it doesn't conflict with the on-board memory.

Fig 3 shows the I/O map. I/O addresses 18<sub>16</sub> to 1F<sub>16</sub> are decoded on the controller board, but not used there. When any of these addresses are used in an I/O operation, the XPORT signal on the expansion bus is asserted (brought low). This allows an external circuit to occupy these I/O addresses without independently decoding the address bus. The interrupt signals are provided on the expansion bus so that external devices can be a part of the Z80 interrupt system.

### Developing the Software

The software component of a microprocessor-based project is at least as important as the hardware. Control programs for the microcontroller are usually written in assembly language and programmed into EPROM. One of the factors that determined the selection of a

Z80 for the microcontroller was that there are many personal computers that can be used to develop Z80 software. Almost any computer running the CP/M<sup>®</sup>-80 operating system can be used as there are a number of good Z80 assemblers available for CP/M-80 machines. For Z80-based computers, the Crowe assembler is a good, low-cost program.<sup>2</sup> For 8080-based CP/M systems, including an IBM<sup>®</sup> PC using the NEC V20 microprocessor in 8080 mode, an assembler that can run on an 8080 and produce Z80 object code is needed. One alternative is to use the Digital Research macroassembler, MAC, with the Z80.LIB macro library.

Of course, once you have some software written you need to get it into the memory of the microcontroller. The final version of your software will probably be in ROM, but during the software-development cycle, when you are testing and debugging the software, you will probably need to make changes to the program. Reprogramming the EPROM each time you make a change is tedious, so it's better to put the software under test into RAM. This can be done with the aid of a *monitor* program, a program that lets you change the contents of the RAM locations and perform other operations from the serial port. Such a program is available in ROM,<sup>3</sup> and it will let you connect your computer to the serial

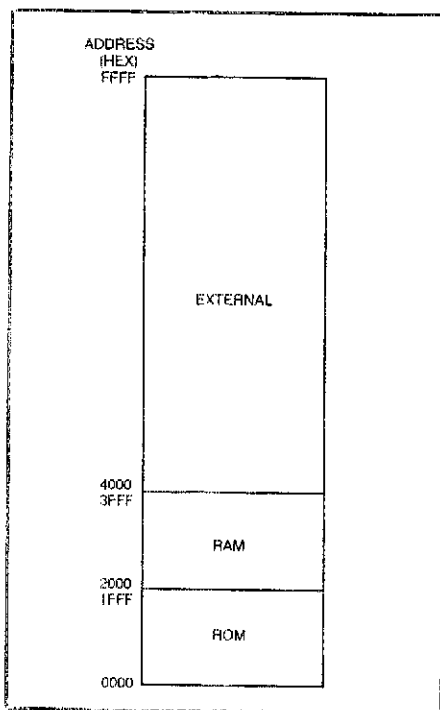


Fig 3—The I/O map of the controller. When an I/O address in the external or XPORT areas are read, the expansion-bus data is placed onto the microcontroller data bus. The "image" of the I/O devices occupying addresses 00 to 1F<sub>16</sub> appear at addresses 20<sub>16</sub> to 3<sub>16</sub>.





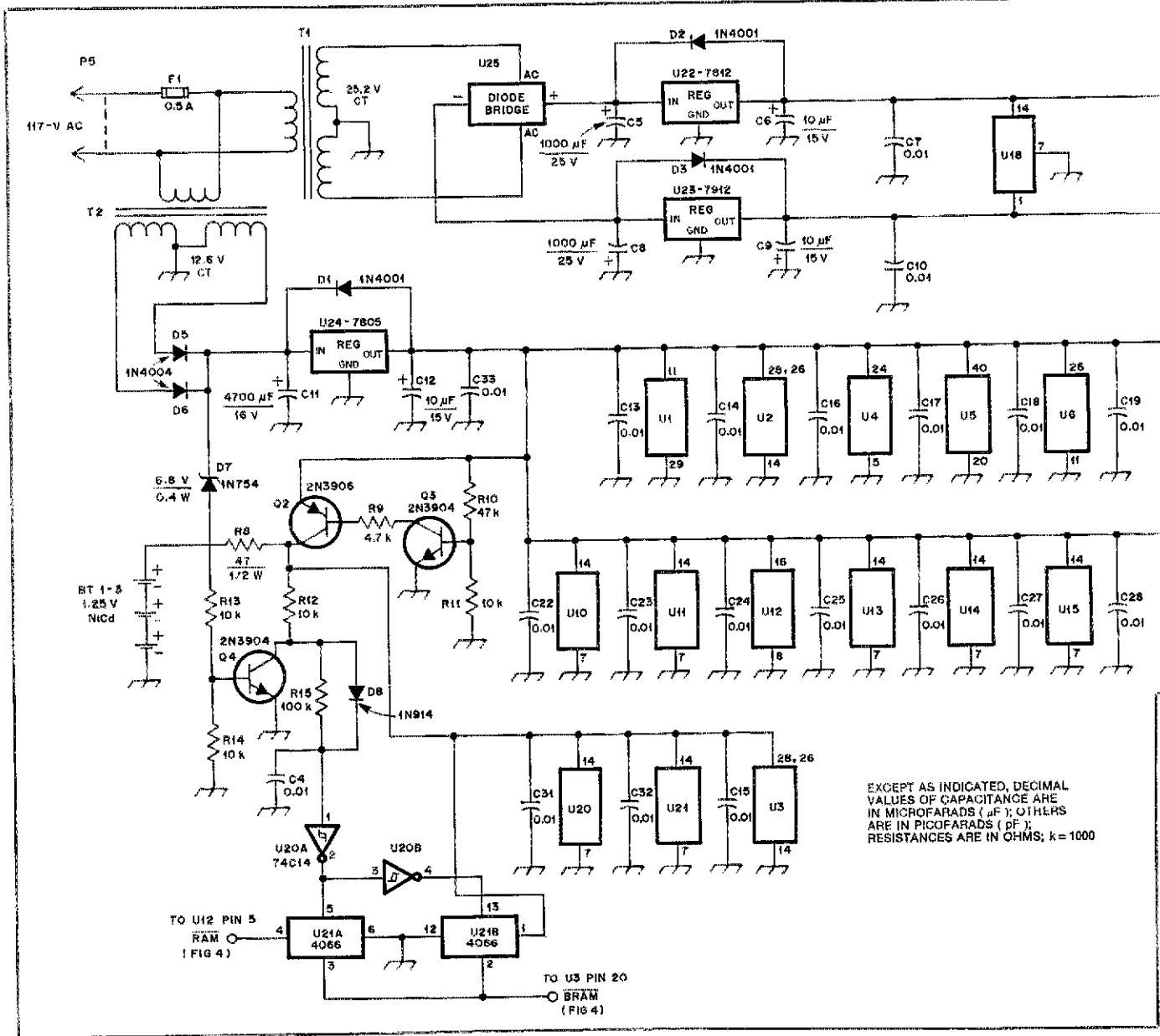


Fig 5—Schematic diagram of the microcontroller board power supply and battery backup circuit.

port and upload Intel hex object files into the microcontroller's RAM.

### Circuit Description

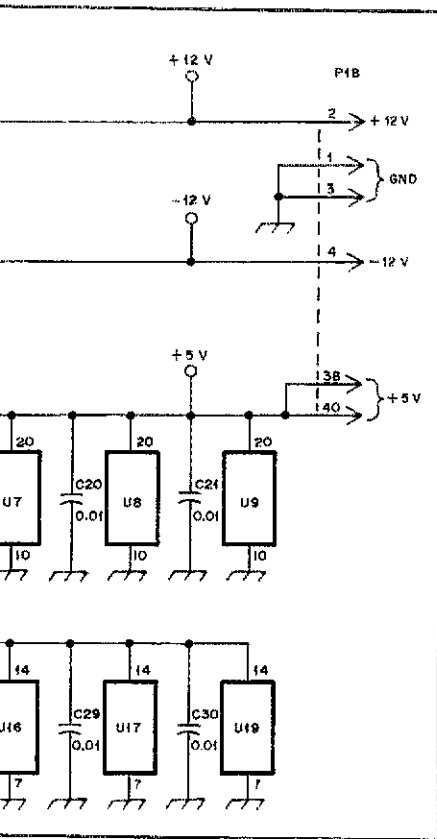
Figs 4 and 5 show the schematic diagram of the microcontroller board. The master clock signal is generated by a 4-MHz crystal oscillator. The oscillator frequency can be trimmed using the CLOCK ADJUST capacitor, C1, if an exact frequency is important. Unless the microcontroller is performing a time-keeping function, the clock frequency doesn't need to be exact. The clock signal is applied to pin 6 of U1. The basic timing of the microcomputer is derived from the clock signal by U1, the CPU. The clock is also applied to the counter inputs of U4, the Counter/Timer Circuit (CTC) for timed interrupt and serial clock generation. The data bus (signals

D0-D7) is bidirectional. Signals are placed on this bus by the microprocessor during write cycles and by other devices, such as the memory ICs, during read cycles. To accomplish this, each IC that can place data on the bus must be a three-state device; its outputs can be placed in a high-impedance state, effectively removing them from the bus. Only one output can drive a data-bus line at a time. Signals generated by the CPU determine which device has control of the data bus. The principal signals used for this purpose are MREQ, IORQ, RD and WR.

When RD is asserted low, either MREQ or IORQ will also be low, specifying a memory read or I/O read, respectively. In this case, the CPU expects another device to place data on the data bus for the CPU to sample. Which device places this data on the bus is determined by the address-

decoding logic. The on-board devices are selected when one of the outputs of U12 goes low. When an external address is decoded, the expansion-bus buffers, U10 and U11, are enabled to allow data on the expansion bus onto the internal microcontroller data bus. Similarly, the assertion of WR and either MREQ or IORQ specifies a memory or I/O write. At this time, the CPU is placing data on the bus with the expectation that one (or more) of the other devices connected to the bus will accept the data.

Each of the data-bus lines is pulled up to  $V_{CC}$  by one of the 10-kilohm resistors in RP1. This is done so that the data lines will be at a known (high) level if no device is driving the bus. This provides a mechanism for the software to determine if a device is present on the board by writing a data



controller: +5 V, +12 V and -12 V. The +5-V supply can deliver about 660 mA using the specified transformer. The microcontroller board needs 450 to 500 mA, leaving the remainder to power other circuitry via the expansion-bus or parallel-I/O connectors. If external circuitry requires much more than 100 to 150 mA of the +5-V supply, an external power supply or a heavier transformer may be needed.

Batteries are included on the board to keep the RAM contents from changing when power is removed from the board. When the unregulated voltage on the input of U24, the +5-V regulator, drops below about 7.5 V, Q4 turns off. This causes U21 to remove the chip-enable signal from U3, replacing it with a constant high. Under this condition, the RAM is in the standby state, in which it draws very little current from the supply.

The microcontroller board is a versatile building block, with almost unlimited application in the amateur station. To get the ball rolling, we will describe an automatic antenna-rotator controller based on it in an upcoming issue of *QST*.

I'd like to thank Paul Newland, AD7I, for permission to use his battery backup circuit, which originally appeared in the *TAPR TNC 2*.

#### Notes

- <sup>1</sup>J. Langner, "A Talking Frequency Display," *QST*, Apr 1985, pp 14-17.
- <sup>2</sup>*Micro Cornucopia*, PO Box 223, Bend, OR 97709. The Crowe assembler is on CP/M users disk 20; price: \$8.
- <sup>3</sup>A 2716 EPROM containing the monitor program, a circuit board and parts kits are available from A & A Engineering, 7970 Orchard Dr, Buena Park, CA 90620, tel 714-521-4160.
- <sup>4</sup>Manufacturers of Z80-family devices: Zilog, Inc, 1315 Dell Ave, Campbell, CA 95008; Mostek, Inc, 1215 W Crosby Rd, Carrollton, TX 75006. Manufacturers of the WD8250: Western Digital Corp, 3128 Red Hill Ave, PO Box 2180, Newport Beach, CA 92663; National Semiconductor, 2900 Semiconductor Dr, Santa Clara, CA 95051 (National designates the device INS8250).

byte containing zero bits into a device and reading it back. If the resulting byte is all ones, the device is not present.

The CTC, WD8250 and PIO ICs are complex devices. Within each of them are a number of registers that are written and/or read by the CPU to perform the I/O and interrupt functions. To explain the operation of each of these devices would require more space than we can devote to the subject here. Fortunately, the manufacturers of these ICs publish data sheets and technical manuals for just that purpose.<sup>4</sup> The WD8250 accepts a clock signal (pulse train) and divides it to produce a clock signal that sets the serial transmission speed. Since the WD8250 cannot accept a 4-MHz clock, the CTC is used to produce a clock at pin 9 slow enough for the WD8250 to use. As with any digital-logic circuit, some mechanism must be included that ensures a known state when power is first applied to the circuit. On the microcontroller board, this job is performed by D1, C3, R7 and U14E. When power is first applied, C3 charges through R7. Until the voltage rises to about 1.6 V, the reset signals are asserted, forcing the circuit to a known initial state. As the voltage across C3 rises above 1.6, the reset signals go false, allowing the CPU to begin operation by fetching the instruction located at memory location 0000, the first byte of the EPROM.

An on-board power supply provides all of the voltages needed by the micro-

hand monitoring of HF broadcast stations during a several-month period. This allows the book to be more accurate than before.

Whether or not you are a newcomer to shortwave listening, you will enjoy each manual's *Lexicon of Terms*. It is written in five languages. Abbreviations and definitions are fully explained in English, French, Spanish, German and Japanese. A guide to the graphics format follows each section, explaining what information will be found on each page. All the details of the station are listed: its frequency, country, broadcast time in UTC, what language it is heard in, what season of the year it can be received and if there is jamming, fade in or fade out associated with it.

The broadcast frequencies covered in Part 1 are 5.73 through 26.1 MHz. Part 2 includes the Tropical Bands (2 to 5.73 MHz), of which there are four. Also referred to as the domestic broadcasting portion of the shortwave spectrum, the Tropical-Band frequencies used are for short- and medium-distance reception (up to 500 miles during the day). Thus, domestic means that the program is directed toward a local audience rather than one overseas.

The last pages of each edition include reviews of new shortwave equipment. Part 1 examines receivers, enhanced-fidelity receivers and ultralight radios that might be considered for traveling purposes. Part 2 takes a look at a 24-hour clock. The reviews are complete, listing special "bells and whistles" that accompany the unit. The authors also rate the radios from excellent to fair. RDI states that their reviews are just that—reviews that should be taken with a grain of salt. Not every reader will want to listen in on every frequency. As in *Amateur Radio*, listeners want a radio to conform to their needs and price range.

A technical data supplement informs the buyer of what tests are performed on the units, complete with a plain-language definition. The performance results for each unit are listed in a table. Questions such as what is selectivity, bandwidth or dynamic range are answered.

Overall, I recommend the *Radio Database International* manuals to anyone who is interested in shortwave listening. They are a must for those wanting to locate DX stations, listen in on those infamous clandestine stations or for the pleasure of hearing what is happening in the world. —Maureen Thompson, KA1DYZ

## New Books

### RADIO DATABASE INTERNATIONAL 1985-6, PARTS 1 AND 2

Lawrence Magne and Tony Jones, editors. *International Broadcasting Services, Ltd*, PO Box 300, Penn's Park, PA 18943. Softbound, 10 × 7 inches, 240 pages, \$9.95.

Many amateurs believe that the first step to becoming a ham is through shortwave listening. Whether this theory is right or wrong, any individual interested in "listening" will enjoy these publications.

What makes them different? The *Radio Database International*, (RDI), used to depend on others to inform them as to when a broadcast would be made. Now, supplemented with their own data, most of their published information is from first-

## Strays

I would like to get in touch with...

□ anyone who has modified a Collins KWM-380 for CW full break-in (QSK), Marvin Sebesta, AJ2Q, 55 Susan Dr, Chatham, NJ 07928.

# Aerials—A Lost Art

## How to get on the air with an impossible antenna.

By George Murphy, VE3ERP

Box 759; 275 Victoria St E  
Alliston; ON L0M 1A0

**Y**ou have no space for an antenna? Then why not put up an aerial?

If you are an Amateur Radio operator, a CB operator, a PhD in communications or a shortwave listener, then you are familiar with antennas. (Insects have antennae—it seems that radios have antennas.) If you are over 40, you also probably remember “aerials.” These were the lengths of wire that were used to receive and transmit radio signals before the hi-tech guys decided to fancy them up and call them antennas.

In the Goode Olde Dayes of ham radio, we used to fire up our rigs into whatever aerial we had, and the worst that could happen was a lot of frying noises and a bit of melted wire, exploded tubes and blown fuses. But with today's rigs that shut down if they don't like the weather, we have to be more careful. My knowledge and understanding of antenna theory is practically nil, so I decided to look into the past, before there was any antenna theory, to see if I could find out why some of the Impossible Antennas I have had actually worked.

### History of Aerials

Way back in the early days of ham radio, before electricity was invented and when all rigs were run on kerosene, an early experimenter by the name of Whitfield Whire noticed that his spark-gap transmitter emitted a lot of sparks, but his signal wasn't getting out. Wanting to get at the underside of the chassis, he hung his radio from the ceiling with a piece of wire and found to his surprise that the rig worked better with some wire attached to it. So he left it there and stopped calling it a “wireless set.” He reported his findings to the ARRL. They published a *QST* article about the Whire Aerial.

A few years later, Garfield Grownd noticed that the desk lamp in his shack had two wires going to it, but his Whire Aerial (which he had built from the article in *QST*) had only one wire—so how come it worked? He had also noticed that in his brand-new, four-on-the-floor Model T

there was also only one wire feeding the lights, stereo and air conditioner. The other wire of each was attached to the car frame. Through clever deduction he decided that the same thing might work with his rig, so Mr. Grownd pounded a piece of pipe into the earth and ran a wire from it to the chassis of his rig. His signal was much better and was copied at WIAW. News of this innovation was subsequently published in *QST*, with the recommendation that every station should have a Grownd.

The next major advance in aerial development was an invention by Diogenes Dipole. One day as Dip (as he was known to his friends) was walking past a playground on his way to a hamfest at Charlie's Bar and Grille, he noticed a couple of members of the local Lion's Club on one of the teeter-totters. What impressed him was the way the Lions kept that thing going at a good clip with hardly any pushing. He said to himself, “It must have something to do with Balanced Lions—perhaps I can do the same thing with my aerial.” When he got home from Charlie's, he attached a wire to the chassis of his rig and ran it up alongside his Whire lead in, then ran it off in the opposite direction to his Whire flat top. Thus was born the aerial, still in use today, named in honor of Diogenes Dipole.

(About this time other experimenters, who didn't know about Balanced Lions, were trying to coax their signals out as best they could, which led to the invention of *coax cable*. But that is the subject for another article.)

Upon reading about the Whire Grownded Balanced-Lion-fed Dipole aerial in *QST*, a European nobleman by the name of Count Herpoise noticed that there were three wires involved in getting a signal out. His desk lamp also had three wires because his country was on 330 V, so it all seemed quite natural. But he got to wondering why three wires were necessary in North America. After much contemplation Count Herpoise realized that, like himself, the aerial must like to bounce its problems off a close friend. This little known and seldom recog-



nized theory was correct, and those of us who are serious students of aerials still refer to the *other wire* as a Counterpoise, named after that early genius, Count Herpoise.

When the article describing the Whire Grownded Count Herpoise Balanced-Lion-fed Dipole aerial was published in *QST*, it was read by another early innovator, Theo Von Trap, who decided to build such an aerial, even though there wasn't room enough on his property to properly install one. So he shortened the flat top by coiling up the wire every few feet or so along the aerial, and kept the coils from spreading out by soldering condensers (we now call them capacitors) across them. Thus was born the aerial known to this day as the Trap Dipole.

Having read all the *QST* articles to date on the development of the aerial, the legendary physicist Morris Nimatch theorized that with all this wire around, some of the power being fed into aerials might not be able to get out. Mo (as he was known to his friends) wanted to see how much of the power was not getting out, and therefore being returned, and invented the See What Returns (or SWR) meter. This device is still known, in honor of its inventor Mo Nimatch, as the Monimatch. (You, too, can build one from one of the many articles that have appeared in *QST* or the *ARRL Handbook* over the years, or you can buy an inexpensive one from Radio Shack, part no. 21-525.)

*QST* duly reported the astounding success of the Monimatched Whire Grownded Count Herpoise Balanced-Lion-fed Trap Dipole, and it only remained for the True Guru of Aerials, Raoul Random, to add the final touch. One day, seeking solace and inspiration, Raoul took his Junior Op to the very playground where Diogenes Dipole had made his remarkable discovery, and he and his Junior Op climbed on the very teeter-totter that Diogenes and the Balanced Lions had made famous. Raoul noticed that it would neither teeter nor totter until he slid *up* the board toward the center. He had discovered that, with proper adjustment, two things can be

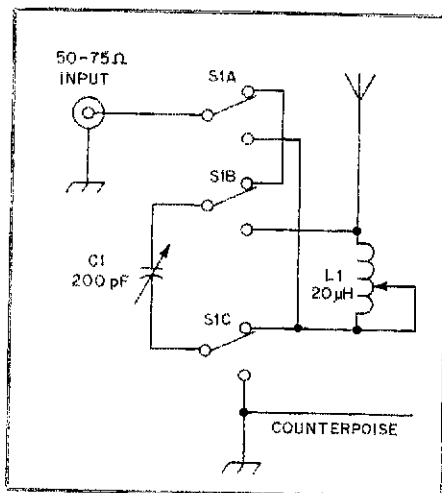
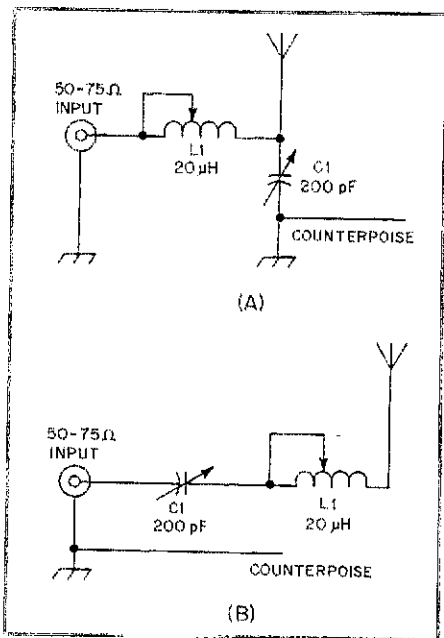


Fig 2—A combination of Fig 1 (A) and (B). Band switch S1 allows you to use either configuration of matching network.

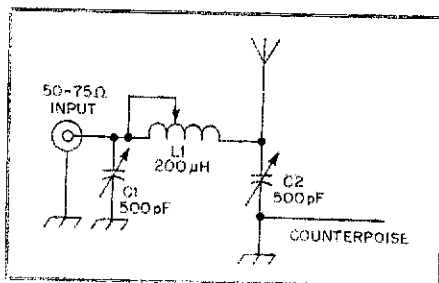


Fig 3—Typical pi-network antenna-matching network. Most commercially available units are of this type. This configuration is better than those shown in Fig 1 at suppressing RFI and TVI.

(according to Whire) of sufficient but indeterminate length (according to Trap), some more wire (according to Grownnd and Count Herpoise), some means of matching it (according to Dipole and Random) and an SWR meter (according to Nimatch).

To do this you could invest in a good-quality antenna matching network with a built-in SWR meter. These marvelous devices are designed to "fool" our rigs into thinking that they're looking into a great antenna, which is rarely the case, but the rig doesn't know that. In the case of the aerials I describe herein, some sort of antenna tuner or matching network is required.

If you don't have an antenna tuner and are not inclined to buy one, you can make one very easily and at a very low cost (see Figs 1-3). All you need is a coil and a variable capacitor or two from your junk box. I have built many by winding some wire around a bathroom-tissue tube and connecting tuning capacitors from some old radios to it. I usually cut a longitudinal slot in the tube to allow room for the nose of an alligator-clip tap. The tube is flimsy, so I glue a couple of cardboard disks inside it to keep it from collapsing when I wind the wire around it. When all is done, I either varnish it or wrap it in tape to keep things from slithering around.

For the circuits shown, try a minimum of 32 turns spaced about 1/16-in apart on a 1½-in tube form. This should work on all bands from 75 meters to 10 meters. You'll have to experiment a little to find where to tap the coil for each band. Variable capacitors are still plentiful on the flea-market circuit.

### Impossible Antennas

An *Impossible Antenna* is nothing more than a Random Whire aerial, with a bit of matching at the transmitter end to get it on speaking terms with your transmitter and receiver (see Fig 4). Random wires are not to be confused with "long wire" antennas,

To Raoul Random goes all the credit for developing the Random Whire aerial, also known to its detractors as the Impossible Antenna. All you need is some aerial wire

balanced even though they are physically different. The results of his research were duly reported in *QST*. The splinters collected by Raoul Random as he slid up the board are still on display in a glass case in the ARRL museum. It is because of these relics that those of us in the Aerial World who claim that a Random Whire is a great aerial are known as a splinter group.

This traumatic experience set Raoul to thinking, and after extensive study of the published works of Whire, Grownnd, Count Herpoise, Dipole, Nimatch and Trap, he came up with the universally applauded Random Theorem, which states:

1) A radio works better when it has a piece of wire attached to it. This wire is called an "Aerial" (according to Whire).<sup>1</sup>

2) The rig works even better if its chassis is connected to Mother Earth (according to Grownnd).<sup>2</sup>

3) Signals are improved if the aerial can bounce things off a nearby companion (according to Count Herpoise).<sup>3</sup>

4) The aerial wires hanging out of the back of your rig work better if they are electrically balanced (according to Dipole).<sup>4</sup>

5) The balance can be monitored with a simple See What Returns (SWR) meter (according to Nimatch).<sup>5</sup>

6) An aerial can be shortened by coiling it up a bit and introducing some capacitance (according to Trap).<sup>6</sup>

7) The balance between the aerial wires does not have to be physically symmetrical (according to Random).<sup>7</sup>

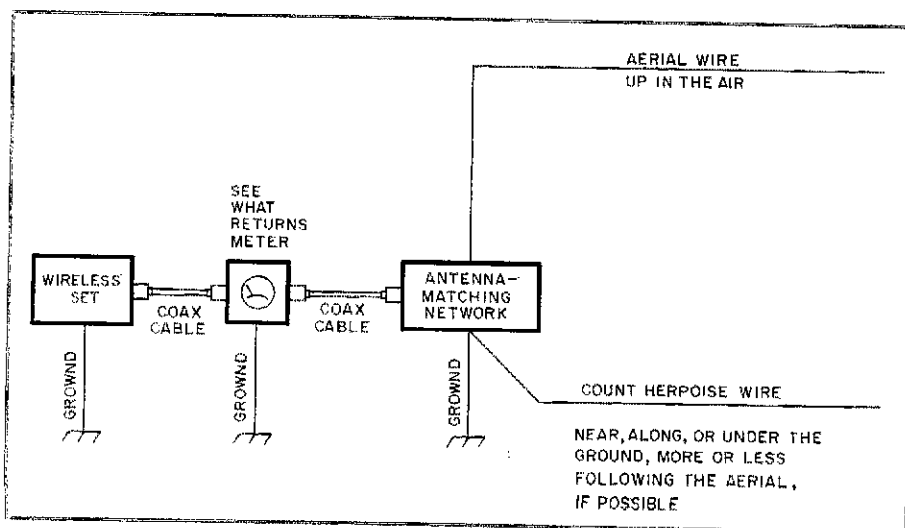


Fig 4—Complete Random Whire Station.

<sup>1</sup>Notes appear on page 22.

which are generally at least a couple of wavelengths long, resonant at the operating frequency, and are excellent performers when installed and used correctly. But, then, so is a Random Whire.

I make no claims for the efficiency of Impossible Antennas, other than that they are a lot more efficient than no antenna at all—my only other alternative many times during my 25 years as a radio amateur. They will also work on all bands with appropriate adjustment of the matching network.

All of the aerials I describe work. They work even better if your station is well grounded. With all of them, I follow Count Herpoise's advice and run a wire from the chassis of my matching network along a baseboard or under a rug to the far end of the shack, or even farther if I can get away with it. A random wire aerial starts radiating right at the matching network, so it is a good idea to have a counterpoise for it to work against. When you run your counterpoise around the room, keep it as far from the aerial as you can.

### *The Indoor Wanderer*

This is one of my favorites. It is the first aerial I install when I find myself in a new QTH. I string a random length of fine wire around the place, draping it over doorways and behind pictures on the wall, and if there is some excess length, I run it down a corner and under a rug. The longer the wire, the better you will get out on the lower bands. If there are any fluorescent lamps along the way, I generally put a few turns of the aerial around one of the lamp tubes—it makes an excellent tune-up indicator. Try it—even a burned-out fluorescent tube will light up with a little RF around it!

### *The Apartment Balcony Blaster*

Many apartment dwellers take the easy way out by installing a mobile whip on the balcony railing. While this works, the Balcony Blaster works better. All you have to do is get friendly with the people one apartment over, and as many floors up as you can find. Early some morning while the Superintendent is still asleep, you get your new friend to attach a weight to some light wire and swing it from his balcony until you can grab it. Tie it to both balconies with some "invisible" nylon fishing line and you are in business. It can go right across the windows of the people in between and they won't even know it is there. If your friend is only two or three floors above you, this one works like a super-long whip. If he is way upstairs, you have a bona fide base-loaded vertical.

### *The Basement Boomer*

The Boomer is probably the weirdest aerial I have ever used, and it was the easiest to install. I lived in the basement of a large, old boardinghouse. I thought there was no way I could install any kind of aerial

until I noticed that the hot-air heating ducts were connected to the furnace with a sort of canvas bellows arrangement that was supposed to keep things quiet. I assumed that the whole duct system was ungrounded, loosened a screw and attached my lead-in to the ductwork. I was on the air in a couple of minutes.

### *The Attic Arsenal*

If you are fortunate enough to live in an attic or can sneak some wire up into one, you can build yourself an indoor antenna farm. Two-meter beams or even small beams for the lower bands can simply be laid on top of the ceiling rafters. You can also string an Indoor Wanderer all along the underside of the roof peak. If you want a rotating beam, rig the beam to a broomstick that sticks down into the attic and stick some handles on the broomstick so that it operates somewhat like the periscope in a submarine.

### *The Towerless Inferno*

Another basement apartment that I lived in had a fireplace that wasn't being used. One night when nobody was looking, I climbed up on the roof and dropped some wire down the chimney. This aerial worked fine for about a year, then even better when the building owner installed a TV antenna on the roof with one of the insulated guy wires attached to the chimney. It didn't take me long to add the guy wire to my aerial!

### *The Double Ender*

My present aerial is a random wire that starts in the ham shack on the second floor of my house, goes out a window over to my studio on the next lot, wanders around that building and ends up in my second ham shack in the studio. I have a rig at each end of the same aerial and both work fine—but not at the same time.

### **Random Wires and RF Interference**

I can't offer much advice about TVI and RFI because apparently I don't cause any. I have found that by running only as much power as necessary and always making sure that I have the best possible match between my transmitter and whatever aerial I am using (I tiddle the matching network each time I QSY more than a few kHz), there have been no interference problems.

By its very nature, a random-wire aerial has no "lead in" and begins radiating right at the connection to the matching network. This fills the shack with RF, but if your station is well grounded, your matching network is properly adjusted and you are not running excess power, you will never know the RF is in the shack.

### **Conclusion**

If you were expecting a scholarly article on antenna theory, you sure didn't find it here. But, if you haven't been able to get on the air because you have no antenna,

then why don't you try an old-fashioned aerial? Almost any rig will work with a properly loaded mobile whip, therefore it should also work with something—anything—that is longer than a whip. It can only be an improvement. The secret is in the loading, so some sort of antenna tuner or matching network is an absolute necessity. I have spent many enjoyable evenings working DX with 10 watts and an Impossible Antenna instead of watching TV—which I can't do anyway because my friend across town, with his 2000-W linear amplifier, high SWR, lossy coax, rusted fittings and leaky trap beam, gets into it!

### **Notes**

- <sup>1</sup>Whitfield Whire, "Aerials—Novel Attachments for Your Wireless Set," *QST*, Apr 1892.
- <sup>2</sup>Garfield Grown, "An Earthy Idea that Will Drive You into the Ground," *QST*, Apr 1895.
- <sup>3</sup>Count Herpoise, "Das Extrawiren Nicht Bin Fur Noddinks," *QST*, Apr 1899.
- <sup>4</sup>Diogenes Dipole, "Two Wire Or Not Two Wire, That Is The Question," *QST*, Apr 1901.
- <sup>5</sup>Morris Nimatch, "Monimatch—The Investment That Shows A Return," *QST*, Apr 1903.
- <sup>6</sup>Theo Von Trap, "How To Shorten Your Aerial By Screwing It Up," *QST*, Apr 1904.
- <sup>7</sup>Raoul Random, "Unless You Are In Jail, This Aerial Will Get You Out," *QST*, Apr 1907.

*"Non Faciat Georgius" (literal translation: Don't leave it to George!)*

[Editor's Note: Those of you who keep track of such things realize that George Murphy has contributed several articles to *QST*. We at ARRL HQ have asked George for biographical information several times. Some of the results we received are shown below.]

### *From Oct 85*

*Technical background: The only technical background I have is when I had my picture taken standing in front of a nuclear power station. I once spent several years working for Ma Bell, but that was way back in the days when you had to turn a crank to make a telephone call, so it doesn't count.*

*Present profession: Industrial designer. How long a licensed amateur? I forget, but I am told I am eligible to join the QCWA. If I knew what that is, I might join—if they have regular meetings in a place that has a bar.*

*Degrees I may hold: The only degrees I hold are about 98.6 degrees F, except when I get hot under the collar.*

*Apart from ham radio, I spend my free time drawing pictures, playing music, watching airplanes, writing complex hi-tech dry-as-dust technical papers for *QST* and the National Enquirer and drinking beer.*

### *From Dec 85*

*Technical background: Hardly any. Present profession: Industrial designer. How long a licensed amateur? Licensed for 25 years, unlicensed transmissions began in 1932 (even before CB) when I built a peanut-tube transmitter to broadcast music played on the family's new electric Victrola to my friend up the street.*

*Degrees I may hold: Fellow of the Royal Order of Ice Worms. This degree is issued only to those who spent time in the Canadian Arctic 30 years ago peering at radar installations. I peered at them, but didn't understand a thing, so they sent me back south.*

*Member of the Society of Professional Engineers of Xmunk. To obtain this degree I had to found the country of Xmunk. It is extremely rare DX and is located on a 10-square-foot plot surrounding my outhouse.*

[We leave it to you: Who is George Murphy? —Ed.]



# Adventures in Satellite DXing

**Part 4:** At last! You've assembled your station and are eager to work DX. Now it's time to find OSCAR 10 and operate through it.†

By Dick Jansson, WD4FAB and Mark Wilson, AA2Z  
 1130 Willowbrook Trail  
 Maitland, FL 32751  
 Senior Assistant Technical Editor, ARRL

In this concluding part of the series on DXing by way of OSCAR 10, we'll examine the subject of locating AO-10 and aiming your antennas toward the satellite. We'll also take a look at those aspects that make OSCAR operation different from routine HF work...

### Satellite Tracking

Expert HF DXers know where and when to point their beams, based on years of experience. Tracking satellites is similar in some ways, yet strikingly different in others. It does take experience to become a proficient satellite tracker and to really understand what is going on. In this way, satellite trackers and HF DXers are similar. HF DXers, however, sometimes have to shrug their shoulders at the vagaries of ionospheric propagation, which at times is simply unpredictable. Predicting OSCAR access is much more precise. There is an enormous satisfaction in positioning a simple graphical tracker or dumping a bunch of numbers into a computer and being presented with the information that an object traveling at greater than 18,000 miles per hour is going to pop over your horizon in precisely 38 minutes and 22 seconds. And then it does.

There are two fundamental reasons that you need to keep track of OSCARs. First of all, they move—some fast, others not so fast. You need to keep track of when the satellite is "in view" of your QTH. Second, since most satellite communications require some sort of directional antennas, you need to know where to point the array. Thus, the two primary functions of OSCAR-tracking efforts are position determination and scheduling. There are other functions that might be determined, but these two are the most basic.

Tracking OSCAR satellites requires information in four areas:

1) You need information about the OSCAR to be tracked—its precise location and rates of movement at a precisely defined instant.

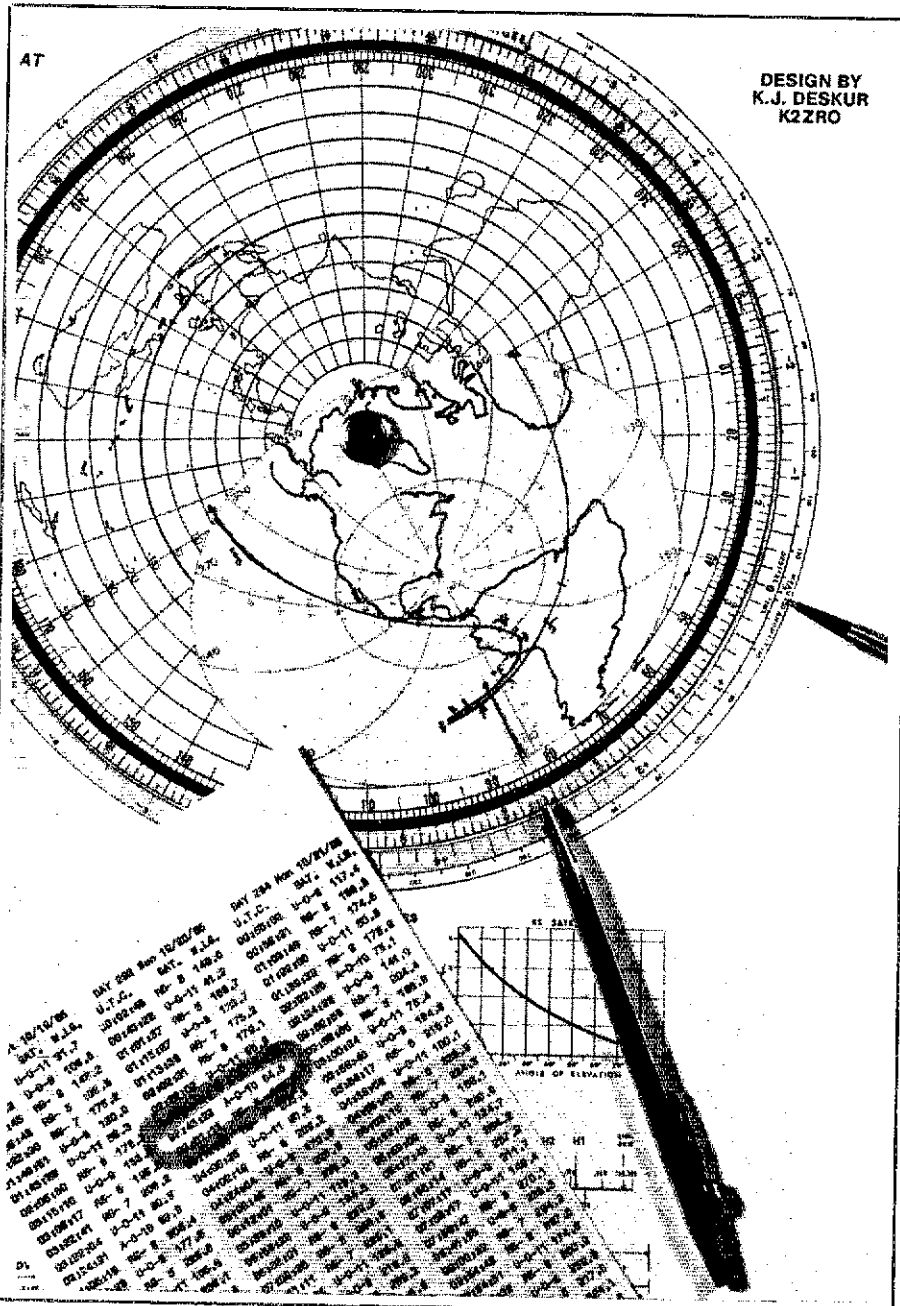


Fig 1—The *Satellite* from ZRO Technical Products is an easy, inexpensive way to track OSCAR 10. The table at the lower left is part of the monthly orbital information available from ARRL for an SASE.

†Parts 1, 2 and 3 of this series appear in April, May and June 1986 QST.

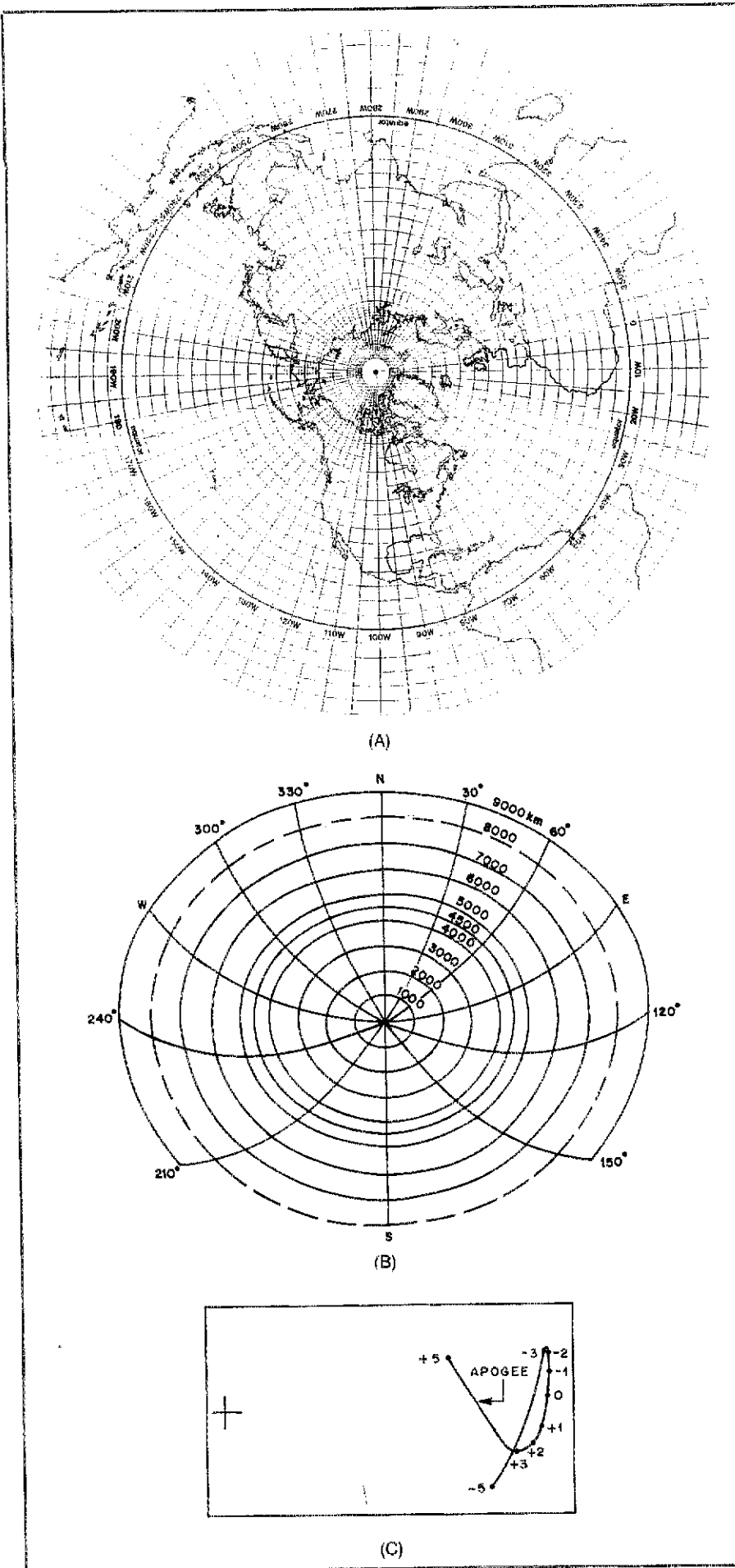


Fig 2—The OSCARLOCATOR from ARRL contains all of the tools needed to find OSCAR 10. The polar projection map at A is used for tracking all amateur satellites. The clear acetate QTH range circle (B) is centered over your QTH. The AO-10 ground track, shown at C, shows the path the satellite will take. The ground track changes periodically, and updates are published as necessary in QST.

2) You must know your own location to a reasonable degree of accuracy.

3) You must know the time of day reasonably accurately.

4) Most importantly, you need a device to coordinate the first three items. This can be a graphical tracker or a computer program. Both will be discussed here.

### Graphical Tracking

Graphical (or manual) tracking methods generally employ a map, typically an azimuthal equidistant projection centered on the North Pole, and one or more clear overlays that allow you to use the map for changing satellite orbits and for different locations on Earth. The overlays allow you to determine which satellite orbits will bring the bird within range of your QTH. They also give beam headings for azimuth and elevation. We'll get to the details shortly.

Most amateur operators who are new to the OSCAR 10 scene are caught up with the idea that they *must* use computer tracking methods to generate the numerical data needed to aim their antennas at the satellite. To those of us who used graphical tracking methods for years to follow the Phase II satellites, such as OSCAR 8, the computer methods were such a revelation that we quickly became married to them. The notion that computers were the only hope was reinforced by the graphical tracking presentations for Phase III satellites given to us at the time of the Phase IIIA demise in 1980. Those manual tracking methods seemed unduly complicated, so we put on our blinders and charged ahead with our computers.

While a great many amateurs do have computers that can be used for tracking (and if you have one, that is the way to go), there are a large number of new satellite operators who are not so equipped. It's easy to be misled into thinking that you must purchase and master a computer before making even a single OSCAR contact. That's enough to make some potential satellite operators lose interest at the onset. Don't be intimidated! Today there are at least two very good, low-cost graphical tracking packages available to you. They give excellent results—finding OSCAR 10 is a snap. Best of all, the investment is downright trivial compared to the cost of even the least-expensive computer.

We highly recommend that you try one of the graphical tracking methods, even if you already have a computer to use for satellite tracking. The introduction to, and

use of, the graphical methods will expand your knowledge and understanding of the nature of the OSCAR 10 orbit and make you a wiser communicator.

The two graphical tracking packages are the *OSCARLOCATOR* from ARRL and the *Satellite* from ZRO Technical Products.<sup>1,2</sup> See Fig 1. While you are at it, obtain a copy of *The Satellite Experimenter's Handbook* by Martin Davidoff, K2UBC.<sup>3</sup> This publication presents an excellent discussion of graphical tracking. As an added bonus, these publications treat Phase II spacecraft tracking as well as Phase III.

All satellite tracking methods, computer and graphical, need periodic updating of orbital parameters and other reference information. Each satellite has different characteristics, so you'll need data for each satellite of interest. Amateurs can obtain this information from the following sources:

- AMSAT publications, including *Amateur Satellite Report*, a biweekly newsletter.<sup>4</sup>

- *QST*
- Daily WIAW Bulletins<sup>5</sup>
- *Project OSCAR Orbital Calendar*, a yearly publication of daily satellite reference predictions<sup>6</sup>

- Various AMSAT nets, especially the Tuesday evening net on 3857 kHz at 9 PM Eastern, Central and Mountain times, and 8 PM Pacific time.

- Tabulated satellite reference information, covering all current amateur satellites and good for about six weeks at a time, is available from ARRL HQ. Include a legal-size SASE with two units of First Class postage with your request. Keep a number of SASEs on file, and you will receive the routine updates.

As mentioned before, most graphical tracking methods are based on an azimuthal equidistant projection map of the Earth, centered on the North Pole. A series of clear-plastic overlays is supplied. See Fig 2. Different satellites usually have different orbits, which means that separate overlays are needed for each bird. Both of the graphical tracking packages mentioned here provide overlays for current satellites.

You'll need two overlays for each satellite. The ground-track overlay, which pivots around a rivet positioned at the North Pole, relates the path of the satellite to the map of the Earth. It shows the various locations that the satellite track can take.

The other overlay provides satellite visibility circles for your QTH. This overlay tells you which part of an orbit will bring the satellite in view of your QTH. It also shows the azimuth and elevation headings so you can point your antennas at the satellite.

Each of the graphical tracking packages

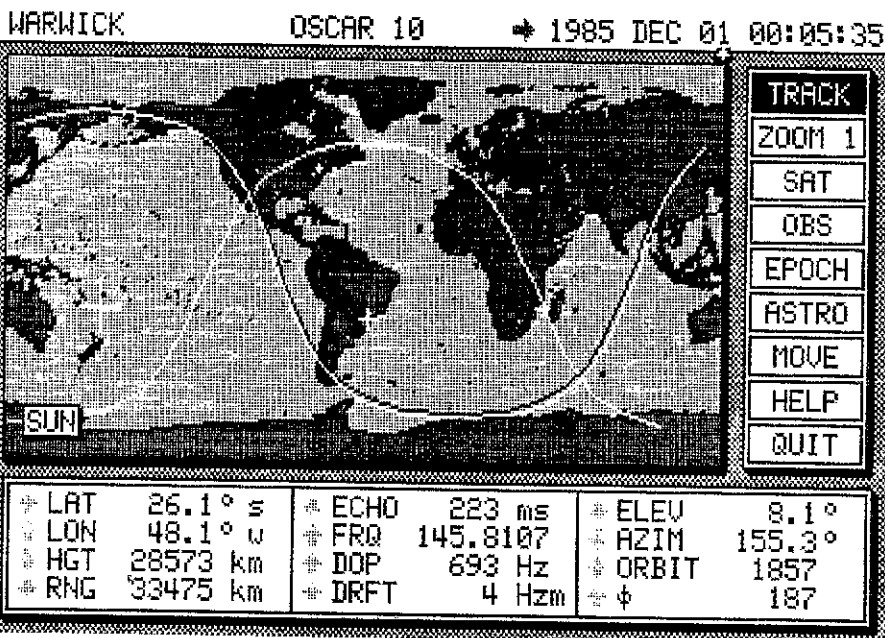


Fig 3—GRAFTRAK II from Silicon Solutions provides an elaborate map display as well as all important satellite parameters. This software runs on the IBM PC and requires an 8087 math coprocessor to help with its intensive calculations.

mentioned here comes with complete instructions for use. While it might seem like a lot of work to set one up, graphical trackers really don't require that much effort. They become a lot of fun and a self-satisfying achievement, once the method is learned.

A valid question is, "How good are the graphical tracking methods compared to computer-based systems?" We ran some test cases to find out. In each case, the *Satellite* results were within 3 degrees of the computer data in both azimuth and elevation. These differences are well inside the half-power beamwidth of highly directive crossed Yagi antennas. Even the most proficient operator would not be able to detect them.

### Computer-Based Tracking

For those of you with personal computers, there is a wealth of software available. Most operators are quite satisfied to use the computer to provide numerical data to locate OSCAR 10. They then take this information and aim their antennas accordingly. For AO-10 this is usually sufficient. Changes in antenna positions are infrequent—anywhere from every half hour up to three hours before significant repointing is needed.

Another class of software allows the computer to automatically control antenna position. This approach has some inherent technical problems that are very far afield from computer byte bashing. Unless you are extremely well versed in the software, electronics and mechanics of digitally controlled, closed-loop servo systems, you should forget automatic-antenna tracking. Once you get into tracking AO-10 you will

find that you need to adjust the position of your antennas only once or twice an hour by fairly small increments. It is just not worth the effort to control the antenna position automatically! In the days of OSCARs 6, 7 and 8, when the satellite was workable for 16 to 22 minutes each pass, operations in the shack were a bit like the proverbial one-armed paperhanger in a stiff breeze. AO-10 is literally a world of difference.

Satellite-tracking software for a number of computers is available from AMSAT, through the AMSAT Software Exchange (ASE). Most of this software is based on the original work by Dr Tom Clark, W3IWI, that was published in *Orbit*.<sup>7</sup> Since the original work, software specialists have found many innovative ways to express Dr Clark's computational methods. A listing of the various versions as of early 1986 is given in Table 1. For a current program catalog and ordering information, write to AMSAT Software Exchange, PO Box 27, Washington, DC 20044, tel 301-589-6062.

Some commercial software vendors advertise satellite-tracking programs in the ham magazines. An elegant package that is advertised in *QST* is Graftrak II from Silicon Solutions. This program, which operates on the IBM® PC, provides a sophisticated, colorful map display showing the satellite path over your QTH. See Fig 3. Also from Silicon Solutions is Silicon Ephemeris, a satellite-tracking program that has a tabular output. Both packages are available from Silicon Solutions Inc, PO Box 742546, Houston, TX 77274-2546, tel 713-661-8727.

Spectrum West offers Autotrak: Computer Rotor Control for several popular

Notes appear on page 29.

**Table 1**

**AMSAT Software Exchange  
Satellite-Tracking Programs**

- 1) Radio Shack TRS-80® Model I, Level II BASIC, 32-kbytes RAM needed. No instructions included; software manual (see item 20) recommended.
- 2) Radio Shack TRS-80 Model III, 32-kbytes RAM needed.
- 3) North Star BASIC under North Star DOS for 5¼-inch, hard sector, single- or double-density drives.
- 4) Microsoft BASIC, version 5.21 under CP/M®, single-density, single-sided 8-inch disk. No instructions included; software manual (see item 20) recommended.
- 5) Apple® II, APPLESOFT BASIC, on 13- or 16-sector diskettes or cassette. Menu driven, output to screen or printer.
- 6) IBM PC, PC-XT or PC-AT version, by WØSL. Menu driven for tabulated output for up to eight satellites in real time. Graphics display of world map. Requires 128-kbytes RAM, DOS 2.0 or later, and BASICA.
- 7) IBM PCjr version by WØSL. Tracking with graphics. Requires 128 kbytes RAM, DOS 2.0 or later and BASICA as above, but modified to run on PCjr.
- 8) IBM PC and compatibles version by N4HY. Called QUIKTRAK, it is menu driven for tracking and scheduling and features a new "Window Track" mode for DX.
- 9) Texas Instruments TI 99/4A, cassette only.
- 10) Apple II antenna positioning and controlling software by KØRZ.
- 11) Radio Shack TRS-80 Model 4, for TRSDOS Version 6.0.
- 12) Radio Shack TRS-80 Color Computer. Requires 32-kbytes RAM and extended BASIC (cassette only).
- 13) Commodore 64®, AMSAT VR85. Datapoint map of 2000, 20 satellites.
- 14) QUIKTRAK-2064, enhanced version of AMS-2064, including machine-language file, cassette or disk.
- 15) Atari® —disk only.
- 16) Timex-2088, cassette only of W3IWI program.
- 17) HP-41C programmable calculator, version ORBIT I of the W3IWI program (approximates real-time operation).
- 18) HP-41C programmable calculator, version ORBIT II of the W3IWI program, converted to run with time module (real-time tracking).
- 19) Heathkit H89 version of W3IWI program. CP/M version configured for H89, CP/M & MBASIC. Requires 5¼-inch H-17 single-sided, single-density, hard-sector disk.
- 20) Using Microcomputer Programs for Radio Amateur Satellite Orbital Prediction by N5AHD. This manual tells how to use the W3IWI program on Radio Shack, CP/M and S-100 bus computers.
- 21) UoSAT telemetry capture and decoding software for the IBM PC.

computers. This software and hardware package allows the computer to control azimuth and elevation rotators, so the antenna positions are updated as the computer recalculates the satellite position. For more information, contact Spectrum West, 5717 NE 56th, Seattle, WA 98105, tel 206-523-6167.

Another package, using a different computational algorithm than W3IWI employed, is available from Manfred, KG6EF, and Gordon Mueller, KB6BPL. The Muellers provide a Sharp PC-1246 pocket computer and a BASIC routine that was conceived by Dr Karl Meinzer, DJ4ZC.

While this computation is somewhat simpler than the W3IWI Keplerian method, it has yet to achieve a great following in the US. For more information, contact the Muellers at 4914 Commonwealth Ave, La Canada, CA 91011, tel 818-790-6695.

**Operating Schedule**

The last bit of information you need to know before you turn on your gear and start working exotic DX is the OSCAR 10 operating schedule. The satellite does not operate Mode B and Mode L simultaneously all the time. Rather, the transponders are turned on and off according to a fixed operating schedule defined by control stations on Earth. This is done to make sure that the spacecraft's batteries are charged (from solar cells) and discharged (through transponder use) at a rate that will assure the longest possible battery life. The OSCAR 10 schedule needs to be adjusted several times each year because of the satellite's position relative to the sun and earth. The current operating schedule will include the on and off periods for both the Mode B and Mode L translators.

You can obtain the current OSCAR 10 operating schedule from several sources. If you're active on HF, you can hear the schedule on the weekly 75-meter AMSAT net mentioned before. Or, if you've located OSCAR 10, you can get this information on the AO-10 General Beacon frequency of 145.810 MHz. Most of the time, this beacon is sending information about important spacecraft parameters (called *telemetry*) back to Earth by means of a phase-shift-keyed (PSK) signal. PSK telemetry has a raspy buzzing sound. Every 30 minutes, though, the PSK telemetry is interrupted by a five-minute CW bulletin that includes the operating schedule and other bits of important news. These bulletins start on the hour and at 30 minutes past each hour. At 15 and 45 minutes after each hour, another five minutes of information is sent by means of 170-Hz shift, 50-baud RTTY. These RTTY bulletins also contain telemetry samplings, for those interested in that aspect of satellites.

**How Well Can You Hear?**

This is the point where we put all of your efforts to use. You have high-quality 2-meter receiving capability, modest transmitting power on 435 MHz, good antennas with azimuth and elevation rotators, and a knowledge of where to find OSCAR 10. You *are* ready, aren't you?

It's a good idea to tune to the beacon frequency of 145.81 MHz each time you begin satellite operation. Among other things, the beacon provides a constant signal for peaking your antenna on the satellite. Determine the beacon strength. If you have the receiving capability recommended earlier in this series, you will have useful readings on your S-meter (normally, less than S9 values). It may be helpful to use a signal

**Table 2**

**AMSAT-OSCAR 10  
Frequency Conversion Chart**

Mode B ± Doppler Shift		
Uplink	Downlink	
	145.987	EB
435.0323	145.9720	SSC H1
435.0423	145.9620	SSC H2
435.0477	145.9600	GCB UL
435.0477	145.9570	ACNF
435.050	145.955	
.055	.950	
.060	.945	
.065	.940	
.070	.935	
.075	.930	
.080	.925	
.085	.920	
.090	.915	
.095	.910	
.100	.905	
435.1037	145.901	
.105	.900	
.110	.895	
.115	.890	
.120	.885	
.125	.880	
.130	.875	
.135	.870	
.140	.865	
.145	.860	
.150	.855	
.155	.850	
.160	.845	GCB LL
435.1647	145.840	SSC 12
435.1747	145.830	SSC L1
	145.810	GB

SSC—Special Service Channel  
GCB—General Communications Band  
ACNF—AMSAT Calling and Net Frequency  
EB—Engineering Beacon  
GB—General Beacon  
LL—Lower Limit  
UL—Upper Limit

source and a switchable attenuator to calibrate your S-meter in terms of decibels. This way you can note signal strengths in decibels above the noise, which has more meaning in weak-signal work than normal S-meter readings.

Once you've found the beacon and know that you're hearing OSCAR 10, tune up through the passband (145.830 to 145.970 MHz). Note that the satellite passband is divided according to a voluntary frequency plan, shown in Fig 4. Nearly all of the CW activity is below 145.900 MHz; nearly all of the SSB activity is above that frequency. You will be able to hear packet activity on Special Service Channel (SSC) L2, near 145.840 MHz.

It will take a while to get oriented to Mode B operation because the spacecraft translator is *inverting*, as shown in Fig 5. This means that a signal transmitted at the high end of the 435-MHz uplink passband will come out on the low end of the 145-MHz receiving passband. SSB signals are inverted as well: If you transmit LSB on the uplink, it will come out as USB on the downlink. Common practice is to transmit up to AO-10 on LSB, providing a USB downlink signal.

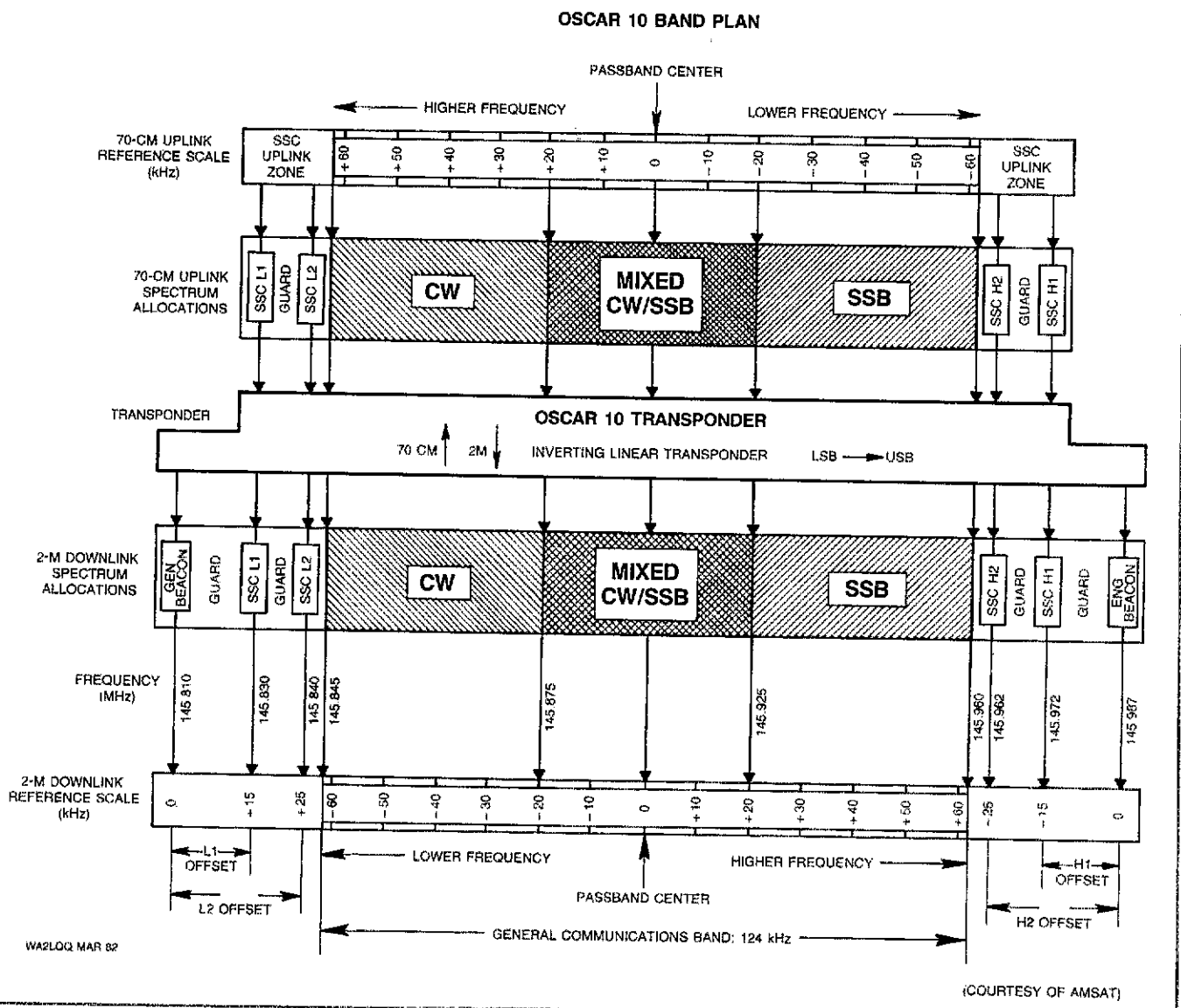


Fig 4—The OSCAR 10 band plan allows for CW only, mixed CW/SSB and SSB only operation. Courteous operators observe this voluntary band plan at all times.

If everything is working right, conversational QSOs can be held with signals ranging from 6 to 15 dB above the noise floor of your receiver. Typically, the beacon is 12 to 15 dB above the noise. Confirmable QSOs have been made with signals as low as 2 to 4 dB above the noise. It is amazingly different from the type of communications that you may have been doing on the HF bands. Note that there is *no* excuse for QRM. Anyone able to receive the satellite should also be able to hear *everyone else* and allow sufficient elbow room for rational QSOs without crowding.

#### Locating Your Signal

Find some vacant territory on the receiving passband of the satellite for testing your own signal, for example, about 145.960 MHz. There's no need to hurry—AO-10 will be around for awhile. The frequency chart shown in Table 2 will help you to find

the right 435-MHz transmitting frequency to correspond with your chosen 145-MHz downlink frequency. If you wish, you can purchase a handy circular slide rule for the uplink-downlink frequency relationships.<sup>8</sup> Assuming you've tuned your receiver to 145.960 MHz, the nominal transmitting frequency is 435.045 MHz. Send a few dits and listen for them on the receiver. Headphones are very helpful here. Tune your transmitter frequency a bit on either side of nominal and find your own signal coming back. Note the offset from the nominal frequency; you'll need to know this number any time you want to bring your transmitter to a frequency you're listening on.

The offset is a combination of equipment calibration and *Doppler shift*. Doppler shift is caused by the relative motion between you and the satellite. As the satellite moves toward you, the frequency of the downlink

signals will increase slightly. As the satellite passes overhead and moves away from you, the frequency of the downlink signals will be slightly lower than nominal. Doppler shift through a transponder becomes the sum of the Doppler shifts of both the uplink and downlink signals. Since the AO-10 Mode B transponder is inverting, an increase in uplink frequency causes a decrease in downlink frequency, so the Doppler shifts tend to cancel.

If you are using the Ten-Tec 2510 Mode B Satellite Station, tuning the frequency offset is even easier. Set your HF receiver, used as a tunable IF, to 29.0 MHz, and set the 2510 to the desired receiving frequency. Tune the HF receiver a few kilohertz on either side of 29.0 MHz, and you will find your signal. Once set, keep your hands off the HF receiver tuning knob! Adjust the HF rig only for very small Doppler shift corrections and do all of your QSYing with

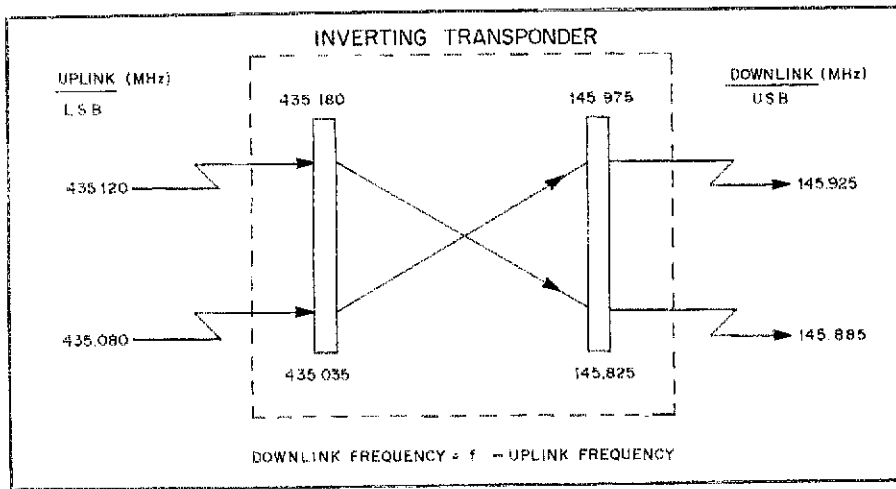


Fig 5—The OSCAR 10, Mode B transponder is inverting. Signals transmitted to the satellite at the high end of the 435-MHz uplink come out at the low end of the 145-MHz downlink. Signals transmitted to the satellite on LSB return to Earth as USB signals. The translation frequency, *f*, is 581.005 MHz.

the 2510 tuning knob. Your transmit signal will always follow your receiver; it's that easy.

Now that you've found your signal, compare its strength with that of the

145.810-MHz general beacon. Your signal strength on the downlink should *never* exceed that of the beacon. If it does, decrease your transmitter power output accordingly. The transponder must share its

power among all users. If your signal is louder than the beacon, you'll activate the transponder AGC and degrade performance. It takes only one hog to make communications difficult for everyone.

### At Last: Operating Through OSCAR 10

Let's try a CW QSO first. There are two ways of finding someone to work on the satellite, just like on any other band or mode: You can call CQ and hope someone answers, or you can answer a CQ. If you've got a good signal through the satellite, you may want to try calling CQ at first. This way, you won't have to worry about bringing your transmitter to someone else's frequency. You'll be able to get the frequency controls set in advance, allowing you to concentrate on making the QSO. After a QSO or two, venture down the band and try to find another station to call.

Find a clear spot in the CW portion of the passband and bring your transmitter to the frequency. Do this the intelligent way: Look up the frequencies in Table 2, set your transmitter to the right frequency (remember the offset) and send a couple of dots if necessary to zero in on your signal. Resist the temptation to put a brick on the dot lever and crank the transmitter control



Fig 6—These are but some of the DX QSL cards gathered from Mode B OSCAR contacts at WD4FAB.

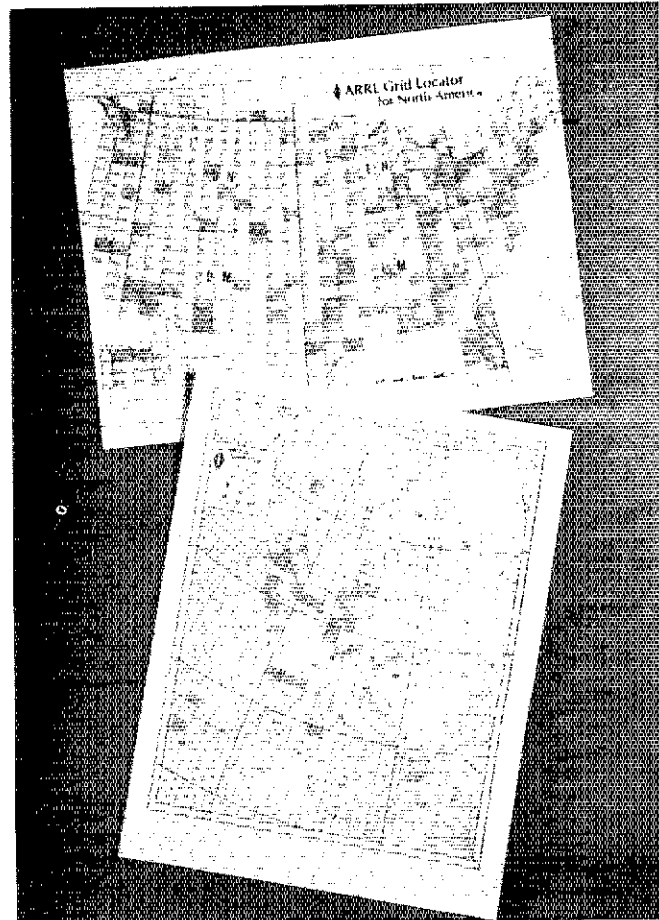


Fig 7—If you're into grid-square chasing, quite a number can be worked via the satellite.

until you find your signal. Such "swishing the passband" causes QRM to everyone else and is considered extremely bad manners.

Now call CQ. Although you can hear your signal on the downlink, you'll probably want to use a sidetone oscillator for monitoring your sending. OSCAR 10 is quite a distance away, so it takes a little time for your signal to make the round trip. When AO-10 is in the highest part of its orbit, the delay is about 1/4 second. It can be disorienting to listen to a delayed downlink signal while you're sending. It's a good idea to adjust the sidetone level so that it's loud enough to use as a monitor, yet weak enough to let you hear downlink signals between characters or words.

Since satellite operation is full duplex, don't be surprised if someone answers your CQ before you've finished. There's really no reason to wait—it's not like routine single-frequency communications where the receiver is disabled until the end of a transmission. This won't be difficult to get used to, especially if you've used a QSK CW rig before. Should Doppler change during the course of your QSO, tune your transmitter to keep your transmitter and receiver on the same frequency. This way, you won't "walk" down the band as things change. That's all there is to it: Now OSCAR 10 operation is just like what you're used to on HF, only the band's always open when the satellite's in view.

#### Now Try SSB

SSB operation via OSCAR 10 is similar

to CW. The time delay is even more difficult to get over, though. New operators usually stumble over their own return voices when they first try AO-10. You may find it more comfortable to turn down the receiver audio gain control while you're talking. The Ten Tec 2510 has a push-button control to mute the receive audio during transmit. These approaches, while helpful, force the operator back to monolog transmission without the full-duplex features available from AO-10. With some practice, you should be able to listen to the *pitch* of your return voice and not be bothered by the *content* of what is being said, thus achieving full break-in voice operation.

Although headphones can be used to enhance any weak-signal work, they are mandatory for AO-10 SSB operation. If you don't use headphones, you'll have problems with the receiver audio getting into the transmitter. The result can be anything from lousy, booming transmitted audio to a screeching, full-feedback oscillation through the satellite. Please use your headphones.

An added bonus of lightweight headphones that do not block off all external sounds is that you can hear your own acoustic voice, as well as your voice as transmitted through the satellite. You can readily tune your transmitter for the same voice pitch from both sources, thus ensuring that you are on "your frequency" and that any other station that hears you will be able to make contact without chasing you up and down the passband.

The message here is that once you have a QSO established, *hold your receive frequency fixed* and make any Doppler adjustments with your transmitter VFO.

That's about all you need to know to get started on OSCAR 10. There are lots of rare DX stations to chase, if that's what you enjoy. And there is always someone around for a ragchew. You'll find the relaxed pace of AO-10, Mode B operation a relief from the hectic doings on HF. Fig 6 shows some of the QSLs gathered at WD4FAB from Mode B contacts, and Fig 7 shows grid squares worked (both here and abroad).

Good DXing on AO-10.

#### Notes

<sup>1</sup>The OSCARLOCATOR is available from your local radio store or from ARRL for \$8.50. Add \$2.50 (\$3.50 UPS) per order for shipping and handling.

<sup>2</sup>The *Satellite* is available from ZRO Technical Products, Box 11, Endicott, NY 13760 for \$10.


<sup>3</sup>M. Davidoff, *The Satellite Experimenter's Handbook* (Newington: ARRL, 1984). Available from your local radio store or from ARRL for \$10 (\$11 outside US). Add \$2.50 (\$3.50 UPS) per order for shipping and handling.

<sup>4</sup>AMSAT, PO Box 27, Washington, DC 20044. Dues are \$24 per year. *Amateur Satellite Report* is published biweekly and is included with AMSAT membership.

<sup>5</sup>See the W1AW Schedule in Jun 1986 QST for more information.

<sup>6</sup>Available annually for a \$10 donation from Project OSCAR, PO Box 1136, Los Altos, CA 98510.

<sup>7</sup>T. Clark, "Basic Orbits," *Orbit*, Mar/Apr 1981, pp 6-11 and 19-20.

<sup>8</sup>The OSCAR 10 "No Ditter" is available from Dave Guimont, Jr, WB6LLO, 5030 July St, San Diego, CA 92110, for \$3, postage paid. 

## Strays



## Next Month in QST

Would your station survive the effects of electromagnetic pulses generated by lightning strikes or nuclear explosions? Find the answer by reading the four-part series on EMP and Amateur Radio, beginning in August. Go west—or whichever direction you must travel to attend the 1986 ARRL National Convention in San Diego. But first read all about the activities scheduled for this premier event of the year. For successfully advancing candidates to licensees, In Training gives hints on the smooth administration of Novice code and written exams. "Miss Manners" visits the On Line column with packet-radio etiquette. NOI? NPRM? It's not alphabet soup—read August's Washington Mailbox for more clues to untangling those mysterious FCC rules.

What contest has new rules and will be held only one weekend this year? Your August issue holds the answer.

Please note: Although we try our best to include in the next issue all the items we've advertised, from time to time we have to postpone publication for a month or two. If the item you're particularly interested in doesn't appear "next month," it most likely will be in the following month's issue.

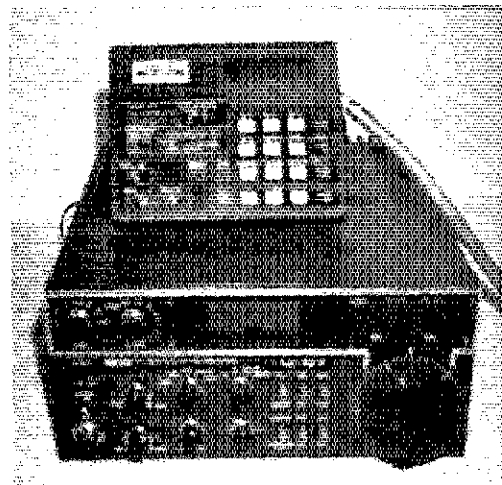
#### NEWSLETTER AVAILABLE FOR THE OSCAR ENTHUSIAST

A free newsletter for OSCAR enthusiasts and those just starting out on OSCAR is now available from the San Francisco Bay Area OSCAR-10 Users Group. Released monthly, the newsletter is edited by KH6JRB and KB6HWV. Send several business-sized SASEs to San Francisco Bay Area OSCAR-10 Users Group, c/o Ross Forbes, WB6GFJ, PO Box 1, Los Altos, CA 94023-0001.

# A VHF/HF Remote-Base Station

Want a remote-base system? Here's a peek at some off-the-shelf commercial equipment that can make it easy.

By Bob Heil, K9EID  
411 S Main St  
Marissa, IL 62257



There's nothing new about remote-base operation. It's been around for years. What is new is that recent technology allows today's ham to create a remote-base system in a few evenings, with a minimum of technical knowledge required and using only basic tools. This article shows some of the concepts in use today and gives examples of how simple it is to do the necessary functions through a remote-control link.

Operation of a remote-base station that is controlled through another radio station is authorized by Secs 97.86 and 97.88 of the FCC regulations. The station used for the control link in this type of operation is defined as being in *auxiliary operation*. The regulations permit auxiliary operation on all amateur frequencies above 220.5 MHz, except 431-433 MHz and 435-438 MHz. This means that *all* control-link frequencies must be above 220.5 MHz. Be thoroughly familiar with these regulations

(Secs 97.86 and 97.88) before attempting auxiliary operation.

As a practical matter, the control link will usually be a 220-MHz or 450-MHz transceiver. A good rig for this purpose is one of the Midland, Cobra or Clegg 220-MHz transceivers—almost identical rigs, they just have different panels. Hamtronics<sup>®</sup> and Spectrum Communications produce separate transmitter and receiver boards that will work just as well.<sup>1,2</sup> Any of the available 220-MHz hand-held transceivers, with DTMF (dual-tone multifrequency) control, can be used as the control station.

## System Parameters

In developing these remote-base stations, simplicity is of prime importance so that

they can be duplicated by almost anyone. Two different concepts are described—a UHF control/VHF remote and a UHF control/HF remote. The same basic parameters apply to both approaches. The differences result from the availability of certain capabilities in one type of equipment as opposed to another. I will describe the basic UHF system first, then detail the parameters for the HF/VHF applications. The concept is based upon patching together commercially available decoder cards to control the various functions of the remote stations (see Fig 1). There are only three basic requirements: Plan and select the connectors to patch the cards, mount the various cards in suitable chassis and, most important, have a good understanding of a transistor dc switch. A typical system requires several of these little jewels, all identical: a transistor, base resistor, relay and protection diode. That's it! These are the heart of the system.

<sup>1</sup>Notes appear on page 33.

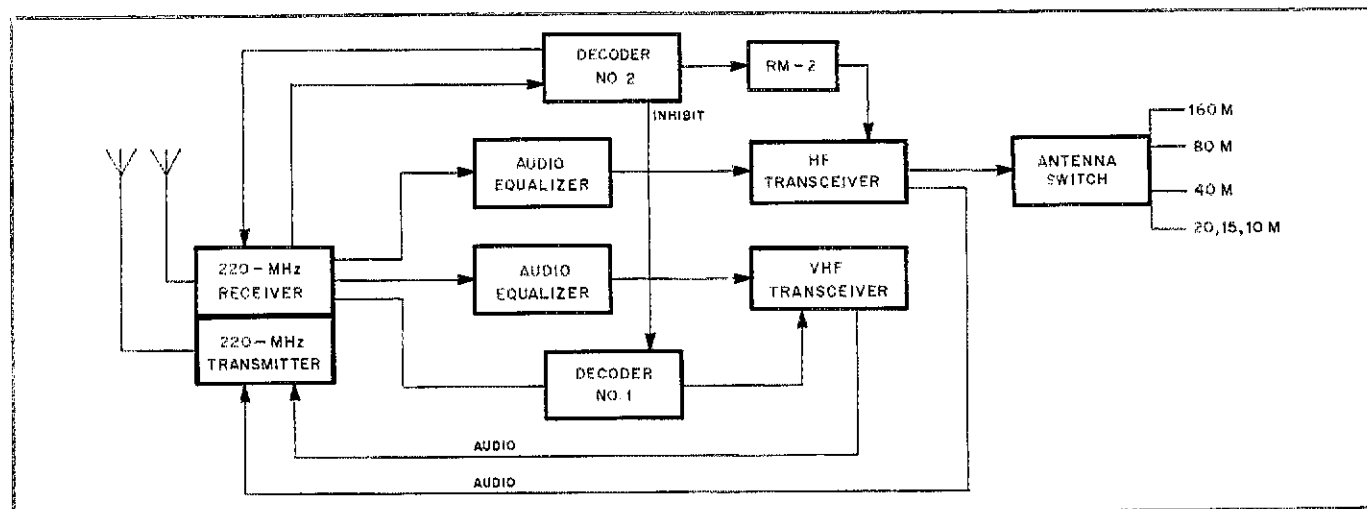


Fig 1—Block diagram of the VHF/HF remote-base station.



The use of the commercially available modules allows the amateur to operate through a UHF repeater and have full control of all basic functions of either a VHF transceiver or a HF station. Through use of the DTMF pad on the control-link handheld transceiver, the remote station is tunable throughout its frequency range in 100-Hz steps. In the case of the HF station, this range is 1.8 MHz through 29.7 MHz. In addition, it allows dialing in any exact frequency, controlling write and read memories, scanning in 100-Hz steps (to simulate sitting at the rig and slowly rotating the tuning knob), switching bands and selecting correct sideband, selecting the proper antenna for each band and indicating the direction to which the antenna is turned. Additional enhancements can provide voice reporting of the exact operating frequency, as well as many other functions that are limited only by your imagination.

### 220-MHz Control Link

The 220-MHz control-link receiver and transmitter need not be connected as a true repeater, although it can be easily done. The 220-MHz control-link receiver audio feeds only the mic inputs of the remote-base stations. When you talk through the control link, the audio is fed to the remote-base mic inputs through an audio equalizer. The control-link audio is not repeated through the 220-MHz control-link transmitter. This transmitter is fed only with the HF or VHF receiver audio. A COS (carrier-operated switch) is installed in the squelch circuit.

The 220-MHz control link is operated with the usual 1.6-MHz split, using low power to two antennas separated by several wavelengths. No noticeable desense has been observed with this scheme. The system could be wired as a full-blown repeater, but that will probably require a duplexer and add to the complexity and cost.

If the 220-MHz control link is based on the Midland/Cobra/Clegg rigs, the job is simple. The receiver board is removed from the case by removing four screws and the squelch and volume controls. The crystal line is a coaxial cable on the common of the 12-position band switch. Simply unsolder this line and solder your operating crystal to the end of this cable. Mount the receiver board in a small box with speaker and power plugs. Removing the 220-MHz transmitter from the original case is inviting disaster (such as spurious responses, self-oscillation, and so on). Leave the transmitter section alone. It can be easily interfaced through the accessory plug on the rear panel. Add the PTT, dc switch and audio-level potentiometer to complete the transmitter.

The decoder boards are commercially available "Remote a Pad," Model RAP-1s.<sup>3</sup> They are modified with the addition of two relays and associated transistor switches. One decoder operates the HF functions and controls the 220-MHz con-

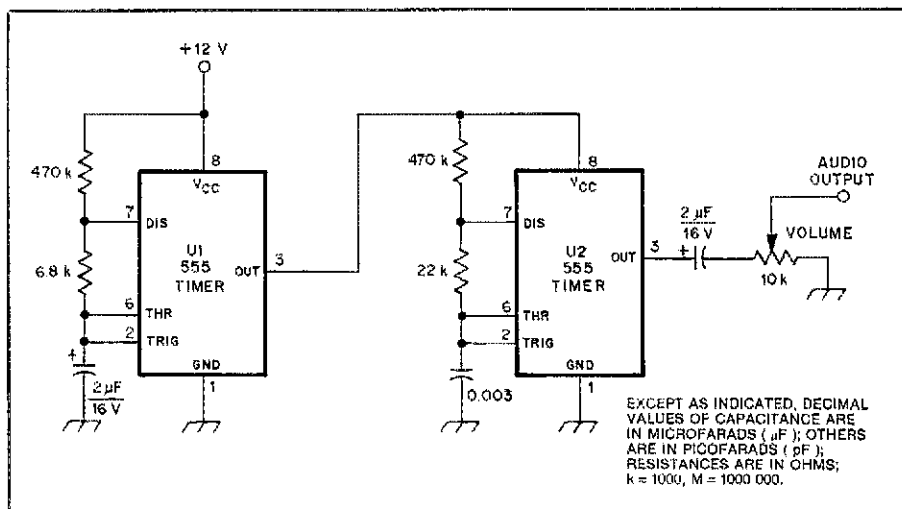


Fig 2—Simple beeper circuit that provides audible transmit-mode warning.

trol link. The second RAP-1 controls the VHF transceiver. Begin the project by selecting proper enclosures for the decoder boards and the 220-MHz receiver. A standard Bud box can be used for each of these, and they are easily mounted side-by-side in a rack mount when complete. The decoder boards fit nicely into the boxes, with plenty of room to fit the two control relays, connecting plugs and other goodies. Use common chassis-mounted 8- and 4-pin microphone connectors to carry data to and from the transceiver's DTMF pad, control lines to the 220-MHz repeater, dc power and audio. Interface connectors are mounted on the back panels and short patch cables are made up to connect the various boxes. Be sure to use shielded cables throughout to reduce RFI and crosstalk.

The RAP-1 decoder board decodes the normal 16 tones, as well as two separate on/off functions. Using two small matrix-board arrangements, the RAP-1 can be wired to control two relays. This makes the RAP-1 ideal for the remote-base control. One relay is used to power-up the 12-V line to the VHF transceiver. The other relay is used to place the remote station in the transmit mode after the proper frequencies and offsets are entered. Neither the VHF nor the HF station can be programmed in the transmit mode. It is necessary to have a "transmit" code so you can dial the rig onto frequency, then dial up the transmit code to key the PTT line. Otherwise, the PTT line will be keyed every time that the 220-MHz receiver senses a signal. Since the transceivers can't be programmed while in transmit, it is essential that you know if the system is in or out of the transmit mode. The simple beeper shown in Fig 2 causes the 220-MHz transmitter to send a short beep every three or four seconds while in transmit. Adjust the level so it is far below the received audio, but still audible. A similar circuit, with a lower-pitched beep appearing about every 10 seconds, is used

to indicate that the system is on 2 meters, not HF.

### The VHF Remote-base Station

Several 2-meter transceiver models are suitable for this project; the Kenwood 7800, 7850 and 7950 are ideal. For purposes of this article, I will describe the modifications for the Kenwood 7800, with which I am familiar. If another transceiver is used, a little bookwork and planning will be necessary.

Access to the tone pad of the 7800 is accomplished through one 12-conductor stripline connector. Lay the 7800 on its top with the front panel towards you. Remove the bottom panel. The stripline connector is in the lower left-hand corner of the circuit board. Following the pinouts from the front-panel keypad, the labels that appear on this connector are, from left to right, as follows:

E B0 B12 B13 B3 B2 B1 E0 E1 E2 E3 C3

The 7800 pad is identical to most other pads, with the exception of the last column. This column is used to set the offset frequencies ( $\pm 600$  kHz), scanning function and simplex. To use these functions, build a small board with three reed relays to key them (see Fig 3). Since the memory section of the 7800 is not used, the batteries can be removed, leaving enough room to mount the relay board. Build the relay board on a small piece of Vector board or make a small PC board. This board allows you to select the offset or cause the 7800 to scan the entire band from end to end. These relays are driven by the matrix section of the RAP-1. Solder a diode onto the "A," "B" and "9." These three diodes feed the three relays that key the "scan-on" function, the + offset and the - offset. The "scan-off" function is the "-" sign and is already connected through the keypad. I chose the "9" to turn the scan on because that number does not affect any

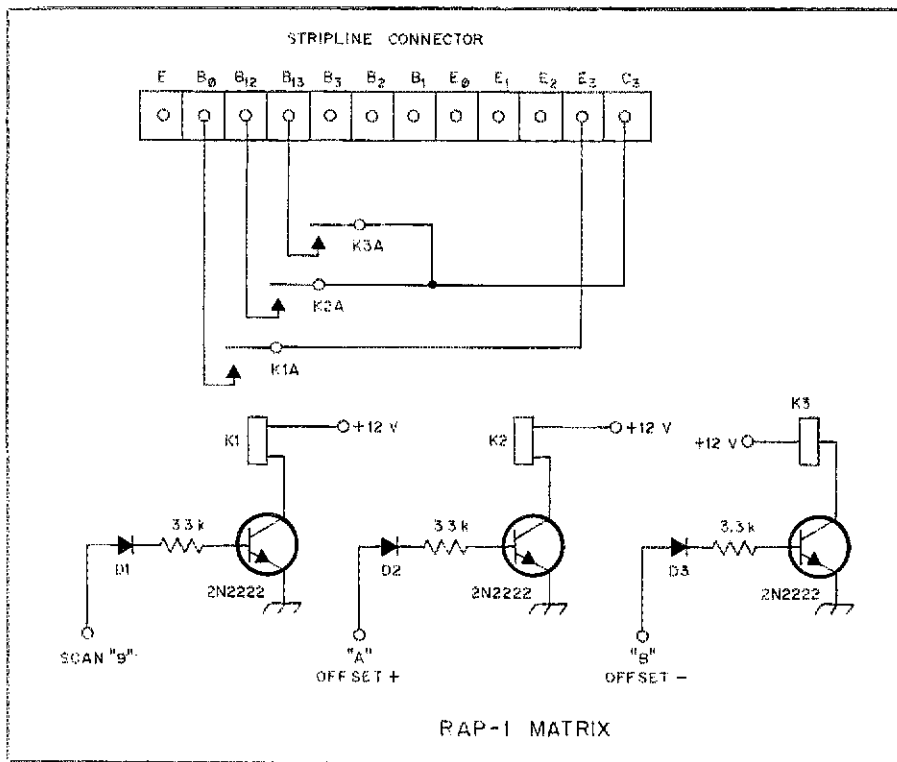


Fig 3—Scan-on and offset selection circuit.

Table 1  
RAP-1 to Kenwood 7800  
Interconnections

J-1 Pin	7800 Stripline Connector
1	E3
2	E2
3	E1
4	E0
5	B1
6	B2
7	B3

other functions of the 7800.

A 24-inch length of 8-conductor shielded cable is used to connect the 12-pin stripline connector to the decoder box. One end is soldered directly to the pins of the connector, with the other end terminated in an 8-pin microphone connector that mates with the chassis connector on the decoder box.

A relay is mounted in the decoder box and wired to the "code 2" function that connects the PTT line to the 7800. This relay actually keeps the 7800 out of the transmit mode until all of the frequency digits are entered. It is also added insurance that your programming tones will not be retransmitted over the 2-meter station.

The connections from the RAP-1 J-1 edge connector to the 7800 are shown in Table 1. The cable is routed out through the bottom of the 7800. Cut a small slot in the aluminum bottom plate near the left-hand front corner or bend the side panel enough to allow the cable to exit.

### Operation

Operation is straightforward. First dial up the 220-MHz transmitter so it will transmit the VHF audio to you. I set the matrix for "1,2,3,A" to do that. Dial in the desired frequency, just as if you were sitting in front of the rig. This lets you receive that frequency through your 220-MHz control link. To transmit, send the transmit-enable code "C,D," and away you go. Here are all of the codes used to operate

the 2-meter remote base.

"1,2,3,A" (first time)	220-MHz transmitter on.
"1,2,3,A" (second time)	220-MHz transmitter off.
"B" (set after frequency)	Minus offset.
"A" (set after frequency)	Plus offset.
"9"	Scan on.
"#"	Scan off.
"C,D" (first time)	Transmit on (PTT enable).
"C,D" (second time)	Transmit off (PTT disable).

### The HF Remote-base Station

The basis for my HF system is the ICOM IC-701 HF transceiver, together with the ICOM RM-2 microprocessor control. This was a sleeper rig of the late 1970s and remains today as the only commercial HF rig with DTMF control. This is not to say that remote-base operation is possible *only* if you have an IC-701. There are several later-vintage rigs that allow computer control of frequency and operation through an RS-232-C interface. More about this possibility later.

The second RAP-1 decoder in the system is used to control both the IC-701 and the 220-MHz control-link receiver/transmitter. The 220-MHz receiver audio is fed to the mic input of the '701 through the audio equalizer. With the '701 VOX en-

gaged, the HF rig then switches into transmit—driven by the audio from the 220-MHz control link.

A third RAP-1 decoder is used to control a Pro-Search Antenna rotator system. Complete directions for this application are supplied with the RAP-1.

I use the "code 1" to turn on and turn off the 220-MHz control-link receiver/transmitter, and "code 2" to turn on and turn off the '701 mic audio. I elected to use this last function so that none of the touch-tone audio could be fed out into the HF bands while you are selecting frequency, sidebands, and so on. This neat little function allows you to dial in the correct frequency, select the antenna, turn the rotator and prepare everything just the way you want it. At the last minute, before announcing your presence on the HF band, punch in the 4-digit tone access for code 2. Just the very last part of the final-digit tone will be broadcast over the air. The only way anyone can obtain your control tones is to hear your 220-MHz signal directly!

Wiring the RAP-1 to the IC-701 takes about 10 minutes. Only nine wires are required for the connection. Eight wires feed the control pad, while the ninth wire is used for the reset button, and must be wired through one of the dc switches and a reed relay. The instructions supplied with the RAP-1 include directions for connecting the RM-2.

### Remote Antenna Control

The antenna switching system can be used with just about any of the current all-mode, solid-state HF transceivers. For overall band coverage, we need four antennas—a 160-m dipole, an 80-m dipole, a 40-m dipole and a tri-bander for 20-15-10 meters. WARC-band coverage will increase that requirement. I used four of the simple little dc switches to drive four relays, and connected four LEDs just for the fun of it, since there is never anyone at the remote base to see them! Five coaxial connectors are mounted on the switching box, one for each antenna and the fifth for the connection to the '701. The '701 has a motorized band switch. When you dial in a frequen-

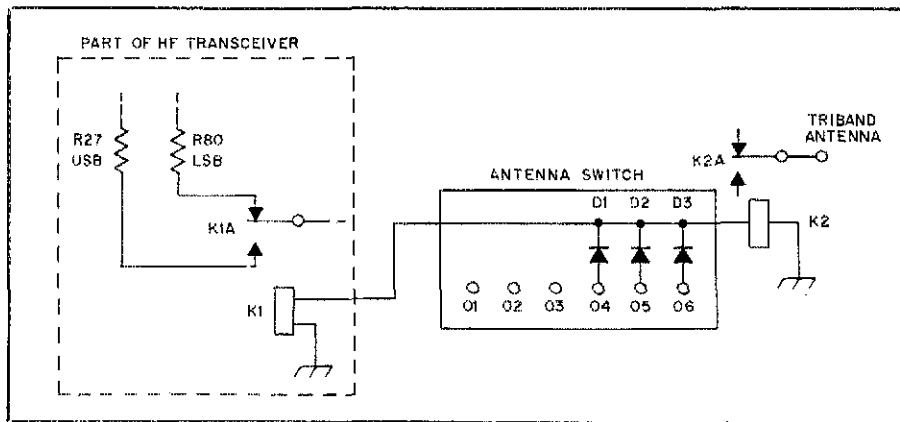


Fig 4—Antenna switching and sideband selection circuit.

cy, the band switch puts 12 V on the corresponding position of the band-switch motor board. This means that just four wires from the '701 to the switching box control the four antennas. The motor PC board is located on the bottom right-hand side of the '701, behind the mic jack. There are 12 large 1F transformers, in two rows of six each. At their right is a board with six color-coded wires on it, marked 01 through 06. The color code is shown in Table 2. When any frequency is selected, 12-V dc appears on the corresponding pin (01-06) on this board. A lead from any pin to a relay will switch the antenna, or anything else you need. Use a separate relay for each antenna—one for each of the low bands, and control the tribander with three diodes feeding one common relay from the 20, 15 and 10-meter points on the PC board (see Fig 4).

The same "high band" line from the three diodes is also used to energize a small reed relay installed on the top main board of the '701 to select normal sideband. With the sideband switch in the LSB position, the '701 is on LSB for 160, 80 and 40 meters, and the relay switches to USB when

the high band is selected. Of course, the frequency should be shifted by 3 kHz when switching sidebands. This can be accomplished with a DPDT relay, but I didn't want to dig that far into the rig. I just add 3 kHz to my frequency when I operate USB.

Another useful feature to include is a total power-down control for the '701. I have experienced some lock-up of the RM-2, so I included a separate code from one of the decoders that removes all power from the '701. With this code I can turn off the '701 for a few seconds, turn it back on, and everything is reset. Power to the 220-MHz control link is not shut down.

#### HF Operation

Operation on HF is as straightforward as on VHF. First command the 220-MHz transmitter to route the '701 receive audio to your hand-held transceiver. To select a frequency, use the "#," "D," "0" and "A." Each time you send the "#," the frequency moves down by 100 Hz. The "D" moves the frequency up by 100 Hz. Holding either of these engaged longer than 0.5 second causes the '701 to scan in that

Table 2  
IC-701 Motor Board Color Codes

Pin No.	Band	Color
01	160 m	brown
02	80 m	red
03	40 m	orange
04	20 m	yellow
05	15 m	green
06	10 m	blue

direction through 100-Hz steps. The "0" stops the scan, and "A" resets and clears the RM-2. To select an exact frequency, just dial in the digits, such as 7.2580. The "0" at the end enters the frequency and the '701 moves to that frequency and selects the proper sideband and antenna. To transmit, enter "A" twice. To exit the transmit mode for retuning or reprogramming adjustments, enter "A" twice again.

#### Other Possibilities

The purpose of this article was to point out some of the ways in which currently available off-the-shelf DTMF decoding equipment can be used to provide a remote-base capability. New technology is appearing almost daily. Now there are systems that allow DTMF control of the newer microprocessor-based transceivers through a computer interface, and it is possible that other new concepts will soon evolve. With a little imagination, it should be possible to "home brew" variations on these ideas. The systems are really simple and easy to assemble. I'll look forward to that day when we can contact each other through our remote base stations.

#### Notes

- <sup>1</sup>Hamtronics, Inc. 65-D Moul Rd, Hilton, NY 14468, tel 716-392-9430.
- <sup>2</sup>Spectrum Communications, 1055 W Germantown Pike, Norristown, PA 19403, tel 215-631-1710.
- <sup>3</sup>Engineering Consulting, 583 Candlewood St, Brea, CA 92621, tel 714-671-2009.

## Strays



- "Evaluation of Duping Algorithms," by Ron Todd, K3FR
- "A Xerox 820-I Compendium," by Andre Kesteloot, N4ICK
- "The Birth of a New Bird," by Maureen Thompson, KA1DYZ

Other features include: the manufacturing processes that produce RF transistors, and usable information on copyright laws—why you should consider them to protect your creation.

*QEX* is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL members is \$6 for 12 issues; for nonmembers, \$12. There are additional postage surcharges for mailing

outside the US; write to Headquarters for details.

#### I would like to get in touch with...

anyone with a manual, schematic or 2-meter-conversion information for the AN PRC 40 AX VHF-FM solid-state transceiver. Martin Berkofsky, TF3XUU, Gardskagi Lighthouse, 250. Gardur, Iceland.

anyone with technical data on a DTS Model 1200 Voicecaster "speakerphone" made by Data Transmission Sciences. Peter de Bruyn, W3EXP, 12907 Crookston La, A4, Rockville, MD 20851.

### QEX: THE EXPERIMENTERS' EXCHANGE

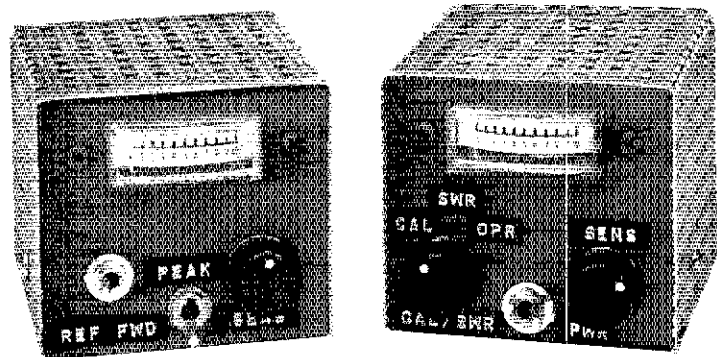
Calling all experimenters! Do you desire to learn about the latest on high-level technical developments taking place in Amateur Radio? If your answer is yes, you will be interested in receiving *QEX*. Each month *QEX* delivers information on the electronic theory that makes Amateur Radio communication possible.

The June issue includes articles on

# The SWR Twins—QRP and QRO

**Part 9:** Portable amateur operation often calls for miniature equipment. Here are two tiny SWR indicators—one for QRP and one for high power.

By Doug DeMaw, W1FB  
ARRL Contributing Editor  
PO Box 250  
Luther, MI 49656



Does the inconvenience of too-large SWR-indicating gear complicate your portable operations? It is not uncommon for us to feel that some of the commercially made SWR bridges and RF-power meters are too big and too costly for occasional use during field day, camping trips, vacations and even DXpeditions. I have seen SWR meters that were larger than an entire QRP station, which presents a rather absurd picture! Because of my need for small accessory equipment, I have built a number of compact Transmatches and SWR meters. The pair we shall consider in this article was built to provide an example of small units that you can build inexpensively for field use. We will also consider some practical ideas for home construction that can be applied to other projects as well. These SWR indicators are not works of art, at least from an aesthetic point of view, but you can easily impart a professional appearance to them if you are skilled in the craft of cabinet and panel design.

## Do You Need an SWR Indicator?

SWR meters and RF-power indicators have become a way of life with most of us. But, "way back when," we managed quite well without these sophisticated gadgets. An experienced amateur could tell if the antenna SWR was low by observing the settings of the tune and load controls of the transmitter. That is, the plate tuning and loading controls were at approximately the same settings as when the transmitter was connected to a dummy load of the appropriate impedance, thereby indicating a low SWR. Some of us used RF ammeters in the feed line to indicate maximum RF current, a condition that generally occurred

when the feed line was matched to the antenna feed point.

SWR has become a more significant concern today because of the many solid-state transmitters that exist. They must "look" into a low SWR—usually 2:1 or less—in order to develop the rated output power and to protect the final-amplifier transistors from damage. The built-in SWR-protection circuits reduce the transmitter output power as the SWR increases. Therefore, it is helpful to have an SWR indicator between the transmitter and the transmission line. The antenna can then be adjusted by means of its length or matching circuit to obtain a low SWR reading.

SWR indicators are useful also as relative output-power meters. They help us to keep tabs on the antenna system and the transmitter performance. Most SWR instruments can be calibrated to read RF power as well, and we will discuss this principle later in the article.

## A QRP SWR/Power Meter

Neither of the instruments in this article is new in concept. The resistive QRP bridge was developed many years ago by the late George Grammer, W1DF. The QRO bridge is a design product of Warren Bruene of Collins Radio. The latter design has become the standard for most amateur SWR and power meters of commercial origin. A number of variations in the basic designs have been introduced, along with some extra convenience features.

Fig 1 shows the circuit for our low-power SWR bridge/RF power meter. R1, R2, R3 and R4 comprise a 50-ohm dummy load. Some of the RF voltage developed across the load is sampled through R5 and supplied to the resistive bridge that consists of

R6, R7 and R8. The antenna represents the remaining leg of the bridge. When it reflects a 50-ohm condition, the bridge is balanced and the meter reading falls to zero. D1 rectifies the RF voltage to provide dc for the metering circuit. Additional examples of this general circuit are given in *Solid State Design for the Radio Amateur* (temporarily out of print).

R10 is a panel control that is used to establish the "sensitivity" or meter response versus the power level. R11 is a PC-mounted potentiometer that we can use to calibrate the meter for a full-scale reading of 10 W. Once set, it should need no further adjustment.

Since R1, R2, R3 and R4 have a combined rating of 8 W, we must not permit a sustained RF power amount of more than 4 W to be fed into the instrument, lest the resistors become damaged from excessive heating. Momentary tests with powers up to 10 W will not harm the resistors, provided the key-down period does not exceed 15 seconds. Allow a cool-down period of at least 30 seconds between brief tests with more than 4 W of RF power. Film resistors are used in my model, but 5%, 2-W carbon-composition resistors will work equally well. If you cannot locate them, you may purchase the film resistors by mail.<sup>1</sup>

The power-handling capability of this instrument may be increased by using higher-wattage (noninductive!) load resistors or by connecting an external dummy load to replace the built-in one. **Warning:** If you plan to use more than 10 W of RF power, and a larger dummy load, be sure to in-

<sup>1</sup>Notes appear on page 37.

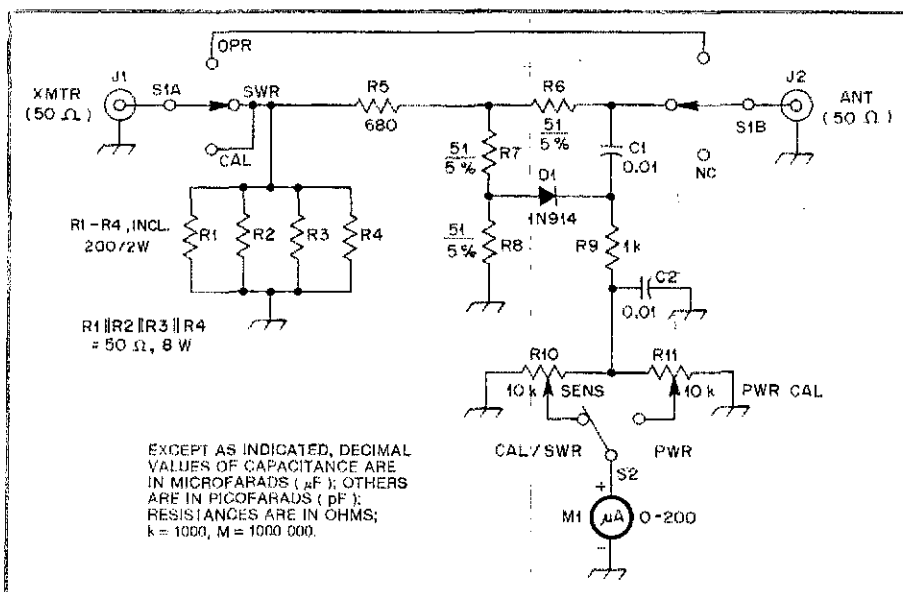


Fig 1—Schematic diagram of the QRP SWR bridge. Resistors are carbon-composition types. Capacitors are disc ceramic. Part numbers listed below are Radio Shack designators, except when otherwise noted.

- C1, C2—Disc ceramic, RS 272-131.
- D1—Small-signal silicon diode, RS 276-1122.
- J1, J2—RCA style single-hole-mount phono jack, RS 274-346.
- M1—Miniature microammeter, 0-50, 0-100 or 0-200  $\mu$ A. See note 2.
- R1-R4, incl—200-ohm, 2-W noninductive resistor. See note 1.
- R5—680-ohm, 1/2-W resistor, RS 271-021.
- R6, R7, R8—51-ohm, 1/2-W noninductive resistor. Available from All-Electronics

- Corp. Los Angeles, CA. Radio Shack 47-ohm units (271-009) may be substituted for suitable performance.
- R9—1-k $\Omega$ , 1/2-W resistor, RS 271-023.
- R10—Panel-mount control, 10-k $\Omega$ , linear taper carbon-composition, RS 271-1721. Knob (0.5-inch OD) is RS 274-403.
- R11—Trimmer control, PC mount, 10-k $\Omega$  RS 271-335.
- S1—Two-pole, three-position rotary wafer, RS 275-1386 (three positions not used).
- S2—SPDT miniature toggle, RS 275-613.

properly for a 50-ohm condition, the meter will read zero. If not, the antenna system or Transmatch should be adjusted until the meter reads zero. Once this is achieved, set S1 to the OPR mode.

RF-power measurements may be made (after M1 has been calibrated by means of R11) by placing S1 in the CAL position and setting S2 to read PWR. This removes the antenna (J2) from the circuit and permits us to develop RF voltage across R1, R2, R3 and R4. You may feed various power levels from 1 to 10 W into the circuit, then note the meter reading for each power amount. A calibration scale may then be drafted for future reference. The 1-10 numerical scales on the meters of these SWR indicators were drawn by hand at  $\times 4$ . I used press-on decals for the numbers. I then had the meter scale reduced  $\times 4$  at a "quick-print" shop, at a cost of 24 cents each. The new scales were pasted over the original faces of surplus 200- $\mu$ A S meters.<sup>2</sup> You may use an available meter that has a dc sensitivity of 50 or 100  $\mu$ A. Fig 2 contains a 0-10 meter scale that you may cut out or photocopy for use on the meters that are available from the source listed in note 3. The cases come off easily, and the meter face can be popped out for modification.

The interior of the QRP bridge is shown in Fig 3. A scale parts-placement guide for the PC board is provided in Fig 4A.

### QRO SWR Indicator

This fraternal twin to the QRP bridge will measure SWR and RF power at levels up to 1 kW. The major problem is that the instrument is so tiny and lightweight that the coaxial attachment cables may become the "tail that wagged the dog." This is often a penalty associated with miniature gear. I find that RG-8X 50-ohm cable minimizes the problem: I have experienced frustration when trying to use the heavier, stiffer RG-8 cable.

Fig 5 shows the circuit for the QRO bridge. I used a hybrid diagram in order to clarify the relationship of T1 to the rest of the circuit. T1 is a transformer for sampling RF current in the feed line. The cable that passes through the toroid core serves as a one-turn primary winding for T1. QRP versions of this bridge can be built if we use a two-turn link in place of the straight conductor that passes through the toroid. This will increase the sensitivity.

This bridge (minus the cabinet) is suitable for inclusion in Transmatches. The PC board (Fig 4B) can be installed near the RF-input jack of the Transmatch. The leads that go to S1 are not critical as to length, so S1, R1 and M1 may be panel-mounted in your Transmatch, if desired.

The shield braid of the pass-through coaxial line (T1) is grounded only at one end. This provides a Faraday shield to discourage the flow of harmonic currents into the bridge. C1, C2 and C5 form a capacitive divider for balancing the bridge in a 50-ohm circuit. D1 and D2 provide dc for the metering circuit. Germanium diodes are

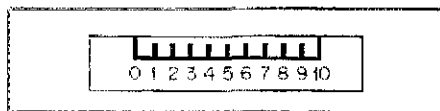


Fig 2—Meter scale that may be pasted over the original scale of the meter offered in note 3. See text for method of making your own custom scale at  $\times 4$ .

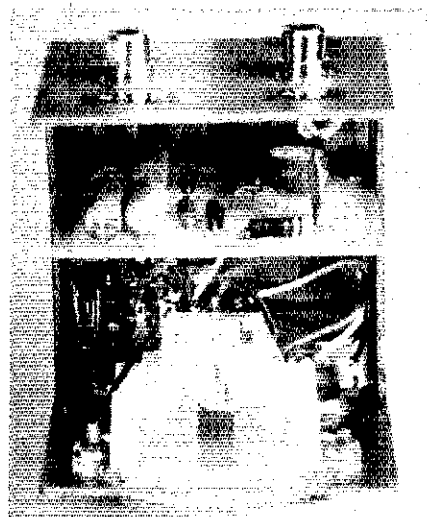


Fig 3—An interior view of the QRP SWR meter. The PC board is mounted vertically by means of two no. 6 spade bolts. A 1/4-inch hole is drilled in the rear panel of the box to provide access to the RF-power calibration control, R11.

crease the value of R5 to prevent excessive RF current from flowing in the bridge circuit. Sample only enough RF energy to provide a full-scale meter indication (R10 set for maximum sensitivity) at about half the power level you anticipate. In other words, if you expect to use 50 W of RF power, select an R5 value that will give a full-scale meter reading at 25 W.

### How to Use the QRP Meter

Calibration of this instrument was covered in Aug 1983 *QST*, at which time I described a similar instrument.<sup>2</sup> I will review the operating procedure here, since some of you may not have used this type of bridge for SWR and power measurements.

S1 allows us to bypass the bridge after making SWR or power measurements. The bridge is out of the circuit when S1 is in the OPR position. When we switch to the CAL mode, the bridge has no termination.

This enables us to adjust R10 (RF power applied) for a full-scale reading at M1. Next, we move S1 to the SWR position. The meter then indicates the relative reflected power. If the antenna is matched and tuned

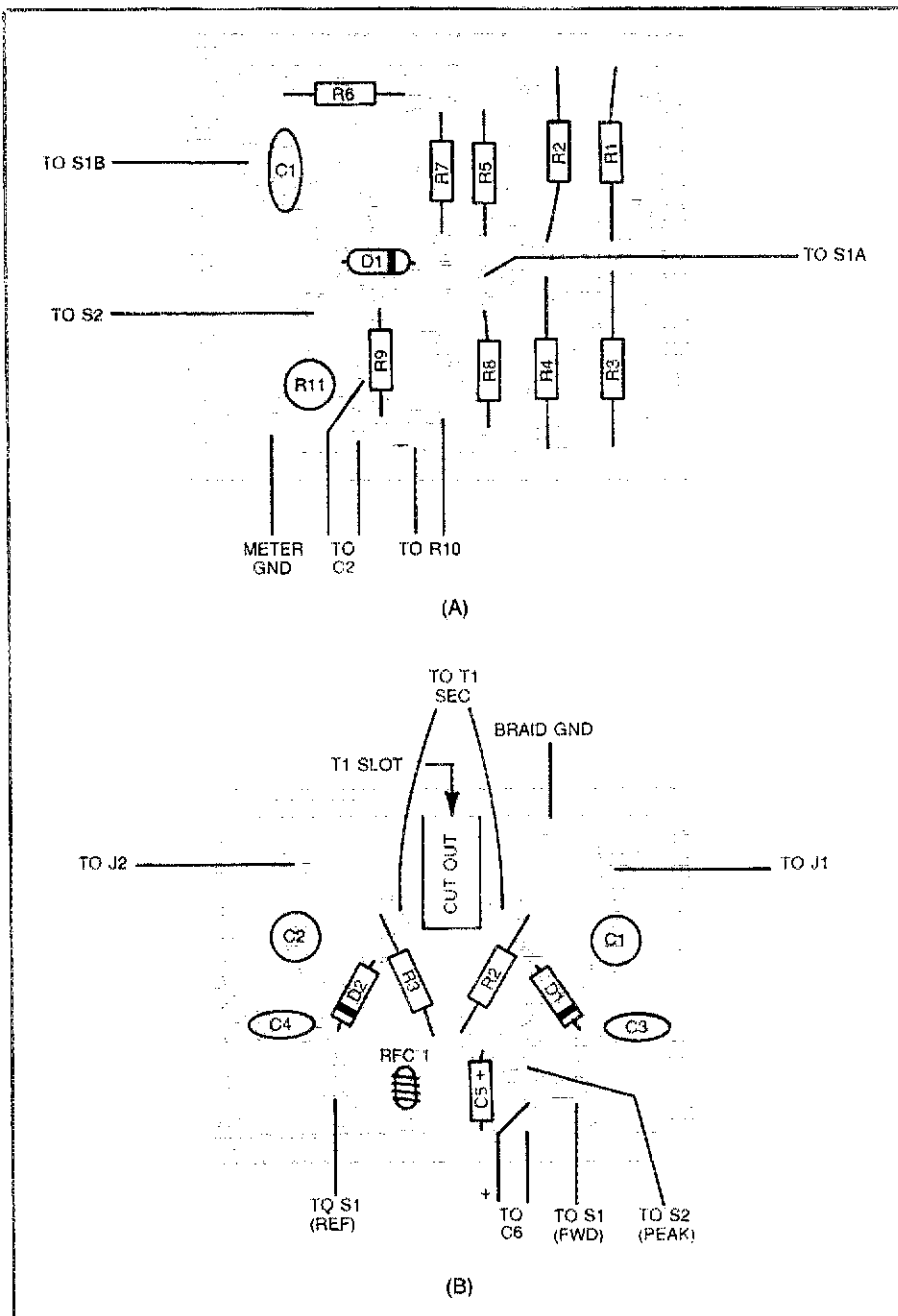


Fig 4—Scale parts-placement guide for the QRP meter (A) and the QRO meter (B), as viewed from the component side of the boards.

recommended to ensure sufficient dc voltage when small amounts of reflected power are present. Silicon diodes, such as 1N914s, may cease to conduct (0.7 V approx) before the SWR is adjusted for a 1:1 state, thereby causing us to think we have a match when, in fact, we do not. Germanium diodes have a lower barrier voltage (approx 0.4). This isn't a problem with the circuit of Fig 1.

I used RG-8X for the line that passes through T1, mainly because it provides a close fit to the center hole of the toroid core. Or, you may use the smaller RG-58, then affix it in the toroid with silicone cement. The RG-8X has a higher power rating, however.

C6 is included with S2 to provide a leveling effect of the meter reading during SSB operation. It will enable you to get an approximate peak-power reading if you calibrate this instrument to read RF watts.

Meter calibration (watts) can be accomplished if we feed a known amount of power through the bridge (into a 50-ohm noninductive load) and adjust R1 for a full-scale reading at M1. A panel mark is then made for this setting of R1. It will enable us to readjust R1 later on for reading RF power. Once we identify this setting of R1, the meter scale can be plotted at different power levels, as I suggested for calibrating the QRP bridge of Fig 1. An RF probe, VTVM or FETVOM and a 50-ohm load

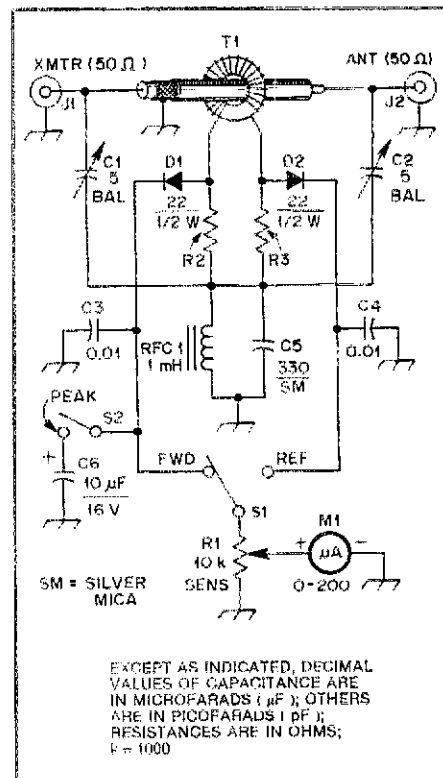


Fig 5—Hybrid diagram of the QRO SWR bridge. A short length of 50-ohm coaxial cable is passed through the center of toroid T1, as indicated. Fixed-value resistors are 1/2-W carbon-composition types. Other components are described below. Radio Shack numbers included.

- C1, C2—Miniature 1-5 or 1-8 pF air or piston trimmer. See note 4.
- C3, C4—Disc ceramic, RS 272-131.
- C5—Silver mica or polystyrene, 330 pF. NP0 ceramic also suitable. Silver-mica capacitor avail from All-Electronics, no. DMCP-330.
- C6—Tantalum or electrolytic, RS 272-1436.
- D1, D2—Small-signal germanium diode, RS 276-1123, 1N34A.
- J1, J2—Single-hole mount BNC or connector of your choice, RS 278-105.
- M1—Miniature microammeter, 0-50, 0-100 or 0-200  $\mu$ A. See note 2.
- R1—Linear-taper, carbon-composition, panel-mount control, 10 k $\Omega$ , RS 271-1721.
- R2, R3—22-ohm, 1/2-W carbon composition, RS 271-005.
- RFC1—Miniature RF choke, 1 mH. Avail from All-Electronics Corp. no. CC-1000, or from BCD Electro.
- S1—Miniature SPDT toggle, RS 275-613.
- S2—Miniature SPST toggle, RS 275-612.
- T1—60 turns of no. 30 enam wire on an Amidon Assoc T50-2 powdered-iron toroid core. Mount in slot on PC board (see text).

may be used for calculating the transmitter output power by measuring the RF voltage across the 50-ohm load [P(watts) equals  $V(\text{RMS})^2/R(\text{ohms})$ ].

Adjustment of the QRO bridge is done with a 50-ohm dummy load connected to J2 of Fig 5. Apply RF power with S1 in the FWD position. Adjust R1 to provide a full-scale reading at M1. Switch S1 to the REF

interior view of this bridge is provided in Fig 6.

#### Construction Notes

The cabinets for these units are made from PC-board pieces. The box dimensions (hwd) are 2-1/2 × 2-5/8 × 3 inches. I chose cane-metal aluminum sheeting for the box covers since it was available at the hardware store. This is an advantage for the QRP bridge, since the holes in the cover permit air flow around the load resistors.

My cabinets were formed by soldering together sections of double-sided PC board (front, back and bottom plates). Strips of PC board are used as stabilizing members between the front and rear panels, adjacent to the bottom plate. These strips provide anchor points for the top cover, which is affixed by means of no. 6 sheet-metal screws. I cut the meter holes with a hand-operated nibbling tool.

I discovered by chance that Krylon® grey undercoat spray paint is excellent on panels: It was the only can of paint I had on hand when I built these units, so I used it. Not only does it dry quickly (5 minutes), it provides a tough matte finish that is quite immune to smudging from our fingers. It appears to be an excellent paint for amateur projects. If you prefer a gloss finish, you may spray the grey panels with polyurethane varnish (also available in spray cans).

The front panels of my units look a bit crude because of the black Dymo® tape labels. Grey Dymo tape would provide a much nicer appearance. White press-on decals might be an even better choice for the control labels.

Adhesive-backed plastic feet are affixed to the bottom of the boxes to prevent excessive movement of the bridges and to avoid scratching the surfaces of desks or tables on which they rest. Screw-on feet may be substituted.

Either of the bridges can be made

smaller, should that be your pleasure. I allowed substantial wasted space in order to keep the units in a size class that would not be awkward to work with (the "tail that wagged the dog" problem).

I hope you have fun with one or both of these weekend projects. You should enjoy building these bridges, and they will not endanger your project fund significantly!

#### Notes

<sup>1</sup>State Street Sales, KA1BUQ, PO Box 249, Luther, MI 49656.

<sup>2</sup>D. DeMaw, "A Beginner's Look at RF Power Measurement," *QST*, Aug 1983, p 35.

<sup>3</sup>Most edgewise imported audio or S meters have microampere movements. Meters used in the instruments described here are available from the supplier in note 1.

<sup>4</sup>Piston trimmers suitable for this project are listed in the BCD Electro catalog, PO Box 830119, Richardson, TX 75083-0119.

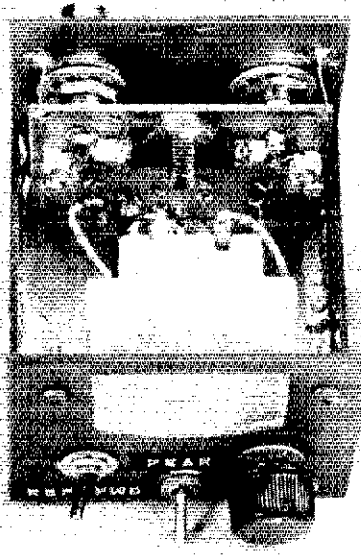


Fig 6—Interior view of the QRO SWR bridge. The PC board is attached to the solder terminals of the BNC jacks. The bottom edge of the PC board is soldered to the chassis at the center. Short wires (upper right and left of PC board) ground the board to the rear panel of the box. C1 and C2 are on the etched-foil side of the board to permit easy access during bridge adjustment (nulling).

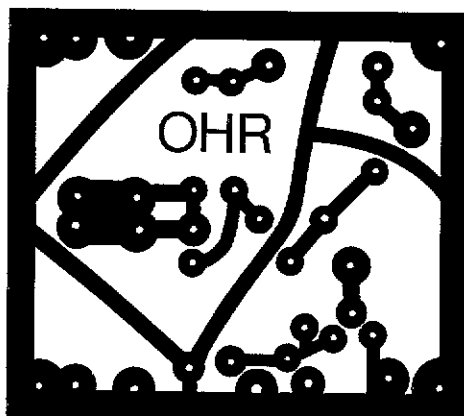
mode and observe the meter reading. If it is not zero, adjust C2 for a zero reading. Next, reverse the cables at J1 and J2 and apply RF power. Set C1 for an MI reading of zero with S1 set in the FWD position. Repeat this procedure one more time. C1 and C2 may be any small trimmer of quality, such as miniature air variable or glass piston trimmers.<sup>4</sup> The *minimum* capacitance of the trimmer must be 1 pF or less in order to null the bridge. An

## Strays

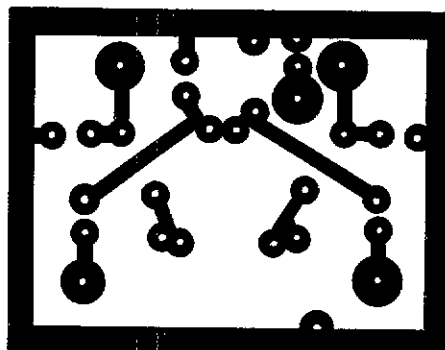
### CALL FOR ARTICLES

□ Artificial intelligence. *Webster's* says it is the "... capability of a machine to imitate intelligent human behavior." What other than computers can do this best? These machines are programmed to calculate a recurring problem—almost equivalent to a calculating human brain.

Are you involved with computers and artificial intelligence as it relates to Amateur Radio? Let us and other readers know through the pages of *QST* what your system consists of and how it performs. Send your information to Paul K. Pagel, N1FB, Senior Assistant Technical Editor, ARRL, 225 Main St, Newington, CT 06111.



(A)



(B)

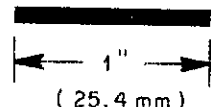


Fig 7—Circuit-board etching patterns for the QRP (A) and QRO (B) SWR/power meters. The patterns are shown full-size from the foil side of the board. Black areas represent unetched copper foil.

# ALC for Class AB<sub>1</sub> Amplifiers

This self-adjusting ALC circuit allows your amplifier to produce maximum power—without splatter!

By Mark Mandelkern, KN5S

Mathematics Dept. New Mexico State University  
Las Cruces, NM 88003

Although class-B cathode-driven triode amplifiers have achieved popularity, don't relegate the class AB<sub>1</sub> grid-driven tetrode to the attic with the old spark transmitters! True, tetrode circuits involve a bit of extra work (the inclusion of bias and screen supplies), but tetrodes in AB<sub>1</sub> amplifier service offer a number of important advantages: (1) Low drive requirements; this is especially advantageous for VHF operation. (2) The use of a loaded, untuned input circuit; this provides stability and precludes the need for neutralization. The untuned input is especially useful in a general-coverage amplifier. With the addition of the WARC bands, it is troublesome to provide switching for multiple-band input circuits. The untuned input may more than compensate for the need for bias and screen supplies. (3) No fluctuating load on the driver; this promotes linearity. (4) No filament choke is needed. Again, this helps compensate for the bias and screen supply requirements.

Chapter 31 of *The 1986 ARRL Handbook* and Chapter 22 of the *Radio Handbook* have excellent examples of high-power amplifiers using tetrodes.<sup>1,2</sup> Detailed information on operating conditions is found in Robert Sutherland's book.<sup>3</sup> Most published designs, however, include no provision for ALC. Even more important than getting the maximum possible power from an amplifier is the obligation to produce a clean signal; that is, one that won't disturb other operators on the band. To obtain both of these objectives, it is essential to use ALC. There is absolutely no other way to get every syllable right up to peak output power without flat-topping.

Many ALC circuits in use involve critical balance or level controls that can be quite impractical to use, especially for contesting and quick band changing. A main feature of the circuit described here is the absence of any such adjustments; it is completely self-adjusting, reacting only to actual grid current and automatically adapting to changing conditions. The circuit can be built into a homemade amplifier or easily added to a commercial exciter or amplifier.

This circuit is used in all of my homemade tetrode amplifiers. One of these, tuning continuously from 1.8 to 54 MHz, uses a 4CX1000A with a 50-ohm passive-grid input circuit. The amplifier is absolutely stable and requires only 30 watts of drive; the original exciter tubes have survived 15 years of use and still show no signs of fatigue. A pair of 6146s drive the 4CX1000A at 50 MHz, but have their own ALC for "barefoot" operation. Another amplifier, using a pair of 4-400As in push-pull at 144 MHz, uses screen neutralization and does not present a fluctuating load to the driver.

Many older commercial amplifiers use audio-derived ALC; one example is the Collins 30S-1. In this amplifier, an audio transformer primary is placed in the tube's

grid lead; current fluctuations during SSB operation produce a secondary voltage that is rectified to produce an ALC voltage. This method works well enough, but provides no ALC during tune-up or CW operation.

The circuit described here operates solely on the dc currents in the grid circuit; thus, it works in all modes. This is especially useful for tune-up and when used with tubes having sensitive grids; it prevents damage to the tube under all conditions. In the 4CX1000A amplifier mentioned earlier, a 1-mA meter relay is used to protect the grid, but in the 15 years of operation with the ALC circuit described here, the meter has never gone past the 0.1-mA mark. The ALC circuit alleviates the need for other means of protection. To protect the screen grid also, the screen protection part of the

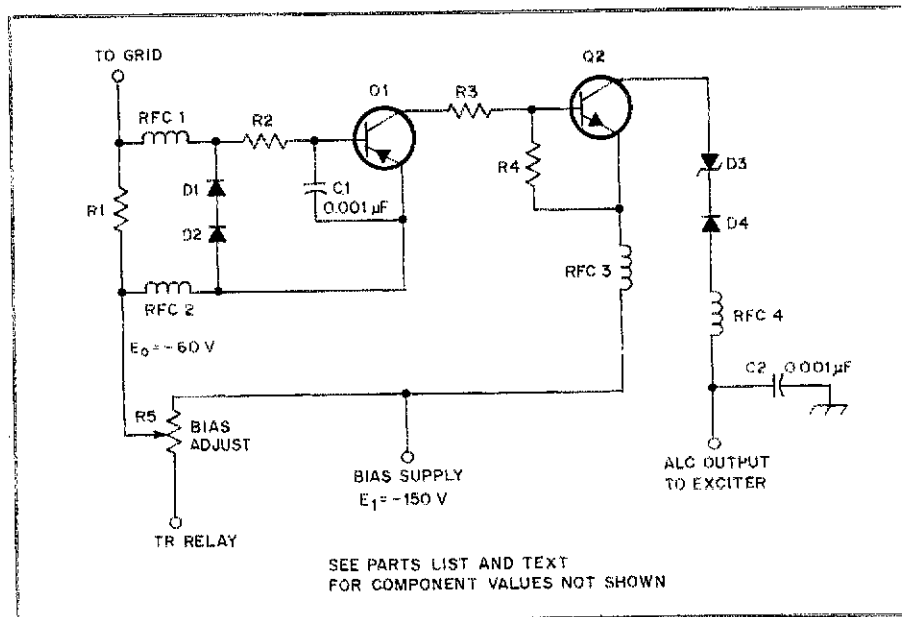


Fig 1—Amplifier ALC circuit. Values shown are typical for a 4CX1000A. For use with other tubes, only R3 and D3 and the voltage ratings of the transistors need be changed; see text.

D1, D2, D4—1N4007.  
D3—130-V, ½-W Zener diode; see text.  
R1—4.7 kΩ.  
R2—470 Ω.  
R3—100 kΩ; see text.  
R4—10 kΩ.  
R5—Existing bias control.

RFC1-4—1-mH RF choke for HF. Use lower values for a VHF amplifier.  
Q1—MPS-A92 or any PNP transistor with a 200-V or higher rating; see text.  
Q2—MPS-A42 or any NPN transistor with a 200-V or higher rating; see text.

<sup>1</sup>Notes appear on page 47.



system described in reference 4 can be used. For triode amplifier ALC circuits, see reference 5.

### Circuit Description

This circuit can be universally applied. Circuit variations depend only on the bias voltages used, not on the tube type. The circuit for bias-voltage levels such as those used with the 4CX1000A is shown in Fig 1. Grid current is sampled by R1, which acts somewhat like a meter shunt; the voltage developed across R1 turns on Q1. Approximately 0.1 mA of grid current is required to develop the 0.6 V needed to forward bias the base-emitter junction. With Q1 on, the operating bias voltage,  $E_0$ , appears at the collector of Q1. The voltage at the emitter of Q2 is derived from a more negative point,  $E_1$ . The difference between  $E_1$  and  $E_0$  appears across R3, and the resulting current turns on Q2.  $E_1$  then appears at the collector of Q2. The Zener diode, D3, in the output line reduces this voltage to a level that is comfortable for the exciter. The transistor types used for Q1 and Q2 are not critical. Q1 and Q2 are silicon PNP and NPN types, respectively, with voltage ratings above the level of the highest voltage in the circuit.

For class-C operation (with suitable tubes only), the ALC line is switched off and the amplifier is driven into high grid current. In this situation, protective diodes D1 and D2 in the input circuit limit the voltage drop across R1, and R2 then limits the Q1 base current. Isolating diode D4 in the output circuit ensures that there is no possibility of the amplifier ALC circuit loading the exciter circuits during barefoot operation. D4 also prevents any possible interaction between the different amplifier ALC circuits in my station, all of which are connected in parallel to the exciter ALC jack.

The voltage ( $E_0$ ) appearing at the collector of Q1 when it is turned on cannot be used directly for ALC. This is because without the higher negative voltage,  $E_1$ , to reverse bias the base-collector junction,  $E_0$  will appear at the collector at all times, even without grid current.

### Circuit Analysis

The important circuit components are R1 and R3. The value of R1 is not too critical; it is chosen as a compromise between the requirements of limiting the grid current to a low level and not introducing excessive resistance into the grid circuit. A value of 4.7 k $\Omega$  satisfies these requirements. I tried lower values of resistance at R1 for several years in one of my amplifiers, using a panel-mounted variable resistor to set the ALC level. No output power or distortion differences were noted using values of resistance between 500  $\Omega$  to 5 k $\Omega$ , corresponding to a grid-current range of from 0.1 mA to 1 mA. No deterioration of amplifier operation has resulted from the insertion of 4.7 k $\Omega$  in the grid lead.

The value of R3 plays a more important

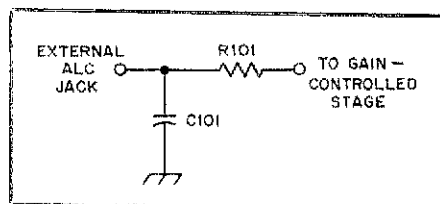


Fig 2—A typical exciter ALC input circuit.

role than may at first be apparent. An ALC circuit must act quickly at the first cycle of the first syllable of the voice signal to properly control the drive level. A typical exciter ALC input circuit is shown in Fig 2. We can insert no appreciable resistance in the collector of Q2 as this would cause a time delay in charging C101 in the exciter. On the other hand, we must prevent creating collector currents beyond the rating of Q2 while charging C101, or when the ALC cable is accidentally shorted (an uncharged C101 acts like a short). This is the role of R3; it is chosen to produce a 1-mA base current in Q2. This limits the collector current to a safe value with any typical transistor that might be used and still provides fast charging of C101 and a consequential quick ALC attack time. For example, if Q2 has a gain of between 20 and 100, the collector-current limit will be between 20 mA and 100 mA.

### Circuit Variations

The only circuit changes required for use with various amplifiers are the value of R3, the voltage ratings of the transistors and the output Zener diode ratings. D3 has a voltage rating of approximately 20 V less than  $E_1$ ; this allows a maximum of 20 V to reach the exciter. The value of R3, measured in kilohms, is numerically equal to the difference between the standby and operating biases,  $E_1$  and  $E_0$ , respectively. The exact value of R3 need only be approximate. Thus, a 4-400A amplifier with a 300-V standby bias and 150-V operating bias would use a 150-k $\Omega$  resistor at R3 and an output Zener diode (D3) rated at about 280 V. (Whatever Zener diodes you have in your junk box can be used to make up a series arrangement at roughly the desired voltage.) If screen-voltage switching is used for standby, the available bias supply voltage is used for Q2; this was called "standby bias" earlier for easy reference; any available voltage more negative than the operating bias will suffice. For example, an 8122 amplifier with screen standby control, and a constant 20-V operating bias, uses the 60-V bias supply at the emitter of Q3, a 39-k $\Omega$  resistor at R3 and a 39-V Zener for D3.

The output Zener has a value that is more psychological than electronic. One of my amplifiers worked for 10 years with no Zener without a bit of trouble—except an occasional worry. In fact, there is almost no way for the full bias supply voltage  $E_1$

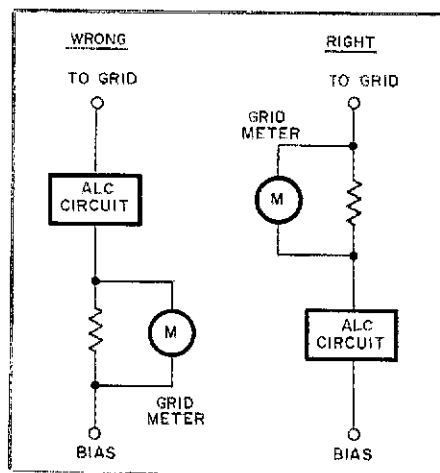


Fig 3—ALC circuit installation. See text.

to appear at the exciter. As soon as the ALC voltage rises far enough to limit the exciter gain so as to reduce the amplifier drive to the grid-current threshold level, the current in Q1, and the base current in Q2, are reduced so that Q2 will provide all the voltage drop required. However, D3 does provide protection for the exciter in the event of a short in Q2. Also, D3 reduces the dissipation in Q2. Since the circuit has been used only with an exciter whose ALC circuit requires less than 0.1 mA, the dissipation in Q2 has not been a problem. Usually R101 is fairly large; hence, there should be no dissipation problems. But if an exciter requires a significant amount of current, the dissipation in Q2 must be calculated.

It is easy to test the exciter by applying the required negative ALC voltage at the exciter ALC jack with a test supply and measuring the current required to swing the ALC meter. The required power rating for D3 can then be calculated. If a transistor with a higher dissipation rating is required for Q2, try an MPS-U10. At slightly higher cost, the high-quality 2N5416 and 2N3439 can be used for Q1 and Q2, respectively.

Although I haven't tried it, this circuit can be used for class-AB<sub>2</sub> operation. To obtain a higher grid-current threshold, simply decrease the value of R1.

### Installation

If the ALC circuit is installed in the wrong part of the amplifier grid circuit, the emitter-base current of Q2, supplied by  $E_1$  and returned through Q1 to the operating bias point at level  $E_0$ , will appear on the grid-current meter. To avoid this, the grid-meter shunt should be between the ALC circuit and the grid, as shown in Fig 3.

When the ALC circuit is installed in an existing amplifier, a handy retrofit method is to build the circuit on a small plug-in circuit board. In this case, it is best to per-

(continued on page 47)

## Spider™ HF Mobile Antenna

Of the several HF mobile antennas on the market, most of them operate on a similar principle. A 4- to 5-foot-long mast attaches to the mounting point, and then some sort of loading coil or resonator goes on top of the mast, with an adjustable-length whip above the loading coil. Different loading coils, or resonators, allow operation on the various bands. Several resonators can be mounted on the mast, eliminating the need to stop the car and jump out to change bands. Many of the commercial mobile antennas come with a multiband adapter.

So what is different about the Spider antenna? This antenna uses a unique type of loading coil, or resonator. Tuning within a band is accomplished by sliding a plastic-coated tuning sleeve along the side of the resonator. There are no electrical connections between the tuning sleeve and the coil. A logging scale is provided on each resonator to index the position of the tuning sleeve. With a simple chart of resonant frequency as a function of logging scale, the antenna can be adjusted to resonance at any frequency within the band. There is no whip above the resonator.

The antenna is supplied with resonators for 40, 20, 15 and 10 meters. The optional 80/75-meter resonator was included with the review antenna. If you already have a 1/2-inch mobile antenna mast, then you may need only the Spider adapter that permits installation of the Spider resonators at the top of your mast.

### Mounting the Antenna

The instructions provide little information about mounting the Spider antenna on a vehicle. I have a van and did not want to use the conventional bumper-mounting method. I was intrigued by the picture in the Spider ads that show it mounted on the front cowl of a van. I have some fairly strong opinions about how a mobile antenna should be mounted. Some of those opinions come from personal experience with mobile antennas, and some come from my knowledge of mechanical construction and antenna principles. Certainly, there are people who do not agree with me or who would not want to follow my suggestions.

A few years ago, I picked up a second-hand mobile antenna for a few dollars at a hamfest. I attached the mast to a bumper mount on my station wagon and soon learned the joys of HF mobile hamming. After about a month, to my dismay, the antenna mast would no longer stay on my car! It seems that the swaying action of the antenna as I drove along had torn the threads out of the bottom of the mast. The antenna was useless. I learned the hard way about using a heavy-duty spring at the base of the mast so as to allow it to sway and not damage the mounting threads.

People have told me that it is not necessary to use a spring at the base of the mast. One person even went so far as to explain how he

visited his friendly, local machine shop when the threads tore out of the bottom of his antenna mast. The machinist was able to enlarge the hole, tap new threads and then install an adapter for the standard 3/8-24 mounting stud. Every few months he would go back to the machinist to have a new adapter installed. Like I said, use a heavy-duty spring at the base of the mast! If you don't think having the antenna sway will damage the mast, just wait until you hit a low-hanging tree branch at 30 mi/h or so!

Of course, the spring will bend as you drive down the highway. In fact, the antenna can bend over quite far, and become a rather serious hazard. The simplest solution is to attach one or two nylon or twine guys near the top of the antenna, and then tie the guy lines to some point on the car to prevent the antenna from bending too far backwards or to the sides as you drive. A roof rack or rain-gutter clips make good attachment points for fastening the guys to the car.

Back to the problem of mounting the Spider on my van. While the instructions made no mention of using a spring and the ad picture does not show one, I wanted to use a spring. By mounting the antenna on the cowl, I couldn't attach guy lines to keep the antenna from bending down along the side of the van. Ideally, a mobile antenna should be mounted in the center of the roof, but I sure didn't want to add 6 1/2 feet to the height of my van! You probably don't want to add that much height to your car, either! The trunk lid or rear bumper are good places to mount a mobile antenna on a car, but not so good on a van. I finally settled on a spot near the top of the rear side panel, and installed a ball mount for the antenna. In this location, I can guy the antenna to the front roof rack to keep it from bending back and

to the far side of the rear roof rack to keep it from swinging over onto the sidewalk or slower traffic lane. By pulling on the front guy, I am able to fold the antenna forward to lay along the roof if there is a low overhead clearance.

For mounting the Spider on a car, a standard bumper mount should work fine. If you mount it on a full-size station wagon, consider putting the antenna near the top of one side panel, or perhaps even on the roof.

In either case, you should have less of a problem determining a suitable mounting location than I did.

If you live in a location where you cannot erect some other type of antenna, the Spider antenna can be used in an apartment or fastened to the metal railing on a patio or porch. With a few radials to form a ground plane, the Spider should serve well as your main station antenna. The instructions that come with the antenna give some details on this type of installation.

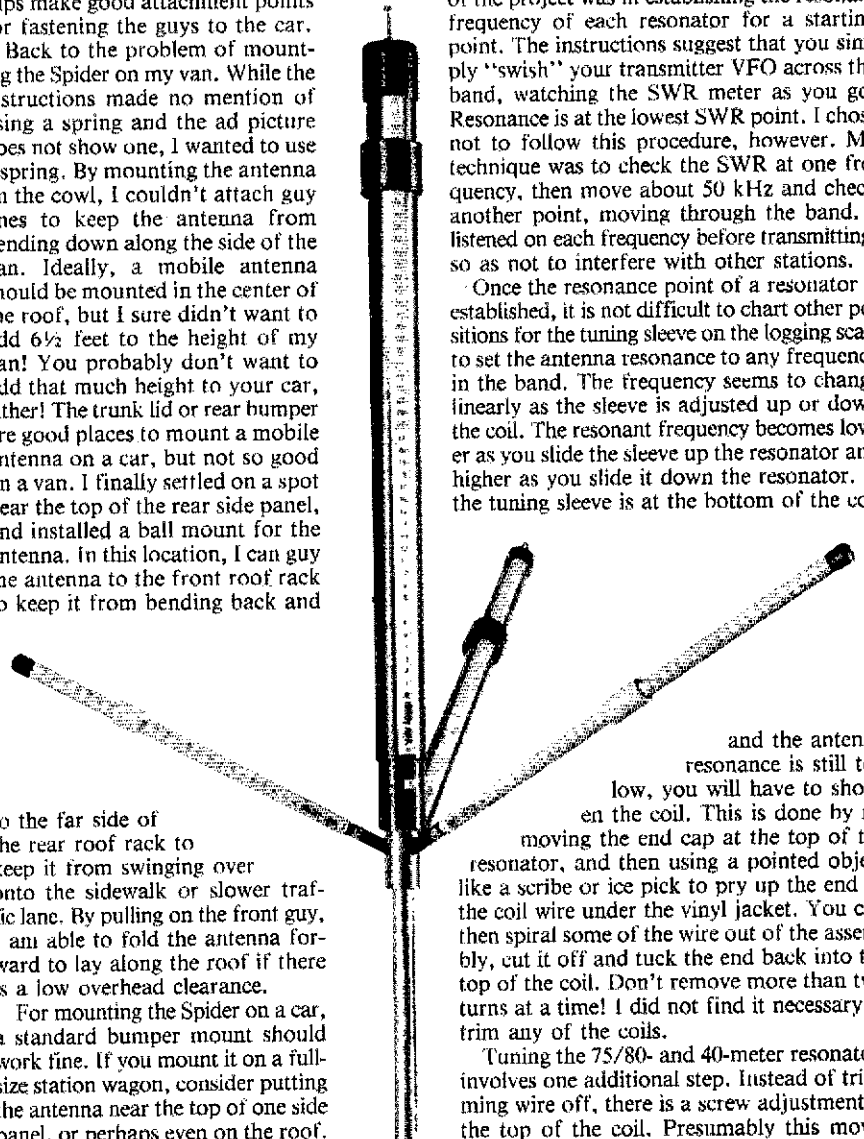
### Tuning the Antenna

I spent about an hour and a half making up tuning charts for the various bands. The procedure is rather simple, although it is time consuming if you have to get in the car, adjust the transmitter, read the SWR, then get out and move the tuning sleeve on the resonator. Most of the time I spent on this part of the project was in establishing the resonant frequency of each resonator for a starting point. The instructions suggest that you simply "swish" your transmitter VFO across the band, watching the SWR meter as you go. Resonance is at the lowest SWR point. I chose not to follow this procedure, however. My technique was to check the SWR at one frequency, then move about 50 kHz and check another point, moving through the band. I listened on each frequency before transmitting, so as not to interfere with other stations.

Once the resonance point of a resonator is established, it is not difficult to chart other positions for the tuning sleeve on the logging scale to set the antenna resonance to any frequency in the band. The frequency seems to change linearly as the sleeve is adjusted up or down the coil. The resonant frequency becomes lower as you slide the sleeve up the resonator and higher as you slide it down the resonator. If the tuning sleeve is at the bottom of the coil

and the antenna resonance is still too low, you will have to shorten the coil. This is done by removing the end cap at the top of the resonator, and then using a pointed object like a scribe or ice pick to pry up the end of the coil wire under the vinyl jacket. You can then spiral some of the wire out of the assembly, cut it off and tuck the end back into the top of the coil. Don't remove more than two turns at a time! I did not find it necessary to trim any of the coils.

Tuning the 75/80- and 40-meter resonators involves one additional step. Instead of trimming wire off, there is a screw adjustment in the top of the coil. Presumably this moves



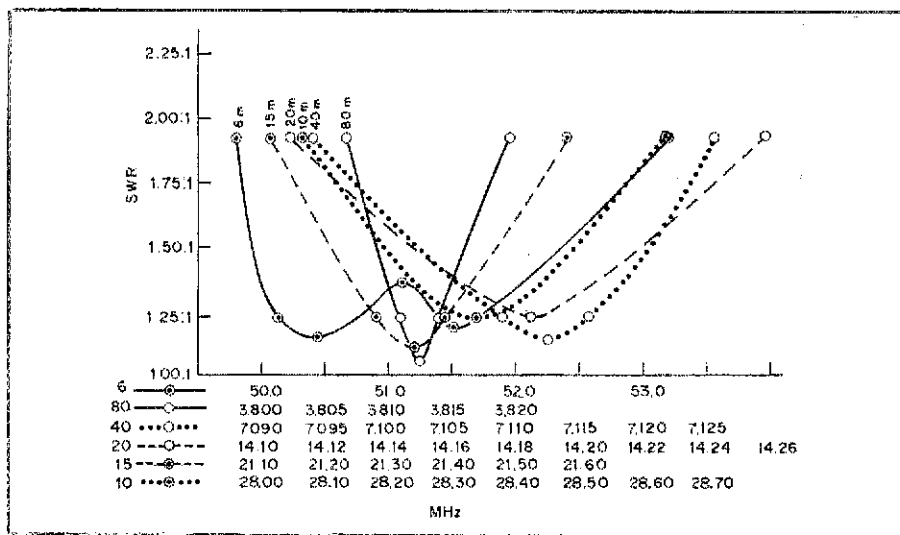


Fig 1—Plot of 80- through 6-meter SWR values calculated from return-loss measurements for the Spider antenna.

some type of core material into or out of the coil. To tune these, you start with the tuning sleeve at the bottom of the coil and your transmitter set near the high-frequency end of the band. The screw adjustment is used to set the high-end antenna resonance, and then moving the tuning sleeve up the coil will lower the resonant frequency.

#### Operation

The basic operating principle of the Spider is not difficult to understand. The mast is like any mobile antenna, and the resonators take the place of the loading coil and the remaining portion of the whip. But how do those tuning sleeves, that appear to be nothing more than plastic-covered toroids, work? As the sleeve slides along the tuning coil, it effectively isolates the part of the coil above the sleeve from the rest of the antenna. The lower the sleeve on the coil, the shorter the effective length of the antenna and the higher the resonant frequency.

The idea of having more than one resonator on the antenna at the same time is based on the principle that the RF will be transmitted by the resonant antenna and be rejected by the nonresonant ones. There is always the possibility that a multiband antenna will radiate harmonics of the desired signal, if harmonics are present in the signal that is supplied from the transmitter. Modern commercial equipment is filtered well enough that this should not be a problem. If you are using a piece of homemade equipment, however, you should be certain that all harmonics are adequately filtered out of the transmitted signal.

#### Construction

The Spider mast is made of solid 5/8-inch-diameter aluminum. At the top of the mast is a 1-inch-diameter section of aluminum with three resonator-mounting holes positioned 120° apart. The hole for a fourth resonator is in the top of this adapter. The bottom of the mast is also a 1-inch-diameter section of aluminum with a standard 3/8-24 mounting stud. This bottom section has three setscrews to hold the mast in position. By loosening these screws, you can rotate the mast to position the resonators after the mast is attached to your vehicle.

The 80-meter resonator outside diameter is just under 2½ inches, the 40-meter resonator is slightly less than 1 inch, and the 20, 15 and 10-meter resonators are each just under ½ inch. The higher-frequency resonators use thin-walled fiberglass tubing. The top of the fiberglass tubing is open, with an end cap to seal out moisture. The low-frequency resonators seem to be made from an acrylic tubing with both ends of the tubing plugged with pieces of plastic for strength and to help seal out the weather. The mounting stud is sealed into the fiberglass. The resonator form is covered with a tightly wound coil of approximately no. 18 copper wire. The entire assembly is covered with a heavy-duty plastic similar to heat-shrink tubing. A clear plastic coating covers the logging scale.

As I learned the first day I had the antenna on my van, the coil wire is attached to the mounting stud by running it through a hole drilled in the stud and soldering them together. While this makes an excellent electrical connection and simplifies construction, it may also weaken the mounting stud. When I stopped at a stop sign, the motion of my van caused the antenna to swing forward. To the best of my knowledge, the antenna did not hit anything, yet the 40-meter resonator snapped off at the base, right at the hole for the wire. (That's how I discovered the method of attaching the wire!) I had no problems with a replacement resonator, and have driven many miles with the antenna on my van.

Later, I also learned that the coil wire is passed through a hole in the fiberglass on the smaller resonators. I had the antenna folded down along the roof of the van with the 20-meter resonator straight up in the air. There is a possibility that I may have hit a low-hanging tree branch, but I am not positive. At any rate, I noticed that the 20-meter resonator was bent toward the back of the van. Further investigation revealed that the fiberglass had cracked, right at the hole that the wire passes through.

#### Operating Impressions

After spending the time to make some tuning graphs so that I could set the antenna resonators for operation at almost any desired frequency, it was a pleasure to use this antenna for mobile operation. While the antenna band-

width is rather narrow on 80 and 40 meters, I could cover a sizeable piece of the higher-frequency bands without retuning the antenna.

Anyone who has ever tried HF mobile operation knows the joy of driving along the highway and chatting with a fellow ham hundreds, or thousands of miles away! The miles pass all too quickly when you get into a good rag-chew with a ham on the other side of the country. I had many enjoyable QSOs with stations in California, Texas and Midwestern states using the Spider. During one trip to Pennsylvania, I checked into the East Coast Amateur Radio Service (ECARS), chatted with the net control station and listened to other check-ins. When I asked for signal reports, a number of stations responded. While no one told me I had the loudest signal on the band, they could hear me with little or no difficulty.

To make the SWR plots shown in Fig 1, I used the spectrum analyzer from the ARRL Lab to make return-loss measurements. The tracking generator produces a signal that sweeps a wide range of frequencies, and a directional coupler is used to pick up the signals that are reflected from the antenna for the spectrum analyzer input. In this way, you can see a display of the antenna response to a range of frequencies and easily determine both the resonant frequency and the impedance match of the antenna.

If the signal returned to the analyzer is 10 dB or more below the tracking generator output, the SWR is 2:1 or better. If the returned signal is 20 dB less than the generator output, the SWR is 1.2:1 or better. By recording the return loss for a range of frequencies in each band, I produced the SWR curves shown. These curves are only for one setting of the tuning sleeve in each band, and so they give an idea of the possible frequency range.

Using this test setup, I discovered an interesting antenna resonance in the 6-meter band. I made no effort to tune the 6-meter response, and it is possible that it occurred because of something in my installation. I decided to include the curve with the other information of Fig 1 because it might be worth further investigation for someone interested in 6-meter mobile operation.

The Spider antenna is rated for use with transmitters of up to 200-W output. My Heath HW-5400 is rated for half that, and I made no attempt to put the rated power into the antenna. The antenna is not designed for operation at 1500 W, so don't plan to use it with an amplifier.

I had some problems with the antenna, but most of those were related to the vehicle I used, and the fact that I mounted it near the top of my van so the top of the antenna was at least 11 feet above the ground. If you mount the antenna on the bumper, or even the trunk lid of a car, you should not have those problems. If you are looking for a mobile antenna that is designed to operate on any one of up to four bands while you drive down the highway, consider the Spider antenna. If you need a simple, easy-to-mount antenna for apartment or other "base" operation, then this may be the antenna for you, too.

The Spider antenna is available only from Multi-Band Antennas, 7131 Owensmouth Ave, Suite 363C, Canoga Park, CA 91303, tel 818-341-5460. Price class: Antenna mast with 40, 20, 15 and 10-meter resonators, \$140; 80-meter resonator, \$38; adapter with 40-through 10-meter resonators for use with your existing mast, \$83.—Larry D. Wolfgang, WA3VIL

# New Products

## PRINTED STRIPBOARDS FROM DICK SMITH ELECTRONICS

□ An assortment of sizes and configurations of printed stripboards is available from Dick Smith Electronics. Patterned after the popular English Veroboard, these versatile prototype and experimenter's boards provide etched copper strips predrilled on 0.1-in centers to allow mounting of ICs, DIP packages and discrete components. Copper strips are pretinned to facilitate easy soldering. When you wish to terminate a circuit, just cut the strip with a hobby knife or the special spot-face cutter available from DSE. Shown (l-r) are four sizes of stripboard, and at top center, the H-5606 design breadboard.

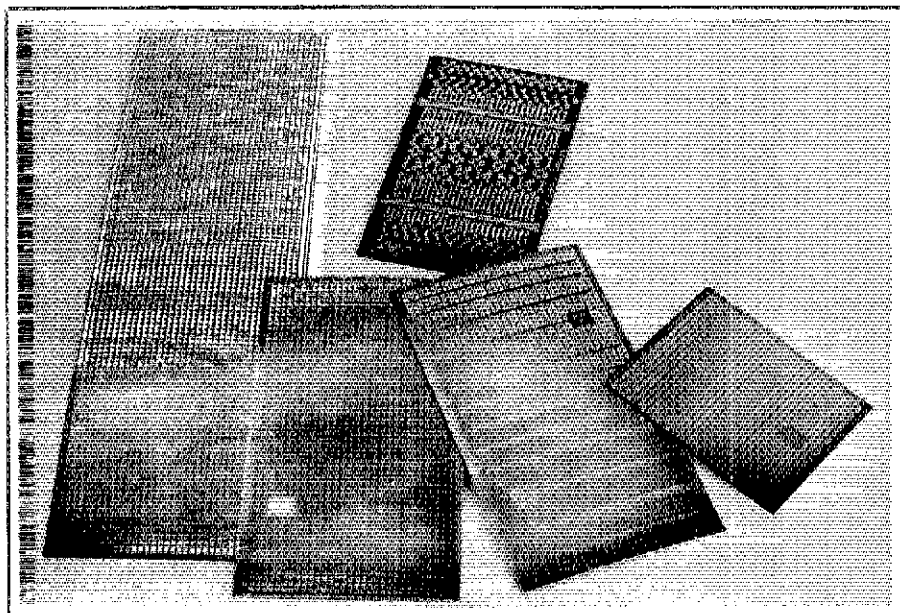
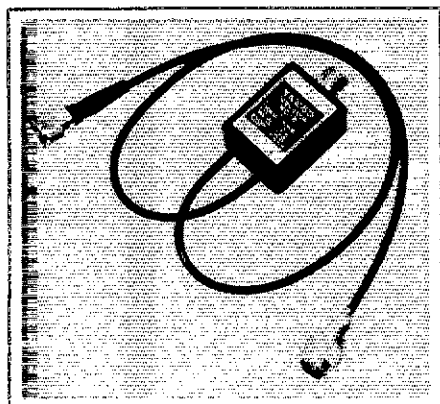
### Catalog

No.	Size	Price
H-5112	3 3/4 × 12 in	\$2.95
H-5612	3 × 6 in	\$1.50
H-5616	3 × 6 in	\$2.00
H-5614	3 × 3 in	\$1.00
H-5606	3 × 5 in	\$1.50

Available from Dick Smith Electronics, Inc., PO Box 8021, Redwood City, CA 94063, tel 415-368-8844. Send \$1 postage for the DSE catalog. The DSE catalog is unique in that there are 15 pages filled with hard-to-get information on pin connections for ICs, Zener-diode data, circuit ideas, transistor interchangeability data, and much more.—Bruce O. Williams, WA6IVC

## YAESU AD-2 DUPLEXER FOR THE FT-2700RH DUAL-BAND TRANSCEIVER AND FT-726R VHF/UHF ALL-MODE TRANSCEIVER

□ Yaesu Electronics has announced the new AD-2 Duplexer to provide semi- or full-duplex VHF/UHF crossband operation with a single 2-m/70-cm dual-band antenna. The single antenna may serve for



both transmitting on one band and receiving on the other band simultaneously. Band-to-band isolation of more than 50 dB assures minimum receiver interference between bands. At high power, up to 50 W, there is minimal insertion loss of either transmit power or receive sensitivity.

### Specifications

Passbands: 140-150 MHz and 400-500 MHz.

Maximum power: 50 W.

Insertion loss: VHF less than 0.3 dB,

UHF less than 0.5 dB.

Impedance: 50 ohms.

SWR: Less than 1.2:1.

Receive isolation: 50 dB.

For additional information contact your local Yaesu dealer or Yaesu Electronics Corp., PO Box 49, Paramount, CA 90723, tel 213-633-4007.—Bruce O. Williams, WA6IVC

## CURTIS 8044ABM KEYSER CHIP

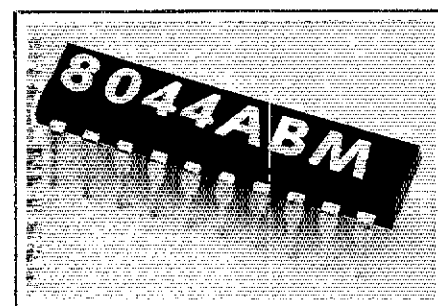
□ An enhancement of the popular 8044 keyer-on-a-chip has been introduced by Curtis Electro Devices. Called the 8044ABM, the CMOS device combines the functions of the 8044, 8044B, 8044M and 8044BM into one IC along with a new capability termed "negative weighting." Common keyer weighting circuits only add weight to dots and dashes by making them longer at the expense of spacing. By your switching a control on the 8044ABM, the weight control will either add or subtract from the code-element length. Negative weighting is useful in situations where the

transmitter is adding unwanted weight that must be cancelled.

The new IC also has a control line to switch the iambic keying action between the "B" method used in some keyers and the usual Curtis "A" method. (The B method adds an opposite element when a squeeze-keyer paddle is released during the generation of a code element; the original Curtis method adds nothing.)

Although *not pin compatible* with earlier Curtis IC versions, the 8044ABM retains all other properties of the 8044 series, including dot and dash memories, key debouncing, self-completing code elements, an instant-starting clock, a built-in sidetone oscillator, an analog speed indicator and extremely low power drain. Normally, the IC is operated from a 5- or 9-V dc source.

The 8044ABM is supplied in a 20-pin DIP plastic package and is priced at \$19.95. For further information, call or write to Curtis Electro Devices, Inc., Box 4090, Mountain View, CA 94040, tel 415-964-3846.—Paul K. Pagel, N1FB



The publishers of QST assume no responsibility for statements made herein by correspondents.

## dB OR NOT dB

In "Gaining on the Decibel," Paul Shuch makes some very good points about the use of the decibel.<sup>1</sup> The article points out the pitfalls involved with carelessly using decibel relationships with power and (particularly) voltage. These points were also made by Michael Gruchalla.<sup>2</sup> While I basically agree with the technical content of both articles, let me supply a different perspective that defines the use of the decibel as it relates to voltages.

Shuch condemns the use of decibels with voltage ratios because of the possible misinterpretation of the results, especially when power ratios in decibels are mixed with voltage and current ratios in decibels. He correctly points out that the equation

$$\text{dB} = 20 \log (V_2/V_1) \quad (\text{Eq 1})$$

is, strictly speaking, only valid when the two impedances associated with the two voltages are equal. There are many electronic systems that have equal input and output impedances, and (as stated in the article) the use of the standard decibel equation for voltage is valid in those instances.

On the other hand, there are many electronic systems that do not have a constant impedance ( $Z_0$ ), but can still be correctly analyzed using voltage gain in decibels. In particular, operational amplifier circuits and active filters come to mind. These circuits usually have large input impedances and near-zero output impedances. Voltage gain is the primary consideration in their design, not power gain. The use of Bode plots (voltage gain in decibels v logarithmic frequency) is a well-established, powerful tool for analyzing this type of circuit.<sup>3</sup> As long as one works only in terms of voltage gain, the results will be consistent and valid.

Yes, care must be taken when working with numbers expressed in decibel form, particularly when both power and voltage are involved, but that does not totally exclude expressing voltage gain in decibels. The advantages of expressing voltage gain in decibels often far outweigh the disadvantages.—Robert A. Witte, KB0CY, 2217 114th Dr NE, Lake Stevens, WA 98258

## PTFE IN RF CIRCUITS

Often we see references to Teflon® in construction articles. Not only is Teflon a

registered trademark of the DuPont Co, but Teflon refers to an entire product line of fluoropolymers. When we refer to Teflon, we are usually talking about PTFE (Polytetrafluoroethylene). This is the white, waxy appearing plastic usually seen in electronic applications.

We should exercise caution when using PTFE in RF circuits. Although PTFE has some electrical and mechanical properties that make it ideal for the builder, it has some properties that can cause problems.

I recommend caution when using PTFE in frequency determining circuits, especially at higher frequencies in equipment subject to temperature changes. PTFE has a coefficient of thermal expansion of approximately  $6 \times 10^{-6}$  in/in/deg F. This amounts to a 1% change in dimensions for every 100° F change in temperature. In addition, PTFE undergoes a change in molecular configuration in the range of 55-77° F with an abrupt change of about 1.5% in dimensions. Not too much of a problem at HF, but this could cause real difficulties at VHF.

PTFE also leaves something to be desired in its mechanical properties. It is a "soft" plastic and exhibits flow under stress. You may find your PTFE bolt has sheared under tension or your standoff insulator has parted from its mountings. Don't plan on using PTFE as an antenna insulator as the wire will cut right through when under tension.

PTFE has remarkable dielectric strength. The published data shows an average of 600 V/mil. Be cautious! Thin films (0.001 to 0.020 in) can contain micro voids that radically change the insulating properties. Don't depend on very thin layers of PTFE for insulation at high voltages.—Adam J. Patarcity, KD2HZ, 1931 Turk Hill Rd, Fairport, NY 14450

## COAXIAL SWITCHES AND LIGHTNING PROTECTION

I wish to bring to your attention the misleading—if not outright dangerous—information presented in the March 1986 QST New Products announcement for the MFJ Enterprises Two-position Coaxial Switch, p 45. Announcements such as this need to be looked at more closely in the future as they can create a dangerous and unfounded sense of security.

The implication given is that this switch is a lightning protector. Not only is it not a lightning protector, it can create a direct path for lightning through your ham gear into the house electrical wiring. I personally know of people who had lightning enter their house through the coaxial cable lead-in from a grounded tower/antenna. In such a system, this switch would shunt the current to the rig.

A grounding coaxial switch is not a substitute for disconnecting your antenna from the rig. Any time there is the slightest chance of a storm, disconnect the antenna, ground and power leads. Don't just turn the coaxial switch.

How is that coaxial switch grounded? In the models I have tested, the center conductor of the coax lead is connected to the shield of the coax and thus back through your antenna to ground. At the same time, however, the shield of the coax running to your \$1000 rig is also connected to this grounded system. Should lightning or any RF/electrical surge on the antenna find the path to ground through your rig to either its ground or into the electrical system of your house, guess what is going to burn out—if not the whole house.

Therefore, do not use your coaxial switch as a lightning arrester. This is not what they are designed for. Do read up on what you are purchasing so you will know how it is designed to be used. Do keep your rig disconnected from the antenna system when not using it. It is also a good idea for all of us to periodically check our antenna ground system and its connections.—David Jones, N4JED, 504 North Broad St, Salem, VA 24153

## BOLTS FROM THE BLUE

Amateurs interested in obtaining some detailed information on the characteristics of lightning, proper grounding techniques and materials to use for lightning protection should consider obtaining the publication, *Lightning Protection Guide for Radio Communications*. This 19-page booklet was written by Roger R. Block, KD7UT, and is available from the Poly-Phaser Corporation, 1425 Industrial Way, PO Box 1237, Gardnerville, NV 89410. tel 702-782-2511. The price is \$4.95.—Paul K. Pagel, ARRL HQ

## Feedback

Please refer to "Real-Time HF WEFAX Maps on a Dot-Matrix Printer," QST, Mar 1986, p 19, Fig 3. Change the GET X statement in line 180 to: GET X\$.

Rodney B. Lewis, W0EO, points out an error in Fig 13A of "Diodes and How They are Used," Mar 1985 QST, p 38. A deblocking capacitor should be placed in the path between L1 and D1.

<sup>1</sup>H. P. Shuch, "Gaining on the Decibel—Part 1," QST, Feb 1986, p 20.

<sup>2</sup>M. Gruchalla, "Defining the Decibel," Ham Radio, Feb 1985, p 51.

<sup>3</sup>J. D. Irwin, *Basic Engineering Circuit Analysis* (New York: Macmillan, 1984), p 480.

## FINE TUNING FOR THE TS-830S

□ After owning a Kenwood TS-520 and TS-820S, I recently bought a TS-830S with 270-Hz (8.33-MHz IF) and 250-Hz (455-kHz IF) CW filters. After installing both filters, I looked forward to some real DX hunting in the crowded bands.

A little operating soon revealed that the tuning rate was too fast for the bandwidth of the filters. I discovered that Kenwood had increased the tuning rate of the '830 from that on earlier models. This made it almost impossible for me to tune in a CW station using the narrow filter.

To overcome this problem, I rigged a 3/8-inch-wide rubber band around the main tuning knob and a small pulley supported by the lower-right-hand dial-assembly screw. That arrangement slowed the tuning rate by a factor of four, but stretch in the rubber band gave too much backlash. The experiment did, however, point the way to the right solution (Fig 1).

I found a 96-tooth antibacklash split gear, with about the same diameter as the tuning knob, in my junk box. The gear was from the main tuning of a surplus ARC-5 receiver. A matching 26-tooth gear comes from the coupling-coil control in the output-inductance circuit of an ARC-5 transmitter. It even had a bearing and spring mount that eases installation.

A bracket made from two pieces of 1-inch aluminum angle and secured by the lower-right-hand dial-assembly mounting screw is a suitable mount and bearing support for the new knob. (I made a template out of paper so that I could secure proper clearances for the name plate and the raised parts of the dial-assembly casting.) The two pieces of angle are fastened together by two screws, as shown in the photo.

Next, I went to a nearby hardware store and got an M-4 × 16 mm metric Allen-head cap screw, similar to the original, but with enough additional length to engage the tapped threads in the dial casting. Note that the mounting hole in the aluminum angle is drilled near one edge; the correct mesh for the gears is achieved by rotating the aluminum bracket about the screw.

Carefully polish the bracket to remove any burrs or roughness, then cover the rear face of the aluminum assembly with adhesive tape to protect the painted surface of the radio.

Remove the plastic kilohertz scale, the associated tension spring and washers from behind the original '830 knob and carefully store them away.

After using my new vernier-gear arrangement successfully for a month, I mentioned it to Jim Aguirre, WB7DHC, who also has a Kenwood TS-830S; it was just what he needed. He found that even with the 500-Hz filters, it was very difficult to tune the receiver with the original dial.

Certainly, the Kenwood TS-830S has all the features anyone could desire for a truly deluxe amateur transceiver, but it is my hope that Kenwood will see the need for a better tuning rate (for CW work) on future designs. [It seems Kenwood has complied; the tuning rate

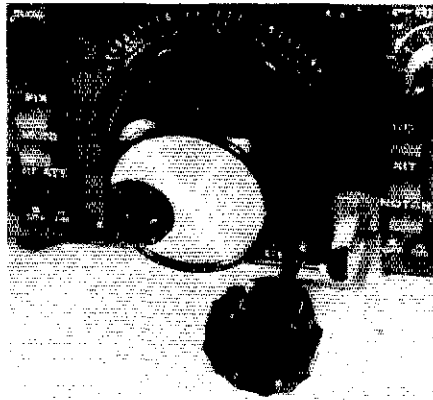


Fig 1—W7BI's vernier tuning arrangement on his TS-830S. (WB7DHC photo)

in the TS-430S is adequate for use with the 270-Hz filter.—Ed.]—Howard O. Lorenzen, W7BI, Bellevue, Washington

## ANTENNA INSULATORS FROM THE GOLF COURSE

□ While erecting a dipole antenna, I found that I had no insulators for the ends. After some rummaging, I came upon some plastic practice golf balls, the kind with holes in them, and decided that they might work. To use them, thread the antenna wire through two of the holes (making sure to get one on each side of the seam); then put nylon cord through two other holes in the opposite side and string them up. They work perfectly! Not only are they light, but they are inexpensive and have a spring to them that tends to cushion the antenna as it sways in the breeze.—Sam Fischer, KA0ILO, Moberly, Missouri

□ Most golf courses now use fiberglass flagsticks on the greens. They usually measure about seven feet long by 1/2 inch in diameter. Occasionally, some are damaged and discarded. Material salvaged from these flagsticks makes excellent dipole end insulators. Cut the sticks into suitable lengths (I use seven-inch pieces) with a fine-tooth hacksaw. Dress the ends with a fine-cut mill file and drill a 1/8-inch-diameter hole about 3/4 inch from each end of the insulator. (I used a high-speed twist drill.) Presto! You now have effective, durable and inconspicuous dipole insulators—and the price is right! No doubt you will have more insulators than you can use, so why not pass some of them out to new hams?—Troy Sherrill, WD8MQP, Oak Harbor, Ohio

## A WEATHER GUARD FOR BASE-LOADED VERTICAL ANTENNAS

□ Carleton Beck, W2PHA, sent in the idea in Fig 2 for protecting the loading coil and bandswitching apparatus of a base-loaded vertical antenna from the weather. First cut

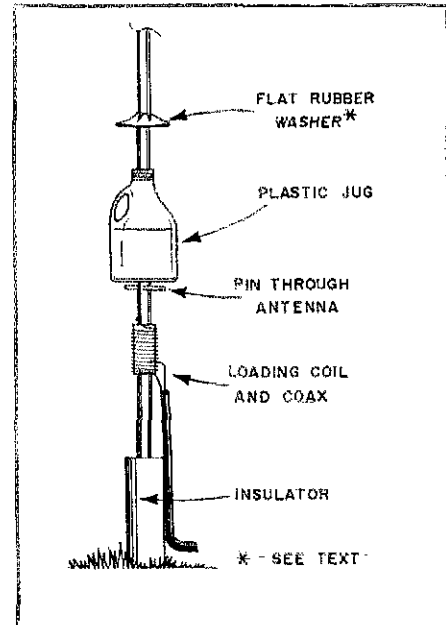


Fig 2—W2PHA's idea to protect base-loading components from the weather.

a large rubber washer from an old inner tube. (Discarded tubes are available at tire shops that service large trucks.) Make the center hole small enough for a tight fit on the antenna. Next, cut the bottom from an old plastic jug, such as those used for bleach or milk. Place the washer and jug on the antenna and then install a pin through the antenna at the position where you want the jug. (A hose clamp might be easier to install and will serve the same purpose.) Finally, slide the jug to the pin and work the washer down to the top of the jug.—Bob Schetgen, KU7G, ARRL Staff

## AN INEXPENSIVE SOURCE OF LIGHTWEIGHT WIRE

□ Lightweight, yet durable wire can be obtained by performing "surgery" on a discarded streetlight ballast. A visit to my electric-company trash bin netted several good coils of wire. The wire is aluminum of approximately 18 to 20 gauge, and it weighs less than three ounces per 100 ft. It takes little effort with a hacksaw and vise to remove the two coils (wound on plastic forms) from the laminated iron core. Each coil (two per ballast core) contains approximately 200 ft of wire. A good coil looks "copper" in color because of the coating on the wire; a bad coil looks black. There is no problem with connections if the wires are clean, tightly twisted and sealed against moisture.—Mike Maloney AC5P, Bartlesville, Oklahoma

## HAMS AND THE NATIONAL ELECTRICAL CODE

□ As a longtime Professional Engineer and instructor, and a newly licensed (1984) ham

I appreciate Doug DeMaw's "First Steps in Radio" series. Part 12 in the series, "The Amateur and Electrical Safety" (Dec 1984 QST), prompted me to pen a few suggestions:

1) When grounding to metal pipe, first check the piping system to see that the metallic pipe actually extends to a good earth ground. I lived in one home where the metal pipe changed to plastic just outside the crawl space wall—hardly an acceptable ground.

2) I question the use of soldered joints, shown in Fig 4 of Doug's December article. It is difficult to properly solder fine copper braid to iron pipe with a torch. Also, soldering is not an accepted practice for electrical grounding in general (Article 250-113, National Electrical Code). Clamps are mentioned in reference to Fig 3, and I believe they should also be recommended for Fig 4.

3) Hams should look to the applicable sections of the National Electrical Code in order to learn the necessity of adequately sized conductors. Article 810—Radio and Television Equipment, Part C; Amateur Transmitting and Receiving Stations, including references therein to Section 810-21, which in turn references several parts of Section 250—Grounding.

I have lived with this code for many years in engineering design work as a Professional Engineer. The code is a minimum safety standard. It does not affect our design as long as we treat it as such. All hams should read it.—Paul C. Leach, PE, N7GGX, Anacortes, Washington

## BESSELL NULLS TO SET FM DEVIATION

A great number of hams have 2-m FM equipment, but modulation adjustment is usually the nemesis of most, unless they have access to a Cushman communications monitor or similar equipment.

Here is an inexpensive and accurate method of deviation adjustment that requires only a nonchannelized receiver with a BFO or product detector, and an AF signal generator. It is called the Bessell Null Method. Frequency modulation is defined by Bessell functions that are best handled with calculus, but for any given deviation, there is a carrier null at a specific audio modulating frequency and amplitude.

$$df = f_m \times k \quad (\text{Eq 1})$$

where

df = deviation

$f_m$  = modulating frequency

k = a constant based on the desired null: 2.405 for the first; 5.521 for the second; 8.654 for the third

To adjust a transmitter, set the deviation control near its minimum position, disconnect the audio input, key the transmitter and tune the receiver close to the transmitter frequency so that a beat note of 100-200 Hz results. Then unkey the transmitter, connect the AF signal generator and set it to supply 2080 Hz, key the transmitter and adjust the generator output level just below that which produces clipping (the best level is indicated by the purest tone from the receiver). Finally, advance the transmitter deviation control slowly until the beat note nulls. You will also hear the beat notes from the 2080-Hz side-

bands produced as deviation increases, but ignore these and listen only to the 100-200 Hz beat. Do not increase deviation beyond the first null: There are other nulls beyond the first that correspond to ever greater deviation ranges.

If the audio signal is distorted, the carrier will not null completely. This is why the input should be set to a level just below that which causes clipping: Clipping produces distortion. Higher Bessell Nulls may be used with correspondingly lower audio frequencies. For example, you can also set 5-kHz deviation by tuning to the second null with a modulating frequency of 906 Hz.—John Gebuhr, WB0CMC, Omaha, Nebraska

## ADAPT THE HY-GAIN® HY-TOWER FOR USE ON 30 METERS

My low-band antenna here in the Florida Keys is an 18HT Hy-gain Hy-Tower vertical; it operates superbly on the 160, 80 and 40-m bands. The antenna has the help of 6 feet of salt water directly beneath it, reinforced by 80 square feet of aluminum sheet at the bottom. With the arrangement shown, the SWR is perfect on 30 m as well.

I tried several methods to get the antenna on 30 meters and finally discovered that shown in Fig 3. The tower resonates on

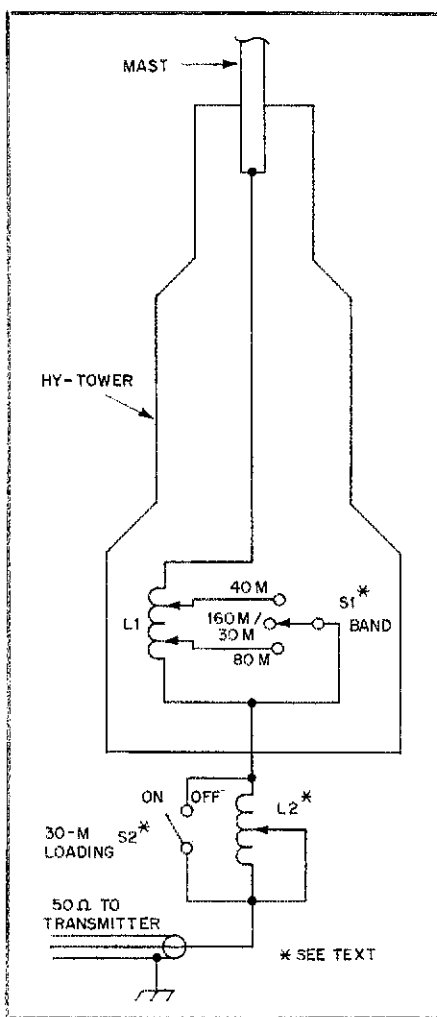


Fig 3—A schematic of the Hy-Tower converted for 30-m operation.

7 MHz because the center conductor feeds the mast above, which is insulated from the tower. When SW1 is set to the second position (which had been used to load the antenna for 160-m operation), the inductor, L1, functions as a choke and decouples the inner wire and mast at 10 MHz. Thus, the tower resonates at around 10.300 MHz. L2 and SW2 were added just beneath the base of the antenna to achieve resonance at 10.100 with a perfect SWR.

My rig is a TS-830S, which provides about 120 W to the antenna, and results verify that the antenna is indeed functioning in good style.—Charles W. Rogers, W2AIW (Silent Key)

## USE A SCANNER TO SET THE FREQUENCY IN YOUR CRYSTAL-CONTROLLED 2-M RIG

My Bearcat® VHF scanner makes an excellent signal generator for adjusting the receive crystals in my 2-m rig. The local oscillator in the scanner runs 10.8 MHz below the scanner receive frequency. (Bearcat radios use a 10.8-MHz IF.) Just add 10.800 MHz to the desired 2-m frequency and set the scanner to the resulting frequency. For example: To align a 2-m radio to 147.57 MHz, add 10.8 to 147.57 and program 158.37 into the scanner.—Roy Williams, W6VON, La Mesa, California

There has been some trouble with local-oscillator (LO) radiation from scanners. Scanner LOs have been known to interfere with repeaters several miles away. I understand that manufacturers sometimes solve this problem by shifting the IF slightly, so that the LO is not on a repeater frequency when the scanner is tuned to popular local channels. Be sure of the scanner IF before using this technique.—Ed.]

## New Books

### NEW BEACON GUIDE

Over 6100 beacons, even after dropping over 1000 listed in the original Beacon Guide that are no longer in service, are listed in the New Beacon Guide offered by Ken Stryker. The new guide covers North America, South America, the Caribbean, Asia and the Pacific, and even the Russian beacons that are excellent targets for the West Coast DXers. The easy-to-use information is arranged in frequency order and is cross-indexed by identification. Information for each beacon includes city, airport, state, province, island, and so on. Geographical coordinates are shown for almost all beacons. Power, in watts, is shown for all beacons.

Included in this new Beacon Guide is a separate, updated listing of over 100 known LOWFERS operating on the frequencies between 160 and 190 kHz. Designed for future updating, the guide is furnished in standard three-ring loose-leaf format.

Available from Ken Stryker, 6350 N Hoyne Ave, Chicago, IL 60659. Price: \$10 postpaid in the US, \$15 by airmail overseas.—Bruce O. Williams, WA6IVC

# Field Organization Call-Sign Badges

Now ARRL Field Organization volunteers can purchase distinctive, official ARRL call-sign badges!

By Steve Place, WB1EYI  
Manager, Volunteer Resources

The long-awaited official ARRL Field Organization call-sign badges are here! And ARRL appointees, proud of the active roles they play, are rushing to buy them.

Hereafter, ARRL volunteers who sport the official green badges will be easily identified as people in the know—key section leadership officials. Those wearing the official orange badges—a recognized emergency-service color—will stand out in a crowd as radio amateurs skilled in the techniques of emergency communications. And National Traffic System leadership appointees, the dedicated brass pounders who usually meet their counterparts only across a crowded band, can now spot each other easily across a crowded hamfest.

Other volunteers will be recognized by their official blue badges (Station Appointees) or light-blue badges (Division Appointees). If you hold a current ARRL Field Organization or Division appointment, you qualify, too.

The program was created by the ARRL Board of Directors in response to your requests. At its 1986 Annual Meeting in January, the Board approved (at Minute 83):

... a program for authorizing ARRL Field Organization volunteers to purchase distinctive, official ARRL call-sign badges, such program to be implemented with the following stipulations:

a) that the design of the badge be patterned after the official call-sign badges for ARRL elected officials, officers and staff;

b) that the background colors of the badges be distinctive and identify categories of volunteers;

c) that each badge manufacturer who wishes to participate must agree to meet and to continue to adhere to quality standards; and

d) that the program operate at no cost to ARRL....

Directors, Vice Directors, Officers, Section Managers and ARRL Headquarters staff (elected officials and staff) have for some time been authorized to wear the distinctive red-background badges with

which many of you are familiar. The new Field Organization badges are nearly identical (see Fig 1) but with different background colors. The badge color for Division appointees is light blue; for the Section Staffs, green; for Station Appointees, blue; for Emergency Communications Appointees, orange; and for the National Traffic System leadership, light green. (Refer to Table 1 for details.)

The official Field Organization badges are made to the same high-quality standards as the red badges for the elected leadership officials. Participating commercial badge engravers have agreed to meet, and continue to adhere to, these standards. For example, official badges purchased from them will have the stripes and ARRL diamond silk-screened on the blank stock, not applied by tape or decal.

*"How Do I Buy One?"*

Participating engravers will sell the official badges only to those who are authorized: Division appointees and currently active volunteers in the ARRL Field Organization. If you're eligible,

1) Get an order form and instructions from your Director, Section Manager, section leadership official or Headquarters.

2) Fill out the form providing *all* the necessary information, including which of the participating commercial engravers you want to make your badge. (The list of participating engravers was not available at the time this was written. Participating engravers will be listed in the *ARRL Field Forum* newsletter, which is sent to all Field Organization volunteers, and the latest, updated lists will be available from Headquarters for a self-addressed, stamped



envelope. Also, watch the Ham-Ads section of *QST*.)

3) Then, send the following to the proper authorizing official (see Table 1). (Directors certify Assistant Directors' or Advisory Committee appointees' eligibility; Section Managers certify the eligibility of all other appointees.<sup>1</sup> Directors' and Section Managers' addresses are on page 8 of *QST*.)

a) the completed form;

b) a check in the proper amount made out to the engraver you've chosen (each engraver sets his own price for the badges, so make sure you remit the proper amount);

c) a stamped, business-size envelope addressed to the engraver; and

d) (optional) a stamped, self-addressed postcard (or QSL).

On receipt of the above, your Director or Section Manager will check to determine

<sup>1</sup>Assistant Emergency Coordinators (AECs), who are not formally part of the ARRL Field Organization, must go through one additional step. As AECs are appointed locally by Emergency Coordinators, Section Managers do not have up-to-date listings of them. For an AEC to be authorized to purchase an official ARRL orange call-sign badge, he must first have his appointing EC sign a statement that his AEC appointment and ARRL membership are current and send it with the order form and other materials to his Section Manager. AECs who are not ARRL members will not be authorized to purchase an official call-sign badge.



**Table 1**

**Official ARRL Field Organization Call-Sign Badges: Eligibility and Background Colors**

**Authorized by Section Manager**

*Section Staff Appointees* GREEN  
 Assistant Section Manager  
 Affiliated Club Coordinator  
 Bulletin Manager  
 Official Observer Coordinator  
 Public Information Officer  
 Section Emergency Coordinator  
 Section Traffic Manager  
 State Government Liaison  
 Technical Coordinator

**Station Appointees** BLUE

Official Observer  
 Official Emergency Station  
 Official Relay Station  
 Assistant Technical Coordinator  
 Official Bulletin Station  
 Public Information Assistant

**Emergency Communications Appointees** ORANGE

District Emergency Coordinator  
 Emergency Coordinator  
 Official Emergency Station\*  
 Section Emergency Coordinator\*  
 Assistant Emergency Coordinator (only if ARRL member)\*\*

**NTS Leadership Appointees** LIGHT GREEN

NTS Area Staff  
 Net Manager

**Authorized by Director**

**Division Appointees** LIGHT BLUE

Assistant Director  
 Advisory Committee Appointee

**Authorized at Headquarters**

**Elected Leadership and Staff** RED

President  
 Vice Presidents  
 Director  
 Vice Director  
 Section Manager  
 ARRL HQ

\*Appointee may choose either or both authorized colors. For example, an SEC may choose to purchase a green badge by virtue of his being a "Section Leadership Appointee" and/or an orange badge by virtue of his being an "Emergency Communications Appointee." (We recommend, however, that all Emergency Communications Appointees purchase the distinctive orange badges for use in emergency field situations.)  
 \*\*See article footnote.

that you are indeed an active, current appointee. If you are, he or she will sign your order form and forward it (in the stamped, addressed envelope you've provided) to the engraver. If you've included a self-addressed, stamped postcard, it will be dated and returned to you as confirmation that your order is on its way. If for some reason you are not a current appointee, your form will be returned to you, and you'll be invited to join the ARRL Field Organization.


Directors and Section Managers can, of course, also authorize your orders in person at hamfests, conventions, club meetings, and the like.

*"But what if I'm not a member of the Field Organization?"*

If you're not, there's a job waiting for

you. Section Staff appointees are the key, section-level leadership officials in their areas of expertise. The responsibilities are great, but the work is rewarding. Station appointees work closely with their section leadership officials in the areas of Volunteer Monitoring, emergency communications, traffic handling, answering technical questions, resolving RFI problems, disseminating bulletin information and keeping the general public informed about Amateur Radio. These men

and women who, as members of the ARRL Field Organization, volunteer their time and talents to serve their communities, are the heart and soul of the American Radio Relay League.

If any of these areas interest you, contact your Section Manager for more information. Or better yet, look for the volunteers wearing official ARRL Field Organization call-sign badges at your next club meeting or hamfest. They'll be happy to explain the terrific opportunities open to you. 

**ALC for AB<sub>1</sub> Amps**

(continued from page 39)

manently install R1 in the amplifier circuit. Then, if the board is removed for testing, there will still be bias applied to the tube. To reduce the value of R1, you need merely shunt it with another resistor on the board, leaving the original R1 in the amplifier.

**Operation**

Between its grid-current sampling shunt, R1, and the exciter ALC circuit, the ALC circuit may be considered a high-gain dc amplifier. In effect, the ALC meter operates as an extremely sensitive grid-current meter, and you shouldn't be surprised if full ALC indications are obtained while almost nothing at all can be seen on the grid-current meter. The action of the grid-current meter will depend on its range and the meter damping.

On VHF, where the secondary emission effect of the tubes is more pronounced, the ALC meter may indicate normally, representing a 0.1-mA grid current, while the grid meter registers negatively. That's okay. The ALC circuit reacts only to the normal grid current at the peak of the RF drive cycle, while the meter reads the average current over an entire cycle, which is negative. This situation is clarified by the discussion and curves on pages 11 through 13 of reference 3.

The ALC circuit can be tested with the high voltage off, when the secondary emission effect is absent. Two-tone tests (using a dummy load) were run on 2 meters while reducing the value of R1 until very small positive grid-current-meter indications were obtained simultaneously with normal ALC meter indications. Severe flat-topping was evident on the monitor scope, and splatter far up and down the band resulted. What this means is that the ALC circuit protects against overdrive that can't even be seen on the grid-current meter. The meter reads the average grid current. We want the grid current to go just an infinitesimal bit positive at the peak of the RF cycle, but not so positive so as to be greater than the negative grid current caused by secondary emission.

Although this circuit looks like a switch

that abruptly turns on the ALC voltage at the instant the grid current reaches the threshold level, in practice the operation is extremely smooth. The reason for this is that the ALC loop gain is not determined by the amplifier ALC circuit, which has very high gain, but by the gain-control characteristics of the exciter stage controlled by the ALC. The action between the exciter DRIVE control and the ALC voltage as indicated on the exciter meter is just the same as when the exciter is operated barefoot; you can forget you have ALC in the amplifier.

This circuit has been used in my amplifiers for 15 years, with no trouble and no reports of splatter. All circuit values are noncritical, and large changes in bias levels and idling current may be made with no ALC circuit changes. Best of all, there are no adjustments to make! This certainly is a "build-and-forget" circuit—I forgot to write this article for 15 years! I want to thank Bill Orr, W6SAI, and Bob Sutherland, W6PO, for their helpful suggestions on operating tetrodes.


**Notes**

- <sup>1</sup>The ARRL 1986 Handbook for the Radio Amateur (Newington: ARRL, 1985).
- <sup>2</sup>W. Orr, *Radio Handbook* (Indianapolis: Howard W. Sams & Co, 22nd ed, 1981).
- <sup>3</sup>R. Sutherland, *Care and Feeding of Power Grid Tubes*, Varian, San Carlos, CA, 1967.
- <sup>4</sup>M. Mandelkern, "High SWR Protection for Transceivers and Amplifiers," *CQ*, May 1980, pp 63-65.
- <sup>5</sup>J. F. Riley, "Improving Amplifier ALC Circuits," Parts 1 and 2, *Ham Radio*, Aug 1984, pp 40-44, and Sep 1984, pp 52-56.

*Mark Mandelkern's PhD in mathematics is the result of his attempts, at age 9, to understand the algebra in the electronics books at the local library.*

*It was there he had gone when his first "home brewed" one-tube receiver stubbornly refused to work. His first home brewed transmitter, operating at 1450 kHz, played the popular 78-RPM-record hits of the day and broadcast all the news of the neighborhood teenage gang. In 1948, Mark received his first amateur license and hasn't been heard below 1800 kHz since!*

*Mark now holds an Extra Class license and has often led his section, division or call area in 160-meter, ARRL DX, CQ WW DX, SS and VHF contests. In 1964, he and Dan Eisman, K8ICB, established the first amateur 6-meter RTTY meteor-scatter link, over a 500-mile path from Long Island to Ohio.*

*Mark has been teaching mathematics at New Mexico State University since 1969. His specialty is "constructive" mathematics, about which he has published a number of research articles. He also published an elementary introduction to the subject for high school and college students in Mathematics Magazine, Nov 1985.* 

# Ham Radio in China

By David E. Peterson, WD0EOI

1852 NW 23 St  
Rochester, MN 55901

Not too much is known about the early days of ham radio in China. We do know that ham radio had its roots in Shanghai, where the first station operated in the late 1920s. Ham radio activities during World War II stopped, of course, just as it did in the US. After the war, it is thought that there were as many as 400 private and public ham radio stations in China. [The Chinese Amateur Radio League was admitted to membership in the International Amateur Radio Union in 1947.—Ed.] After the 1949 revolution, ham radio was not allowed until 1958. In the period 1958-1966, there were six stations in four cities.

The cultural revolution (1966-1976) was a period of turmoil in China. Its roots were political, and ham radio, like most other technical and educational institutions, got caught in the middle. To use ham radio was to leave yourself open to charges of "having an illicit relation with a foreign country." So, ham radio was (once again) banned and, sadly, all written records that documented the early history of ham radio in China were lost or destroyed.

## Current Activity

When ham radio was again authorized, in 1982, the first station to come on the air was BY1PK, the headquarters station for the Chinese Radio Sports Association (CRSA). [CRSA joined the IARU in 1984.—Ed.] I recently visited Beijing and spent a morning at BY1PK talking with Wang Xun, the Deputy Secretary General of the CRSA, and Tong Xiao-Yong, the station manager.

Currently, there are 10 licensed Amateur Radio stations in China:

**Beijing:** BY1PK—CRSA Headquarters Station; BY1QH—Qinghua University; BY1SK—Youth Amateur Radio Station of the Xuanwu District, Beijing.

**Shanghai:** BY4AA—Shanghai Branch of CRSA; BY4AOM—Shanghai Station for All Old Amateurs (ie, previously licensed).

**Chengdu (Sichuan Province):** BY8AA—Sichuan Branch of CRSA; BY8AC—Youth Amateur Radio Station of Chengdu.

**Fuzhou (Fujian Province):** BY5RA—Fujian branch of CRSA; BY5RF—Youth Amateur Radio Station of Fuzhou.

**Wulumuqi (also spelled Ürümqi, in Xinjiang Province):** BY0AA—Xinjiang Branch of CRSA.

Private ham radio stations are not allowed in China today. Ham radio is found only at clubs affiliated with the CRSA, and people learn about ham radio by taking classes at a club station. The BY1PK station building is, in fact, a sports school, which offers courses in such things as ham radio and modeling (airplanes, ships), and has dormitory facilities to accommodate visiting sports teams. This school currently has 20 students and amateurs who are

special station (BT0NMN) was set up in the Himalayas (at a height of 4700 meters) to support a joint Chinese-Japanese mountaineering expedition on Mount Naimona'nyi. This station was instrumental in supporting the rescue of an injured Japanese member of the climbing team (see September 1985 QST, page 11).

## Future Growth

For the Chinese, ham radio is much too expensive to be just a hobby. For instance, the cost of an ordinary transceiver (about \$500) represents more than one year's salary for the average technical worker in China. Future growth will be tied closely to the rate at which China is able to industrialize and to the potential benefits to society that ham radio is able to offer.

Growth will come in two areas. First, it is hoped that private operation of ham radio equipment will be once again allowed. If this happens, one would expect that there would shortly be several hundred licenses issued. Second, the number of club stations will increase. By the end of 1986, it is expected that there will be two or three additional stations in the corridor between Shanghai and Beijing (in cities along the railroad), and one station each in Canton and Hunan provinces.

The rules of the game are that BY1PK will provide the training and technical support, but the money, space and people must come from the local government. So, ham radio must compete with all the other needs that a local government has, and its success will depend on ham radio being seen as a major contributor to a community's technology base, education advancement, health and safety.

## A Final Note

The CRSA wants very much to reconstruct the early history of ham radio in China. CRSA has written to all of the old Chinese amateurs that it has been able to find, asking them to supply whatever historical reminiscences they can. I have volunteered to collect similar information in the US. If you worked any Chinese stations before 1949, please send me that information (call, date, name, station location, etc). If you can send copies of QSL cards, that would be even better. I will consolidate the information and pass it on to the CRSA.



Wang Xun, Deputy Secretary-General of the Chinese Sports Association, operates at one of the positions at the CRSA headquarters station in Beijing. Amateur operation in China today is strictly a club activity. (WD5CAY photo)

authorized to use the BY1PK station.

## The BY1PK Station

As you might expect of any headquarters station, BY1PK is equipped with the latest in ham gear. All bands from 1.8 MHz through 432 MHz are covered. Modes operated include CW, SSB, SSTV, RTTY and OSCAR. The rigs are the latest in solid-state technology (mostly Yaesu and Kenwood), and there are kW amplifiers for the low bands. Supporting the shack is an Apple II® personal computer with software for such things as satellite locating and contest logging.

Antennas on top of the five-story building include dipoles for 160 and 80, a 7-element beam for 20-15-10, a 3-element beam for 20-15-10, a 5-element beam on 6, and beams for 2 meters and 70 cm (including OSCAR).

Station activities include working DX (over 90 countries to date), contesting and providing technical support to the other stations and special-purpose support as required. For instance, in May 1985, a

# Ham Radio Spends a Weekend at the Boston Museum of Science

By Elizabeth Karpiej, KA1DTU and Robert Salow, WA1IDA  
Club Services Assistant Box 116, Newton, MA 02161

*Invention is 10 percent inspiration and 90 percent perspiration.—Thomas Edison*  
*Ninety-nine percent of success is just showing up.—Woody Allen*

As different as the two people quoted above are, their formulas for success are remarkably similar. Bob Salow, WA1IDA, recognized the truth of these statements when he undertook to organize an exhibit of Amateur Radio at the Museum of Science in Boston.

Local hams had long had a goal of setting up a permanent station at the Museum, and Museum officials had expressed interest in the project. Until the formation of CEMARC, however, none of the area clubs had had the personnel or organization necessary for so ambitious a project.

CEMARC is the Council of Eastern Massachusetts Amateur Radio Clubs. It came into being several years ago when the need to coordinate the dates of club activities, meetings and flea markets and to provide speakers was recognized. The Affiliated Club Coordinator (ACC) appointment also played an important part by acting as a neutral clearing house for the information. Each club elected a delegate to work with the ACC and represent them at the CEMARC meetings.

When Bob proposed an exhibit at the Museum of Science, both he and the ACC for Eastern Massachusetts, Lew Nyman, K1AZE, recognized the need for "seed money." The group managed this by making and selling repeater maps. Many of the CEMARC crew pitched in with printing, verifying repeater sites and selling advertisements. This money became the CEMARC treasury. It was used for postage and beginning the Museum project.

The exhibit took over a year to put together. Dennis Shapiro, WIUF, was acquainted with the former Director of the Museum, Bradford Washburn. Mr Washburn forwarded the CEMARC proposal to the Museum Committee in March 1985. Dr Roger L. Nichols, the Director of the Museum, replied with an enthusiastic letter.

Bob called one of the people mentioned in the letter, Chuck Howarth, in September 1985. Mr Howarth agreed to meet with Bob and Lew, K1AZE at the Museum one even-

ing. On arriving, though, they were given a letter from Mr Howarth, informing them that he was being sent to Africa! He referred the two hams to Phyllis Dohanian, the then-Director of Volunteers. Ms Dohanian was extremely helpful and knowledgeable.

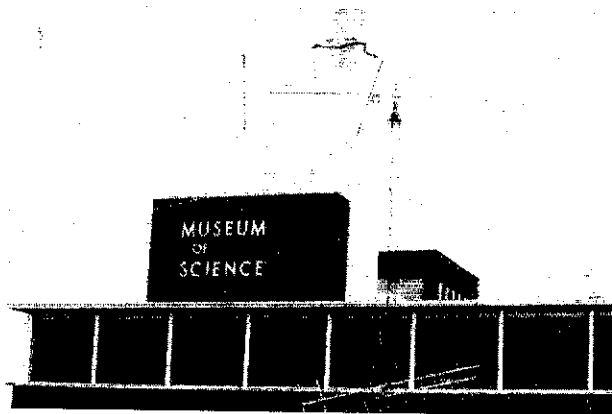
The exhibit was now delayed by several factors, one of the foremost being that CEMARC was an unknown quantity. They had not actually finalized plans for this exhibit and were unsure of how much space they would need to set up equipment. The idea of antennas on the roof (with the radios six floors below!) was also making Museum officials hesitate.

Finding a suitable date was another problem. The Museum had demonstrations and exhibits planned a year ahead, so finding a timely date for the amateurs was a problem.

Bob and Lew have a lot of experience in management. They were able to convince Chuck and Phyllis with a presentation, and through them were able to assure the Museum that the hams were completely capable of setting up and following through on the exhibit. They cited the many successful projects and all the community service that amateurs had organized and completed.

The Museum Committee was impressed. Thanks to Bob and Lew's persistence and dedication to their goals, the Amateur Radio exhibit at the Museum of Science was on. Over a year of waiting and planning was going to pay off.

There were meetings throughout the winter with other CEMARC members. The project began to take shape as plans were made for the number of booths, modes of



(WA1IDA photo)



A few of the more than 7000 museum visitors enjoy the many offerings at the CEMARC Amateur Radio Exhibit. (WA1IDA photo)



A visitor to the museum talks to a station in Wakefield 12 miles away, while other visitors await their chance. Visitors who participated in the ATV exchange received a certificate of completion. (WA1IDA photo)

operation, volunteer schedules and equipment loans. The antennas were lent by Cushcraft Corporation.

### Up on the Rooftop

On March 16, the group had an antenna-raising party on the roof of the Museum of Science. Along with a few ARRL observers, they erected the lent towers, climbed up and down stairs and ladders, ran coax and wires down to the exhibit floor, and tuned up the rigs. This was also a test to see what kind of shielding and modifications would be needed at the exhibit. The group had determined that it was necessary to have working radios, computers and code oscillators for the exhibit to be a success.

A QSO with a West German station proved that the antenna system was running fine. As a hint of things to come, even the sight of a table with a few people hunched over it brought a small crowd of interested observers. The CEMARC crew packed up their rigs and headed home. Now they just had to write the literature,



A group of young visitors work toward a certificate of successful completion in Morse code class. More than 600 certificates were awarded over the weekend. (W1UF photo)

publicize the event, get the workers, put up signs . . .

### Rainy, Cold and Great!

The weekend of April 26-27 was cold, misty and just perfect for museum goers. The CEMARC group had run a final check on the antenna system the week before. The beam was up and working, the rigs tuned.

The exhibit was arranged around a central open space. The area was divided into eight booths, each demonstrating a different aspect of Amateur Radio. The General Information Booth personnel actively involved visitors by guiding them to different exhibits and introducing them to the hams working the equipment. There was also a mini-theater, showing the videotapes *SAREX* (Shuttle Amateur Radio Experiment) and *Amateur Radio's Newest Frontier*, and a photo display of famous hams. A Novice station demonstrated Morse code in action. The group was also



Going home movies one better, a young visitor works the ATV station at Wakefield, Massachusetts for a certificate of completion. (K1THP photo)

lucky enough to have Richard Clancey, whose call is KA1SM. KA1 Science Museum was the special-event station for the weekend. Everything needed for a successful event was in place. All that was needed were the people.

Was it a success? The kids who came in droves to the Morse Code Training Booth thought so. After learning six letters and their names, each participant was presented with a Code Achievement Certificate. Over 600 certificates were awarded during the two-day period.

Inquiries at the general information booth ranged from "I used to be a ham; how do I get started again?" to "Ham what?" Several thousand people viewed the exhibit; and hundreds participated directly in one aspect or another of Amateur Radio.

The most popular booth was the ATV setup. The booth was never empty, as crowds, sometimes five deep, watched themselves communicate with another station in Wakefield, about 12 miles away.



Jim Henderson, N1DEA (left) guides a visitor through a packet contact. (WA1IDA photo)

The operators at the Wakefield repeater site did yeoman duty, talking to hundreds all weekend.

The packet station was also very well attended. Computers are a familiar sight to most, and even young children could get on and type away. Those who operated packet were surprised, pleased and intrigued by the possibilities of this mode.

Message handling was well received. The message center took and passed over 200 messages for the public. It was an excellent opportunity to explain how Amateur Radio works.

The OSCAR (Orbiting Satellite Carrying Amateur Radio) station ran into problems with RF and interference. They never did get to work anything. The group did have a VR85 program from AMSAT that ran on a Commodore 64<sup>®</sup>. It tracked OSCAR 10 in real time, and the hams working at the booth were articulate and helpful.

The Executive Director of the Museum, Dr Nichols, came by the exhibit on Sunday. He expressed the museum's pleasure with the quality of the exhibit and ability of the amateurs. More important, he invited CEMARC back next year, saying, "You'll need more space." Yes, they will. Bob and the rest of the CEMARC crew already have plans for 1987.



Preparation played a key role in the exhibit's success. Here, the CEMARC crew make sure all the pieces fit in a dry run on the antenna assembly at the home of Steve Gilbert, WA1AYS. (WA1IDA photo) [BY: ]

# IMRA: Amateurs with a Mission

Members of the International Mission Radio Association lend their own definition to "people helping people."

By The Reverend Michael Mullen, CM, WB2GQW

St John's University Radio Club  
St John's University, Bldg 1 6-B  
Jamaica, NY 11439

There is some dispute about how long Charlie's heart had stopped. "My heart stopped for about 14 minutes, according to my roommate," says WD4NWS. "But, according to my doctors, it was much less than that."

However long it was, there is no dispute over the size of Charlie Herron's heart. It's a big one. He is one of the regulars running traffic and phonepatches daily through a net set up for the benefit of missionaries of all denominations in remote corners of the world.

The retired salesman from Cleveland, Ohio, now living in Miramar, Florida, explains, "I am trying to repay the debt I owe my Maker."

Charlie, 77, admits he has always been "an old ragchewer." When he bought a receiver and happened on the net run by the International Mission Radio Association, he just had to get his own license. The IMRA net runs on the 20-meter band at 14.280 MHz, Monday through Saturday, at 2-3 PM Eastern Time (1900-2000 UTC Standard Time and 1800-1900 UTC Daylight Saving Time).

IMRA's slogan, Charlie points out, "is 'people helping people,' and when we help people we are serving our Maker."

Charlie is one of more than 900 persons in 40 countries who belong to IMRA, a nonprofit organization. It grew out of an effort by some Catholic Franciscan priests to determine how many clergy were engaged in ham radio. For a few years they compiled an annual listing. Then they decided, using this group as a nucleus, to form their own organization. They held their first organizational meeting in Hudson, New Hampshire in 1963. There were 50 people present. They called themselves the Catholic Mission Radio Association. Within several years they changed the title to the International Mission Radio Association, incorporated, and opened up the membership to clergy and laity of all faiths.

IMRA has two purposes. The first is to establish a communication link for missionaries to keep in touch with their families, friends and confreres; the second is to provide radio equipment for these missionaries.

As membership has tripled in the last six years, net activity in the same period has doubled. Annually, there used to be



IMRA President The Reverend Mike Mullen, WB2GQW, at club station WA2KUX, St. John's University, is one of many amateurs who regularly check into the IMRA net. IMRA members help provide a communications link to families and colleagues as well as technical information and equipment for fellow missionaries worldwide.

11,000 check-ins with 5000 pieces of traffic. The comparable numbers now are 19,000 and 10,000. Walter Walker, WA4LEX, says that when he took over as IMRA's net manager, in January 1978, there were 26 sessions, 964 check-ins and 496 pieces of traffic. In January 1986, in his monthly report to *QST*, Walker cited 1794 check-ins and 1218 pieces of traffic in 27 sessions. Walker, who operates out of Nokomis, Florida, is a retired Air Force sergeant who had been a chief engineer for the Armed Forces Radio and Television Service in the Mediterranean area.

"Ours is more or less a traffic running net," says Walker. His technical advice is much sought after among the missionaries who spend years studying philosophy and theology but never examine a diode and know a capacitor as some strange object buried in the bowels of a radio.

Father John Coggan, TG4GB, out of Solola, Guatemala, is among the missionaries who look to colleagues like Walker for help. A Catholic missionary in Central America for 19 years and a ham for six, Father John says he relies on the net for technical information since he doesn't know much about radio. "I am able to get information on antennas and things like that," he said. "I don't have much preparation in technology, and I

glean any information I can get over the net."

A priest of the diocese of New Ulm, Minnesota, Father John is typical of the missionaries who have first priority on the IMRA net. He uses it to keep in touch with his mother in DeGraff, Minnesota. His brother in Minnesota is also a ham, but is not always available, as he is on the road a lot.

The help often goes beyond technical assistance and telephone patches, as Herb Adkins, KA4JWS/6Y5, attests. Herb is the director of the Bethel Christian School in Mandeville, Jamaica, which he says is "located way back in the hills and on top of a mountain." He turns to his radio frequently.

"No telephone, telegraph, no neighbors, slow mail service, but we have the radio and IMRA and one old donkey. As the local missionary of long standing in the area, I have, out of necessity, become the local undertaker, dentist, midwife, school bus driver, pastor, teacher, along with some other things that I can't write about!"

Before moving to Jamaica, Herb and XYL Vivian lived in Winter Haven, Florida, where he was in the auto repair business and she was a teacher. They came to Jamaica in 1973, intending to work at the school for one year. Herb checks into

the net frequently, and once a week speaks to his brother in Florida.

Another missionary who finds the IMRA net invaluable is Brother Robert Walsh, YN4RC, in Bluefields, Nicaragua. "I check in every day. People who want to get in touch with me for any reason know where I am for sure," he explains.

The routine also gives the Christian Brothers in the United States some peace of mind that their colleague is safe in that politically unstable region. "If I am not here they get worried," Brother Bob says. "They find out what is the matter, if the rig is down or something else is the matter."

Brother Bob uses the net to keep in touch with his mother, brothers and sisters scattered in Minnesota, Indiana, Wisconsin and Pennsylvania. He also likes the fact that "we get priority on traffic. The other nets are pretty formal and you can wait 15 to 30 minutes to get in. IMRA is much more informal, much more convenient and I feel much more comfortable with this traffic net."

We hear that from others. Members consider IMRA a "family net," where the people in the field have precedence, particularly someone on a generator.

Most of the traffic handled is into and out of South and Central America, Mexico and the Caribbean area because of the more favorable propagation conditions between the United States and those places in the afternoon. On any particular day, approximately 75 hams will check into the net and stand by to be of service to missionaries.

The second purpose of IMRA is to supply radio equipment on loan to missionaries of any denomination. All that is required is that they be authorized by their Church, stationed overseas and licensed for Amateur Radio by the country where they work. IMRA has distributed more than \$40,000 worth of radio equipment to missionaries. Many members making out their wills bequeath their radio equipment to IMRA to be used for this purpose.

Warren Mulhall, WA2BPV, immediate past president of IMRA, has headed the Equipment Committee for the last 17 years, while his wife, Evelyn ("Evey"), WA2HWF, has served for 12 years as recording secretary. Married 40 years, they make a very good team. Evey monitors the IMRA net from the couple's Manasquan, New Jersey home in case someone is looking for her husband while he is away. Warren recently retired from the Army Communications Systems at Fort Monmouth, where he designed radio kits for military vehicles.

Although the purpose of IMRA is to run a net for missionaries and to provide the rigs to get them on the air, members—like most hams everywhere—are especially proud of their role during emergencies. There is no calculating the works of mercy performed by Amateur Radio operators in times of natural disaster. Being an established net with links to missionaries in isolated places, IMRA members many times have handled emergency traffic in-



An ARRL-affiliated club since April 1983, IMRA has experienced steady growth, both in membership and in net participation, in the past few years. Shown is then-Hudson Division Director W2IHA (second from right) presenting a plaque to (l-r) IMRA past President and Membership Chairman WA2IPM, President WB2GQW and Treasurer WA2YNO when the club became affiliated.

side and outside their own net.

In December 1972, when an earthquake shook Nicaragua, more than 13,000 pieces of health-and-welfare traffic were handled. The Nicaraguan government had designated the IMRA net as the official emergency channel, and almost all the hams in the United States worked through that frequency. In 1976, during the Guatemalan earthquake, the net was loaded with traffic. At that time, Byron Lovelady, WB5BAH, an IMRA member who is a Methodist minister in Houston, was on the air continuously for four days handling health-and-welfare messages. Much of it was emergency traffic between Roosevelt Hospital in Guatemala City and the research department of the Medical Center in Houston. Because of his work, Byron received a letter of appreciation from the government of Guatemala.

Another citation of appreciation to IMRA came from Catholic Relief Services, which had turned to us for help in 1979 when Hurricane David slashed through the Caribbean islands. Slamming across Dominica on the night of August 30, 150-mile-per-hour winds leveled almost every home. When the storm reached the Dominican Republic, its savage fury left 80,000 people homeless. A few days later, Hurricane Frederic hit the latter island with even heavier rains. When normal communications were wiped out, radio amateurs took over. A Hurricane Traffic Net was set up on 14.303 MHz, and IMRA members joined other hams on that frequency to relay health-and-welfare messages for the next few weeks until ordinary communications could be restored.

In New York City, Catholic Relief Services could not make contact with its directors on the two devastated islands. CRS turned to IMRA for help. We established communications with a ham radio station set up at the American Embassy in Santo Domingo, Dominican Republic and another at the Red Cross headquarters in Roseau, the capital of Dominica. For over a week, messages went back and forth with

regard to planes flying down, supplies being distributed, outlets being organized and government clearances being secured.

The Association also is involved in helping missionaries when they need medical information and supplies. It enjoys a close working relationship with MARCO, the Medical Amateur Radio Council, Ltd. MARCO and IMRA have supplied various mission stations with medical supplies and equipment worth many thousands of dollars.

Through IMRA, Amateur Radio has gained many enthusiastic boosters in this country and abroad in the various religious communities. We recently notified 100 Catholic and Protestant foreign mission directors about our work. Most of them responded that they were grateful to hear from us and had no idea of the tremendous possibilities of ham radio to help them in personal communications. Since then, 35 religious communities or dioceses have taken a sustaining membership in our organization.

There has also been a lot of attention given to Amateur Radio in the religious press. For example, in the fall of 1984, the work of IMRA was presented over two national television satellite networks.

The best way to learn about IMRA is to tune into the net and, if you like what you hear, join. Members are kept informed through a bimonthly newsletter. Complete membership information may be obtained by writing to Brother Bernard Frey, OFM Cap, Trinity Retreat, 1 Pryer Manor Rd, Larchmont, NY 10538.

*The Rev Michael Mullen, CM (Vincentian Fathers), is president of IMRA. A ham since 1968, he received the Special Achievement Award at the Dayton Hamvention™ in April. Recently retired after 40 years as Professor of Theology at St John's University, Jamaica, NY, he has been involved in various forms of communications since 1950. He is a past president of the Catholic Audio-visual Educators' Association, and is an honorary lifetime member of CINE, an organization set up at the request of the US State Department to select all American documentary films entered in foreign film festivals.*

## HR 3378 Passes Subcommittee

After being scheduled and cancelled six times previously by a US House of Representatives Subcommittee, the "markup" session on HR 3378, the "Privacy Act" bill, was finally held May 14. At the markup session the bill is literally "marked up" or amended by the Subcommittee and voted on.

The Subcommittee renamed the bill "The Electronics Communications Act of 1986" and, after making some minor changes, approved the bill unanimously.

HQ reading of the bill is that amateurs are totally exempt. The pertinent part of the text now says:

"It shall *not* be unlawful . . . to intercept any radio communication which is transmitted . . . by a station operating on a frequency assigned to the amateur or by a citizens band or general mobile radio services station . . ."

That wording, HQ believes, exempts phone patches; nevertheless, HQ is exploring the idea of adding some language to the report that says so explicitly.

The bill, which received the strong backing of the Justice Department, the American Civil Liberties Union, and the computer and communications industries, proposes a new definition for the interception of radio and electronic communications. Instead of "acquisition of the content," which is the present definition, the new definition would be "interception of the transmission of the content." That is, mere reception of a protected communication would be a crime.

A penalty of up to one year in jail, and up to a \$10,000 fine, would be imposed for intercepting certain transmissions in the short-wave bands—namely, the handful of remote

broadcast pickup stations still operating around 26 MHz. Ship-to-shore radio-telephone conversations may be similarly protected (we're hoping for clarification on this point). Also protected would be any signal "transmitted using modulation techniques whose essential parameters have been withheld from the public with the intention of preserving the privacy of such communications." That includes scrambled and encrypted transmissions, and may even include radioteletype using bit-inversion codes as well.

Scanner owners monitoring the VHF and UHF bands will find there are penalties for tuning in the remote broadcast pickup stations around 153, 161, 450 and 455 MHz; radio common carriers around 152, 158 and 454 MHz (those are traditional car phones); anything encrypted or scrambled; and any FM subcarrier service, even if piggybacked onto a broadcast signal. Willful interception of a cellular phone call would carry a penalty of up to 6 months in jail and a fine of up to \$500.

The bill would make it illegal to eavesdrop on certain electronic communications, including electronic fund transfers, and computer messages and data transmissions. It would become a misdemeanor to use a satellite dish to intercept subscription television signals if the information is then used commercially.

The final version of the bill makes it okay to listen for illegal stations, for land mobile stations to check for frequency before transmitting, to listen to aviation, marine, fire, public safety and similar signals unless they are encrypted, and so on.

A member of the Subcommittee, Rep

Michael DeWine (R-Ohio), attempted to amend the bill to use the terms "intercept and divulge or use" in place of "intercept" alone in the legislation at those points where discussion focuses on unencrypted communications by radio. This is the same terminology in Section 705 (formerly 605) of the Communications Act, which has served since 1912. Rep DeWine pointed out to the Subcommittee many of the arguments that have appeared in the amateur and radio communications trade press. He noted that the legislation would produce only the illusion of protection for cellular radio, since there were millions of TV sets capable of being tuned to cellular frequencies. Moreover, the Justice Department has stated that they don't intend to enforce the cellular provision of the bill. However, his amendment was defeated with only three yes votes being heard. The debate showed that most congressmen wanted, through this legislation, to make a strong policy statement that no one should eavesdrop on neighbors.

Now that the House Subcommittee is wrapping up its work, the Senate Subcommittee considering the companion bill is expected to hold hearings soon. The House may consider this bill within the next two months.

Putting this all together, we can see that the common assumption that all of the RF signals pervading our homes are part of the public domain would no longer be valid, if this bill becomes law. Although the scope of this bill has been narrowed from what it had been, it still represents a great departure from traditional US policies.

## LEAGUE MEMBERS TO CHOOSE BOARD MEMBERS

Who steers the ship of Amateur Radio? Where do its policy decisions get made? By whom? How can you—the amateur in Belleville, Illinois, or Moscow, Idaho, or Idalia, Colorado, or Cuero, Texas, or Chester, Vermont, or Lake Havasu City, Arizona, or Rhinebeck, New York, or Fairmont, West Virginia—get a voice in the running of Amateur Radio's affairs?

There is just *one* national-level, general organization of Amateur Radio in the United States. It goes without saying that its views on subjects related to ham radio will be important. Thus, the members of its Board of Directors play a large role in Amateur Radio decision making. Where do these Directors come from? From among you, the League members. The directors and vice directors serve two-year terms, without salary—and you nominate and elect them as your "Senators" in a representative government.

This year, it is the turn of ARRL Full members (that is, licensed amateur members of all categories—Life, Youth, Senior, Family or Annual) in the Central, Hudson, New England, Northwestern, Roanoke, Rocky

Mountain, Southwestern and West Gulf Divisions to pick a Director and Vice Director for the 1987-88 term.

If you are in any of these eight divisions, read on—this blurb's for you!

### ARRL Divisions

The policies of the League are established by 16 directors, who are elected to the Board on a geographical basis to represent their Divisions and constituents (see page 8 of any *QST* for a list of the Divisions, directors and vice directors). These directors serve for two-year terms, with eight standing for election in alternate years. Just as in national or state politics, ARRL voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection or to decide that other representatives could do a better job and work for the election of those persons. Vice Directors, who can fill in when the Director is unable to serve, are also elected at the same time.

### Call for Nominations

Nominations are now open for Director

and Vice Director in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions for the two-year term beginning January 1, 1987. From now until August 20 at noon, League Headquarters will accept nominating petitions signed by 10 or more Full members of a division, naming a Full member of that division as a candidate for Director or Vice Director.

The candidate must submit information (on a form provided by Headquarters) that will allow the Executive Committee to determine the eligibility of the candidate in accordance with the provisions of the Articles of Association and By-laws and a statement of not more than 300 words setting forth the candidate's qualifications. The EC will meet shortly after August 20 for this purpose, so candidates should make sure their information form arrives at Headquarters as early as possible *and in any event no later than August 30*. (It is in the candidate's best interest, obviously, to get the nomination in *early*. If there is to be a mid-August nomination for some unavoidable reason, the candidate information and 300-word statement should

accompany the nominating petition.) The statement will be included with the ballot mailed to members and will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of this statement will be grounds for disqualification by the Executive Committee.

The nominee must hold at least a Technician class amateur license, must be at least 21 years of age and must have been licensed and a Full member of the League for a continuous term of at least four years immediately prior to the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates: (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

#### Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that Division who were in good standing as of September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1, and, to be valid, must be received at HQ by noon on Tuesday, November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such—each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for Vice Director if he or she wishes. Since all the powers of Director are transferred to the Vice Director in the event of the Director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for Vice Director is just as important as for Director.

#### Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a form may be obtained from Headquarters upon request:

Executive Committee  
The American Radio Relay League  
225 Main St  
Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the ... Division, hereby nominate ... of ... as a candidate for Director; and we also nominate ... of ... as a can-

didate for Vice Director from this division for the 1987-1988 term.

(Signature ... Call ...  
City ... ZIP ... Date ...)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

#### Absentee Ballots

All ARRL members who are licensed by FCC but are temporarily residing outside the US are eligible for Full membership. Those members overseas who arrange to be listed as Full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the US, Full members temporarily living outside the ARRL Division they consider home may have voting privileges by notifying the Secretary prior to September 10 giving their current QST address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions, but your QST goes elsewhere, please let the ARRL Secretary know as soon as possible, but no later than September 10, so you can receive a ballot for your home division.

#### The Incumbents

These persons presently hold the offices of Director and Vice Director, respectively, in the divisions conducting elections this year: Central—Edmond A. Metzger, W9PRN, and Howard S. Huntington, K9KM; Hudson—Linda S. Ferdinand, N2YL, and Stephen A. Mendelsohn, WA2DHF; New England—Tom Frenaye, K1KI, and Richard P. Beebe, K1PAD; Northwestern—Mary E. Lewis, W7QGP, and Rush S. Drake, W7RM; Roanoke—Gay E. Milius, Jr., W4UG, and John C. Kanode, N4MM; Rocky Mountain—Lys J. Carey, K0PGM, and Marshall Quiat, AG0X; Southwestern—Fried Heyn, WA6WZO, and Wayne Overbeck, N6NB; West Gulf Division—Raymond B. Wangler, W5EDZ, and Thomas W. Comstock, N5TC.

Petitions need 10 or more signatures of Full members and are due at Headquarters by noon August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon November 20. The new term will begin at noon January 1, 1987.

For the Board of Directors:  
May 16, 1986  
Perry Williams, WIUED  
Secretary

#### FCC DENIES ARRL PETITION TO REQUIRE LABELING OF RFI SUSCEPTIBILITY

The FCC has dismissed an ARRL Petition to require the labeling of home electronic equip-

ment relative to its susceptibility to radio-frequency interference. The petition requested that the Commission require a tag or notice to be attached to home electronic devices or their instruction manuals indicating whether the device incorporated shielding, filtering or circuitry designed to reduce its susceptibility to nearby radio transmitters. The Commission stated that it approached this problem with the view of minimum regulatory involvement and took note of the voluntary RFI susceptibility standards recently set by an ad-hoc committee of the Accredited Standards Committee (see May Happenings page 47).

The Commission stated that in view of these voluntary standards it was premature to consider mandatory standards and dismissed the ARRL's petition. The League is keeping its options open concerning its response to the Commission's action.

#### FCC ACTS ON REPEATER COORDINATION

The FCC has published a Report and Order in PR Docket 85-22 regarding frequency coordination of repeaters. These new rules become effective 0001 UTC July 12, 1986. The following are the highlights of the Order:

- When there is mutual interference between two repeaters, the Commission says that both repeaters are mutually responsible to resolve the interference between them. If one repeater (or auxiliary operation) is coordinated and one is not, then the station engaged in noncoordinated repeater operation has *primary responsibility* for resolving any interference.

- The Commission decided *not* to require that all amateur repeaters be coordinated. It left open the possibility, however, that if repeater-related coordination difficulties continue to increase in the amateur service without adequate voluntary resolution, then they would reexamine the problem.

- The Commission declined to adopt rules to mandate the use of any particular spectrum-efficient technology, such as tone-operated squelch.

- Amateur coordinators are encouraged to pool together to create an accurate data base, but FCC declined to adopt rules that would require such a data base. The Commission noted that ARRL has agreed to establish and maintain a computerized data base of the nation's repeaters and commended this action.

- Legitimate functions of an amateur frequency coordinator include: (1) denying requests for coordination in congested bands or requiring the use of less congested bands, (2) setting aside frequencies for certain operating modes, (3) limiting antenna height and effective radiated power, and (4) requiring special access requirements as a prerequisite for coordination.

- Since the Commission feels it can now leave to coordinators the matter of determination of acceptable power levels and heights above average terrain, *Section 97.67(c) with accompanying table, 97.85(g) and Appendix 5* of the amateur rules have been *deleted*.

- The Commission did not adopt rules to formulate national band plans or to require them. The Commission favors voluntary band plans over FCC-imposed ones in the amateur service.

For those of you keeping track of the Rules, an unusual FCC error occurred in this report and order. Note that 97.3(k) is a definition



of "coordinated station operation." However, in last January's "Microwave Access Docket," PR 85-23, 93.3(k) was already the designation of the definition of the National Radio Quiet Zone. Sharp-eyed ARRL staffers noticed the error, and the FCC has been notified. The Commission promises to rectify the mistake shortly.

The following are the actual Part 97 changes. We have put an asterisk before 97.3(k).

#### 97.3 Definitions

*(k) Coordinated station operation.* The repeater or auxiliary operation of an amateur station for which the transmitting and receiving frequencies have been implemented by the licensee in accordance with the recommendation of a frequency coordinator.

*(r) Harmful interference.* Interference which seriously degrades, obstructs or repeatedly interrupts the operation of a radiocommunication service.

*(aa) Frequency coordinator.* An individual or organization recognized in a local or regional area by amateur operators whose stations are eligible to engage in repeater or auxiliary operation which recommends frequencies and, where necessary, associated operating and technical parameters for amateur repeater and auxiliary operation in order to avoid or minimize potential interference.

3. Paragraph (c) of Section 97.67, including the table contained therein, is removed and reserved.

4. Paragraph (g) of Section 97.85 is revised to read as follows:

#### 97.85 Repeater operation.

(g) Where an amateur radio station in repeater or auxiliary operation causes harmful interference to the repeater or auxiliary operation of another amateur radio station, the two stations are equally and fully responsible for resolving the interference unless one station's operation is coordinated (see 97.3(k))\* and the other is not. In that case, the station engaged in the non-coordinated operation has primary responsibility to resolve the interference.

5. Appendix 5 to Part 97 is removed and reserved.

## FCC NO LONGER PROVIDES COPIES OF RULE MAKINGS

Amateurs are reminded *not* to write FCC in Washington for a copy of a Rule Making. The Commission no longer supplies this material free of charge. All Commission public notices, decisions, NPRMs, press releases, etc. are available only by purchase from the FCC's duplicating contractor, International Transcription Services (ITS), or through other recognized distribution services.

ARRL HQ called ITS to ask what their rates were for recent FCC dockets. The person answering the phone told us the rates are 7 cents a page plus a \$26 per hour research fee, and that the average research time for a recent FCC docket was one half to one hour!

HQ will provide a copy of any amateur-related Commission rule making free to any ARRL member upon receipt of a business-sized SASE with three units of first-class postage.

## NUCLEAR ACCIDENT

The lack of information via official chan-

nels on the nuclear power-plant accident in the Ukraine once again has brought Amateur Radio into the media spotlight. HQ has been responding to inquiries from newspapers, the networks and the wire services with information provided by an East Coast amateur who speaks Russian and who has been in contact with stations in the Ukraine and elsewhere in the Soviet Union. A number of television interviews with ARRL HQ staff concerning Amateur Radio have resulted.

## NEW FCC TELEPHONE DIRECTORY AVAILABLE

The latest edition of the FCC telephone directory is available from International Transcription Services, Inc. Copies may be purchased for \$2 each by mail from ITS, Suite 140, 2100 M St NW, Washington, DC 20554.

## NEW MEXICO AMATEURS LOWER LICENSE PLATE FEES

New Mexico amateurs have been successful in obtaining repeal of a state law that had placed amateur call-sign license plates into the "vanity" category and raised the fee from \$3 to \$15. Amateurs in the state worked hard to convince the legislature of the value of amateur license plates for emergency and public-service work. The repeal bill, numbered SB-19, was passed unanimously in both the New Mexico House and Senate, and was signed into law by the governor on February 28.

## FCC DENIES PETITION FOR RECONSIDERATION BY ARRL

The Commission has affirmed its previous decision in PR Docket 85-21 deleting the 30-day retest waiting period for an amateur operator license.

The FCC denied a petition for reconsideration filed by the ARRL which argued that a mandatory waiting period was essential to preserving examination integrity. The Commission stated that such a waiting period unduly limited the flexibility of Volunteer-Examiner Coordinators (VECs) to administer examinations. Also, VECs have many alternatives to assure retest integrity, including imposing their own waiting periods, using different or multiple sets of questions or keeping records to assure that persons being reexamined receive different question sets.

## 420-430 MHz LINE A

October 1985 Happenings carried the news that the FCC had removed the 420-430 MHz band from the Amateur Service north of "line A," a line near the vicinity of the US-Canadian border. [See §97.3(f) for an exact definition.]

The Commission has now issued a Notice of Proposed Rule Making, PR 86-163, concerning Private Land Mobile Operation in this band in the Detroit, Cleveland and Buffalo city areas. The Docket proposes 25-kHz channel spacing with a maximum power of 110 watts output. Base stations must be located within 30 miles of the centers of these cities, with mobile stations confined to a 20-mile radius of their associated base stations.

The Commission reminds amateurs that, south of line A, amateur stations operate on a secondary basis and may not cause interference to, or claim protection from, private land mobile operations, including those north

of line A. The Commission does invite comments on technical standards that would minimize interference potential between the private land mobile service and radio amateurs. The last day for filing comments is June 23, 1986 (a date probably already past by the time our readers receive this issue), but reply comments supporting or opposing the remarks of others may be filed until July 8.

## SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Missouri, Southern New Jersey, South Carolina, Western Pennsylvania, Eastern Massachusetts, Nebraska and New York City-Long Island Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters, but are not required. The following is suggested:

(Place and date)

Field Services Manager, ARRL  
225 Main St. Newington, CT 06111

We, the undersigned Full members of the ... ARRL Section of the ... Division, hereby nominate ... as candidate for Section Manager for this Section for the next two-year term of office.

(Signature ... Call ... City ... ZIP ...)

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher and a Full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4 PM Eastern Local Time September 5, 1986.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1986. Returns will be counted November 18, 1986. SMs elected as a result of the above procedure will take office January 1, 1987.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1987.

## SECTION MANAGER ELECTION RESULTS

The following elections were conducted for a two-year term of office beginning July 1, 1986.

Balloting results: In the Northern Florida Section, Royal V. Mackey, N4ADI, received 604 votes; Cameron Magnon, W4UEA, received 556 votes. In the Vermont Section, Frank I. Sutor, WICTM, received 91 votes; Robert McCorkle, WBIAJG, received 79 votes; Ralph Stetson, KDIR, received 49 votes. In the Illinois Section, David E. Lattan, WD9EBQ, received 1224 votes; Joseph D. Cassata, KA9CAI, received 709 votes. 55

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

## OUR GROWING TECHNOLOGY!

When I was licensed in 1933, ham equipment, especially transmitters, had to be "home-built." There were a few "ready made" receivers, but nearly all transmitters were built from parts. Hams learned theory and gained practical knowledge whether they wanted to or not. In the process, they made major contributions to the radio art.

In the late 1940s, the interception of ham signals by poor quality TV and audio equipment imposed far more stringent construction requirements.

As a result, home construction of ham equipment is much more difficult and not as much fun. (Fortunately, there are still some dedicated builders and experimenters contributing to the advancement of the art.) Manufacturers stepped in with some fine equipment and made it easier for more non-engineers to enter the hobby.

Now we have more bankers, lawyers, doctors, etc., enjoying the hobby and contributing in their own way. If we had to depend just on radio engineers and experimenters for public service operations—earthquake, flood, MARCO, storm watch, etc—we would be in bad shape! (I used the term "more bankers" purposely. My 1933 "Elmer" was a banker!)

Some of these people enjoy just operating CW and have no desire, or need, to upgrade. Even a casual listen to some of the Novice calls in the Novice bands will reveal some very good operators, better than is often heard in the "extra" phone bands!—*Jerry S. Stover, W5AE, Dallas, TX*

## RED CROSS SAYS THANK YOU

As you're aware, we're in the process of recovering from floods that have heavily damaged much of north central California. Despite the hectic pace right now, we can't postpone expressing our gratitude to the Amateur Radio community for its overwhelming and effective response to the disaster.

In the Sacramento area, every American Red Cross call for help from our Amateur Radio support team was answered on time and professionally. The local hams under the exceptionally able leadership of Emergency Coordinator KJ6R provided outstanding service to us.

Throughout the disaster area in Sacramento, El Dorado, Placer, Yuba, Yolo and Sutter Counties, amateur support has made all the difference. Our heartfelt gratitude to all.—*Bascombe J. Dunlevy-Wilson, American Red Cross, Sacramento, CA*

## DEAD BANDS?

I should like to add a suggestion to the article "Spots Before Your Eyes" by KITD, in May 1986 *QST*.

Too many of us, including me, tune across, let's say, 10 meters. Nothing heard, so the band is dead. But there might be a hundred

operators around the world doing the same thing. So bat out an occasional CQ. You might not get an answer, but on the other hand there is no telling who might come back to you.—*J. C. Arenburg, W4DZA, Hialeah, FL*

## CODE'S HIDDEN MESSAGE

Reference is made to the May issue of *QST*, page 54, in the Correspondence department, "Hidden Messages."

I have wondered whether hams ever went to see Disney movies for about 50 years, and along comes a confirmation from G3DOJ in the May issue!

I started my first ham station in 1921 (9VA), attended Dodge's Radio School in 1922-23, and got my first commercial assignment on the SS *Manitou* for the 1923 season on Lake Michigan. I worked on ship and shore stations for a few years, finally winding up at a broadcast station in Hollywood. The broadcast station got into financial trouble about the same time that movies began to talk. I met Walt on a movie lot and worked for him the next 41 years.

Radio code was used in a number of pictures. I believe that the cartoon "Pigs is Pigs" was the only one that had Morse code on a sounder. However, I also sent Morse code for the sounder in the old Railway Station at Disneyland and Walt Disney World. I retired in 1971 as Sound Director. Ham radio continues to be a great hobby at age 82.—*Robert O. Cook, W6WV, South Pasadena, CA*

## GRAVITY GRADIENT MODULATION REVISITED

April fools! What a great article! You even had me wondering there for a minute or so. I just finished reading your article on "Gravity Gradient Modulation: The Newest Frontier on Amateur Radio" by David L. Morris, NS5D, and I must say, it is really interesting!

Really now, .025 antigrams of antimatter? And blowing up UPS trucks? You say that too much and UPS will wonder what us amateurs are concocting next!

Anyway, S9+ for the article. I almost fell into it hook, line and sinker.—*Chris Hays, WB0LPV, Florissant, MO*

## "T" IS FOR IMPORTANCE

Regarding W0YBV's letter in the May issue concerning the "T" in RST, I received a T8 report just recently and was very glad to get it. Sounds contradictory, but true. I have a new all band transceiver that I use with a long wire antenna when listening to the lower bands. While shifting bands I heard an interesting station on 20 meters. I had an adjacent transceiver tuned to 20 meters coupled to my all band trapped doublet. I called him and got an answer, but also an RST 578. I immediately recognized what had happened as I had a similar experience aboard ship

many years ago. I had the station QRX a few seconds and disconnected the long wire antenna. Called him back and got an RST 599.

A good note may never be assumed. One can never tell when some odd-ball situation might arise that would give you a signal less than T-9. I'd say keep "RST" the way it is.—*Otto Freytag, K4QFM, Riviera Beach, FL*

Let's settle this "T" in RST once and for all. To those who think it should stand for trivia, how else can you inform the other guy on CW that his tone is less than a pure dc note? The other ham may have a chirp, 60 cycle or 120 cycle power supply hum or other properties which indicate he has a problem on his end. Not everyone has perfect filtering and line voltage regulation. "R" is, of course, for readability and usually indicates sending proficiency. "S" is for signal strength and "T" is for tone, which tells a lot more than most hams realize. It is only excessive courtesy or bashfulness that prevents a lot of us from giving the other guy anything less than a T9 when he deserves less and would appreciate an honest report. In over 46 years of mostly CW, I have heard many a CW note with problems, and I have never failed to give this ham a true report on his "T" (tone)!—*Fred H. Culvers, N9FC, Kenosha, WI*

## MY ELMER—THE GREATEST

For those of you who are ARRL members, many of you haven't been in this hobby long enough to experience seeing old friends listed as "silent keys." It brings back memories when it happens. Just as I have helped you get your license or upgrade, there was a man who helped me in 1964 when I was 15 and wanted to get started in ham radio. His name was Everett Letich, then K9THZ and now N9EV.

He taught me that we are all here to help each other. He took the time to take me to the local club meetings, even when the local club meeting was 60 miles away. He let me read copies of *QST* and *CQ* and listened to me dream about the wonderful rigs that I would someday own. When he went to a hamfest, there was always room for a teenager with not too much money to ride along at no charge. He loaned me books and took the time to explain what I couldn't understand.

As you may have guessed, he died recently and my life is a lot emptier because of that. Some of you wonder why I do the things that I do and why, with my recent illness, I still keep on with the training classes. It is my way of saying a partial thank you to a man you will never know. So if, on occasion, I have helped you in this hobby, it can be traced back to a ham who was never too busy to help a young would-be ham. If you feel that you want to repay any small favor that I may have done for you, remember that sometime you may have the chance to pass on the favor that K9THZ did for the young pre-WN9NJZ. If you do, I know that I will be as proud of you as Everett was of me.—*John Bonar, NA2C, Syracuse, NY*

## W2QHH—A Persistent QRP Quest

*How many new DXers are there out there in the wide, wonderful world of Amateur Radio DXing who really and truly believe "you can't work anything with 20 watts and a wire"?*

Howy Bradley's latest triumph is his 160-meter DXCC. This feat is in spite of numerous adversities: QRP, no radials and an in-town location from the bottom of a 1500-ft "hole" constantly subjected to line noise that runs over S9 most of the time (he's only 150 yards from the local power plant).

W2QHH was first licensed as W8JIW in 1933 (in the same house he still lives in), before western New York was changed from the 8th to the 2nd call area. He has *always* run low power in his personal attempt to prove what can be done from a poor QTH at the bottom of a 1500-ft hole, without a beam, without a decent ground system—a QTH subjected to extremely high noise levels.

His first rig was a 210 final running 22-watts input, crystal controlled on 20 and 40, later accompanied by a single 6L6 on 10 meters using a single crystal on 28,080 kHz. An emergency-powered single 6L6 rig was added, for use on 160, 80, 40 (10- to 17-watt input). The receiver was an SW3 followed by an RME-69. Antennas included end-fed 99- and 270-foot wires. With this equipment Howy achieved prewar WAC, WAS and DXCC.

In the early post-WW II days, a Millen exciter was used on 160, 80, 40, 20, 10 and 11 meters, still crystal-controlled with a maximum input of 35 watts into a 270-ft wire. Viking Rangers 1 and 2 were the first rigs with VFOs that he used: rigs carefully limited to 55-watts input on CW and 40 watts on phone, gear used since they first were available over 30 years ago, along with Collins 75A1, 2, 3 and 4 in succession. With this setup, at least 100 countries were confirmed on each of 6 bands, 160-10 meters. The durable long wire is now 264 feet, due to breakage and splicing, and about 40 feet high, running NW/SE. A brief trial of a tribander in 1970 yielded poor performance because of lack of antenna height (20 feet on the roof) and reflective shielding from the ac lines completely surrounding his QTH. The long wire outperformed the beam in 90% of the world's areas, providing respectable competition with QRO stations to such spots as the South Pacific and long path to the South Indian Ocean. DXers have visited Howy and gone away shaking their respective heads, no doubt looking for a "hidden kilowatt"! One major club emissary took one look at the rig, antenna, etc., and said unequivocally, "It can't be done."

Some awards for which W2QHH was first in North America include the H-22 (for all 22 original Swiss Cantons), BCA (98 countries in Britain), 7-Band WAS, WPR/500 (for 500 KP4s), USA-CA no. 4 (confirming all 3079 USA counties in 1968), British Empire DXCC, Zone 29 Award (confirmed contacts with 25 stations in Zone 29) and the world's



W8JIW/W2QHH in the early '30s with a 22-watt 210 crystal-controlled final, the 20- and 40-meter rig with which pre-WW II WAS/WAC/DXCC were accomplished (400 kHz of 20 meters was covered by five receiver dial points!). His first Asian, a VS6, was "about 14105," with W2QHH crystal controlled on 14,364. (No zero beating in those days!)



W2QHH, still using the original Ranger transmitter. Nowadays the top of the Collins receiver is adorned with a surprise gift of a silver bowl from YLRL, received when Howy confirmed a total of 2000 different YLs (since endorsed for over 3500).

first WAC/YL, WAS/YL and DXCC/YL (issued by YLRL), with YLs from some 180 countries—despite lack of sideband equipment. YLCC-3600 for confirmations from over 3600 different YLs has been achieved (with some 25 more cards on hand for submitting), representing a world record. (What YL is there out there who hasn't been contacted by W2QHH for a sked!) Over 300 award credits have been made. These days, however, award chasing is limited almost solely to making additions to YLCC and DXCC, the latter now coming painfully slow. Total DX confirmed is now 364 all-time and 362 postwar.

The aforementioned emergency rig, with never more than 17-watts input, provided a

good start on top-band DXing in the early 50s, with everything but Asia confirmed. But, pressures of work and health (walking 22 miles a day with heavy loads of mail, often in 2-3 feet of snow and in temperatures that ranged to 35 degrees F below zero) made it necessary to forego "midnight DXing" for some 30 years. Thus, that 160-meter WAC had to wait until 4X4NJ was worked in 1985, and DXCC/160 early this year.

As further evidence of this poor DX location, 30 hams have operated from his town (mostly with more highly elevated locations), all with far more power. W2QHH has worked about a thousand Asians and holds QSLs from some 1300 different stations.

Fortunately, much of Howy's rare DX was worked before the levels of present-day activity, in times of higher sunspot numbers and before his local noise problem reached its current peak. These days noise on 160 runs S9 or better most of the time. For some three years a computer directly beneath his long wire antenna wiped out 160, 80 and 40 for eight hours a day (until it was moved 10 miles down the road!). Most receiving is done on a 135-ft wire about 30 ft high. The 264-ft wire is used for transmitting, although the short wire does a bit better in a few limited areas, and the wires are alternated.

Despite the lack of sideband, some 200 countries have been confirmed on phone, without any real serious efforts on his part. If the rig isn't "cold and drifting," he gets favorable DX comments to the effect that "would never have known that you were on AM if you hadn't told me!"

W2QHH gratefully acknowledges the help by various individual DX stations down through the years. But, at least 95% of his DX has been the result of his own efforts (which have never made use of CQ DX!).

For those "purists" who question 20-watt output as being QRP, Howy feels that it has to be so, considered in today's QRO American handdom and that 20 watts to an end-fed wire (without a tuner) likely equates favorably with 4-5 watts to a good beam in a decent or elevated QTH.

Although he never submitted the cards, for some strong personal (and noble) reasons, Howy is most proud of what he believes is the world's first 3.5-MHz DXCC (1953). (ARRL has not endorsed it for single band.)

DXing and awards chasing have gone hand in hand with Howy's public-service activities. He has handled considerable third-party traffic through the years, especially with Canadian Arctic outposts (and he has received three ARRL Public Service Awards).

W2QHH, the oldest USA FOC member in point of membership years (First-Class CW Operators' Club), epitomizes the club's motto, a line well worth remembering: "A man should keep his friendship in constant repair."

### DIXIE DXers

NQ4I reports on his recent DXpedition to 8RIZ,

a trip he calls the first major contest effort from 8R1 ever, and one which netted him 6k+ contacts, single operator all-band. Rick is a member of the Dixie DXers Contest Club, headquartered in Atlanta. The club was organized four years ago and, since its inception, has mounted expeditions for every major contest. Club member K4JPD made tremendous scores from HH2CQ. Other notable efforts include 4V2C on phone and CW for the last three years. The club meets at 6 PM the third Thursday of the month at Morrison's Cafeteria, Virginia Ave, Hapeville, Georgia. The club's officers this year include President W8ZF, VP K4JPD, Secy/Treas WD4IKI and (you might guess!) Contest Chairman NQ4I.

## ZL1AMO

Ron still has logs and QSLs for: VR6HI, Mar/Apr '79; ZK1MB, Aug '79; ZK2EA, A35EA, 5W1CW, Aug/Sep '80; H44RW, Apr/May '81; VK4ANS/LH, Jul '81; YJ8RW, Nov/Dec '81; 3D2RW, Sep '82; ZK1CQ, Aug '79 and Apr '82; ZL1AMO/C, Nov/Dec '80 and Mar/Apr '83; ZK9RW, Oct '83; ZL8AMO, Mar '84; ZL7AMO, May/Jun '84; FW0BX, Oct '84; A35EA, Mar '85; 5W1CW, Nov '85. Ron also manages cards for ZL7AA (whew!). Ron Wright, ZL1AMO, 28 Chorley Ave, Auckland 8, New Zealand. (special thanks to W2TKG!)

## THAILAND

KC7V reports on his recent trip to the Far East and Southeast Asia. He was able to attend the monthly meeting of the Radio Amateur Society of Thailand (RAST) in Bangkok. Their club station HS0A is active only in major contests. HSIYL (XYL of Silent Key HSIWR) and a group of dedicated hams have been working

## Troster's Tips for Easy Listening

### Working Split

You are the DX station and are now working "split." That is, you call for answers on a frequency different from that of your transmit frequency. But, if you say "U2," never work anyone closer to your own frequency than "U2." Listen where you say, or above.

After each QSO your callers will tend to pile-up on, or very close to, the frequency of the last station you worked. You, the DX station, may have to tune several hundred cycles higher after each QSO to find a clearer frequency. You are thereby setting a working system of "drifting up" after each QSO. The astute DXers will hear your moves and will move up to where they hope you will be listening next. But, every op doesn't follow along. So, in effect, you are spreading out the callers, thereby reducing QRM a little on your end (maybe!).

But, don't drift too far. Remember there are other people on the band who aren't calling you and who have their own QSOs going. You don't wish to be guilty of causing QRM to other ongoing contacts by spreading your callers out too far.

After you drift up 4-5 kHz, start drifting back again, or pick the loudest signal, snap back to "U2" and start over, or just jump back and forth to find a signal that you can copy. If you want to generate some fun, say "D2." Now, that will separate the fellows who are copying you from continuous callers (known, in some circles, as lids). But, don't say "D2" if you are working only 1 kHz inside the band! You just know there will be some of those lids who will indeed drop out of the band to call you!

More next month from W6ISQ.

diligently with the government in opening up Amateur Radio. Currently, the group must obtain special permission to operate the contests. According to HSI AOL and HSI AOK, the efforts are starting to pay off, and another club station may soon be on the air.

## GRENADA

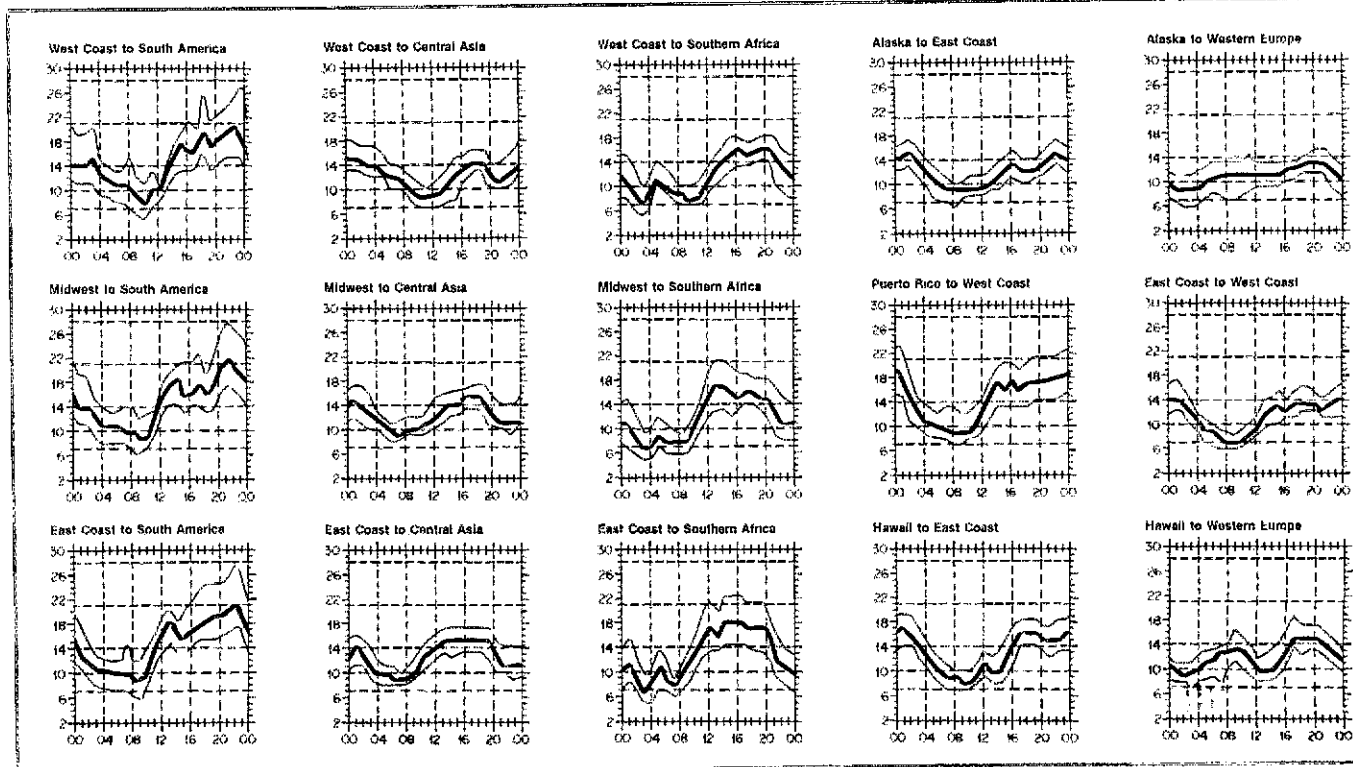
K4LTA's seventh venture into the Caribbean netted his group of eight operators a total of 19,500 contacts: about 15,000 were on CW (3400 in the CW DX Test), and 4007 in the sideband contest—before dupes. QSLs for all contacts with J34Z, including both contests, go to NF5Z. For contacts with J34LTA, confirm via K4LTA, J34WG to W5PWG, and J34HN to N6LHN. Cards to WA8FSX/J3, N4MMV/J3 and N4FKO/J3 go via their stateside CBA. The group was warmly received by the local amateurs on Grenada and enjoyed their visit to this beautiful island. K4LTA was personally pleased that he was able to make 140 EU contacts on top band—better than his previous trips. Where to next year, Bill?

## DXers QSL MANAGER DIRECTORY

WA3WIX reminds us of WB4KCL's computerized listing of over 12,000 QSL Managers (including both foreign and stateside), covering 1979 to the present. Reese feels that this over-248 page compilation is "one of the best" for serious DXers. It goes for \$14.95 for North America, \$24.95 for others. Write to Fred Smith, WB4KCL, 2265 Sweetbriar Dr, Alexandria, VA 22307.

## CALL-SIGN SUFFIXES FOR CHINESE STATIONS

Thanks to JA1UT and WA3WIX for providing



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the

the following information on the call-sign-assignment system in China. The call-sign prefix for a Chinese amateur station is BY (for a permanent club) or BT (for a special event). The suffix depends on the station location.

1AA-ZZZ Beijing	4RA-ZZZ Jiangsu	8AA-IZZ Sichuan
2AA-IZZ Hei Long		
Jian	5AA-IZZ Zhejian	8JA-QZZ Guizhou
2JA-QZZ Jilin	5JA-QZZ Jiangxi	8KA-ZZZ Yunnan
2RA-ZZZ Liaoning	5RA-ZZZ Fuzian	9AA-FZZ Ningxia
		Huizu Z*
3AA-FZZ Tianjin	6AA-IZZ Henan	9CA-LZZ Qinghai
3GA-LZZ Nei Mongol Z*	6JA-QZZ Anhui	9MA-SZZ Shaanxi
3MA-SZZ Hebei	6RA-ZZZ Hubei	9TA-ZZZ Gansu
3TA-ZZZ Shanxi	7AA-IZZ Hunan	0AA-MZZ Xinjian Uygur Z*
4AA-IZZ Shanghai	7JA-QZZ Guangxi Zhuangzu Z*	
4JA-QZZ Shandong	7RA-ZZZ Guangdong	0NA-ZZZ Xizang Z*

\*Z = Zizhiqu

### THE CIRCUIT

□ **Montserrat:** A multioperator effort by W2JGR, K2MFY and K2OVS (members of the LIDXA) is expected in time for the July IARU HF Championship (formerly the IARU Radio-sport Championship), all bands/modes. QSLs go to the operators' home calls.

□ **J87BS:** WB6WQA notes that Stuart's manager (NW5K) can't get the logs. (Stay tuned.)

□ **KP2:** As a result of increasing cruise-ship activity, the weekly noon luncheon meeting of the Virgin Islands Amateur Radio Club has been changed from Tuesday to Monday. The friendly event takes place at the Dolly Deck, Havensight Mall, Charlotte Amalie.

□ **St. Kitts:** KG9N notes he'll be operating /V4 Jul 16-29, 80-10 phone/CW. Cards via Chuck

Van Hoorn, KG9N, Box 57, Goodfield, IL 61742.

□ **NADXA:** The Northern Arizona DX Association, a League affiliate, is located in the northern third of the state, with Flagstaff being the primary meeting center. The group monitors 147.50 simplex for DX info. New Pres KR7Y, Secy W7YS and Program Chairman NN7A welcome visitors; POB 2741, Flagstaff, AZ 86003.

□ **V2A:** From Nov 21 to Dec 31 last year, the Southwest Ohio DX Association operated CQWW C/W from Antigua, not to be confused with a spring (of this year) phone operation under that call. QSLs for the CW contest contacts go to John Young, K8BA, 105 Bramble Bush Dr, Springboro, OH 45066. Cards for contacts made just before or after the 1985 operation should go to the individual home addresses.

□ **JARL:** The DX Family News Letter reminds us that 1986 is the 60th anniversary year for the Japan Amateur Radio League, and that there exists the possibility of some contrast and/or big DXpedition to somewhere before year end. (Shades of Okino-Torishima!)

□ **EL2AY/TU2NG:** Cards for these African contacts go via Carol McClure, N5GAP, 3428 Kilrush Dr, Arlington, TX 76014.

would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and therefore may not be accurate. The call sign in parentheses is the QSL manager.

A35EA (ZL1AMO)	UA1OT (UB5KW)
CE8CON (WB3CON)	VP2MJ (W2BJI)
CU2AK (CT2AK)	VP2MO (WB2LCH)
HC5EA (K8LJG)	VP2MU (K1CLN)
HG1Z (HA1XR)	March 1986
HH2W1 (KF6CN)	VP5Y (N6ER)
HK0BRX (WB9NUL)	VP8LP (G3VFN)
I341TA (K4LTA)	V2AJI (W2BJI)
I34WG (W5PWG)	V47KJ (WB2JI)
I34Z (NF57)	V47M (N1OE)
J73YB (KD4ZS)	ZF2HI (KZ2E)
J87BM (W1JPW)	Z56LJA (N4NW)
PJ0B (K3EST)	3G3DX (CE3ES)
PZ5JR (K3BYV)	3X0HSH (DK8PR)
PY0FG (PT7AZ)	5X5GK (DJ5RT)
PY4WAS/PQ8 (PY4AG)	6Y5HN (KC3EK)
P40M (KB9AW) 1986 only	8P9AF (VE3LG)
S90AS (IT9AZS)	9U5JB (ON5NT)

### QSL Manager Volunteers

KA6SAR  
LZ1OT

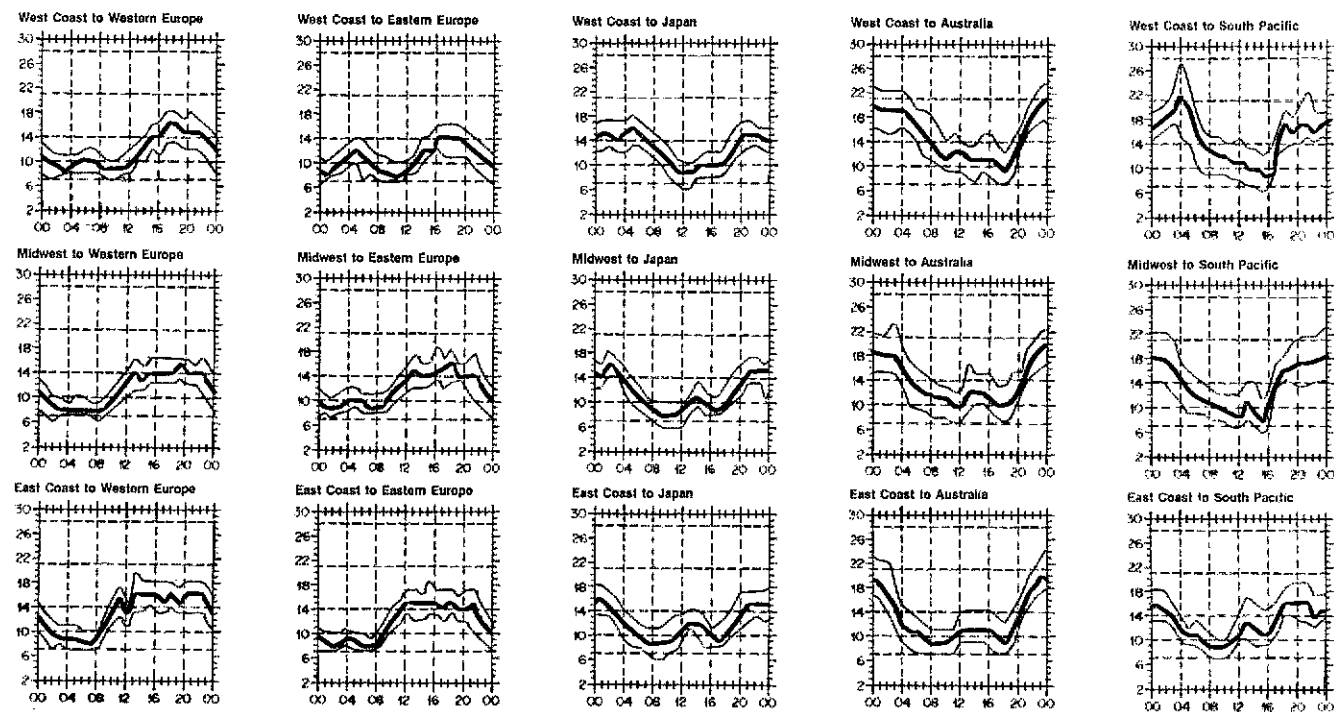
### Special Notes

- KE3A is not the manager for 6Y5IC.
- W1WI is not the manager for XU1WR.
- Clipperton DXpedition '86 QSL via YASME Foundation, Box 2025, Castro Valley, CA 94546.
- QSL Corner, Jun 1986 QST, contains information and addresses for ARRL Incoming Bureaus. Mar 1986 QSL Corner contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

## QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who



month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). See April 1983 QST, page 63, January 1977 QST, page 58, September 1977 QST, page 35, and January 1979 QST, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for July 16 to August 15, 1986, assume a sunspot number of 9, which corresponds to a 2800-MHz solar flux of 71.

# DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from March 1 through March 31, 1986. An SASE will bring you the rules and application forms for participation in the DXCC program.

## New Members

### Mixed

CT4CP/185 D.121 H/111 DJRFV/107 DK9HN/136 F06IGF/105 G3AQB/101 G3WPF/288	GI4PMP/103 GM3RFO/107 GM4BWT/104 HA8IB/104 HU1DX/104 IV3BLQ/117	IK4DCT/104 IK5CQV/221 J73DF/108 JG2CLS/149 JA3DM/105 JA3FKK/153	JE3LWB/309 JA4FMS/109 JH4BWJ/110 JH4KMA/205 JR6LDE/218 JH9AUB/273	JA0CWZ/315 LA2EG/225 OK1DIL/105 PA3AGI/129 SM7FBJ/101 SP3CB/262	YU2LDD/100 4X6IL/165 W1TOS/100 W1ULLE/107 AE2L/118 KA2ELW/299	KB2OR/101 N12Z/103 W2TJO/110 K1T3H/103 N3CZJ/106 WA3WBU/127	N4HKK/104 W4JM/180 WA4JWS/130 KE5OD/106 NN5G/122 N6IBM/103	W7DP/157 KD9OT/104 KD9OO/136 N9BMS/256 KE0V/188 N0CLV/106
--	--	--	--	--	--	--	---	--

### Radiotelephone

CT4CP/152 DK9HN/125 DL3FAH/115 E5DIL/112 G4OWN/121 G4VZU/107 GM3WIL/135	GW4UZL/124 HA5SO/120 HK4AHX/110 HK4DHH/277 IV3BLQ/115 JA1ABP/105 JG2CLS/107	JR6LDE/214 JH8WGR/105 JA0CWZ/215 JQ4WR/210 LA2EG/103 K1ABP/101 OK1HP/101	P17NK/178 PT7ZD/107 SV1UG/120 SV1VS/106 VE4AGT/124 YV1DPS/285 4X8IL/158	K1NIT/100 KA2ESQ/102 KA2UTV/161 K33F/135 K3CZJ/101 AA4FL/108 K4SWF/200	WA22GO/148 KC3AW/100 KC3DJ/113 K53F/135 N3CZJ/101 AA4FL/108 K4SWF/200	KB4IZB/100 KD4OH/204 W4APQ/259 W4KHZ/197 W4TLA/101 WA4BQH/160	WA4ETN/105 WA4GRZ/103 N6IBM/103 WN6R/163 N7ACK/108 N7FTL/106	W7DP/122 K9AYK/102 KD9OT/104 KM9W/209 N9BMS/238 KE0V/106
---	---	--	---	--	---	--	---	---

### CW

CT4CP/119 F9BB/137 G3WPH/272 HA1YG/124	JA1CWZ/112 JG2CLS/117 JE3LWB/284	JH9AUB/191 LA2EG/116 OK1DIL/105	OK1DJM/105 OK1VK/265 SM5AOB/212	SM5CAK/229 SM6AHS/169 NN2G/106	WA2AQG/100 WA2AXK/100 KC4DY/113	W4NUS/198 K6GS/110 KD8WP/110	KM9W/113 N9BMS/110 N9CVO/108	N9KX2/100 NF9V/110 W9FF/105
---	--	---------------------------------------	---------------------------------------	--------------------------------------	---------------------------------------	------------------------------------	------------------------------------	-----------------------------------

### 160 Meters

F6BWO/102	I2ZGC/104	I77V/102	ZL3GQ/102	W0CM/101
-----------	-----------	----------	-----------	----------

### 5BDXCC

KB2RZ SP3BYZ L21KSN	W05P F7LAY LA2EG	JR3HZW KA1DGS OK1AJN	N6VI N2CIC W0H8H	CT2CE W1RQ UQ2DGM	KF4NO HA5KKB K2UJFM	UA3PDW RB5MT UA4CBO	UA6RB JABVA	K7ABV JA1ATK
---------------------------	------------------------	----------------------------	------------------------	-------------------------	---------------------------	---------------------------	----------------	-----------------

## Endorsements

### Mixed

CT2CE/268 CT2CJ/205 DF4TD/252 D95FM/201 DK1HO/227 DL2GBB/163 DL3IE/313 DL3NA/1184 DL6DK/182 DL7MAE/298 DL7WL/305 E17CC/287 F6EYS/294 GM3CSM/303 GM3WIL/256 J0MU/284 JL8P/216 JL9TO/223 JF1WOC/229 JL1BLW/278 JM1KYK/163	JH1EBE/310 JR2CFD/213 JH7LMZ/292 JA8CAQ/258 JA0AZE/292 JA0CAK/313 LU1SE/263 OE2KGM/237 OK1ABP/297 OK2QR/310 SL0AS/281 SM5CSS/261 SM5HYL/294 SM6AHS/295 SM0CCM/308 SP6EAQ/305 SP6EWY/316 W2QAG/304 SV1JA/154 T429K/199 VE3HO/313	VE3NSZ/176 VE4AGT/125 YU1NR/248 YU2OB/315 YU7DR/230 4Z4KK/275 AK1A/284 K1KOB/282 K1RHH/298 K1WJ/310 K1YR/275 K1ZLA/175 KA1A/283 KA1MX/152 KE1F/301 NK2H/266 N1AKX/304 W1ACB/310 W1DCH/330 W1FG/205 W1KB/319	W1OQP/251 W1HQ/316 W1UA/154 K2AX/201 K2MPB/144 K2QFY/209 K2SD/252 KA2AO/1131 KA2UTV/161 K4SE/309 K4TIA/273 K4ZCQ/175 KB4FQ/307 KB4IL/304 KC4QT/250 KF4R/125 N4AVV/306 W4ZD/275 KU5L/256 N4DAZ/299 N4ERM/160	AA4AM/259 AA4EH/128 AA4KT/310 AA4VK/306 AK4H/202 K4AOH/189 K4HTY/280 K4NYW/307 K4RIG/304 K4SE/309 K4TIA/273 K4ZCQ/175 KB4FQ/307 KB4IL/304 KC4QT/250 KF4R/125 N4AVV/306 W4ZD/275 KU5L/256 N4DAZ/299 N4ERM/160	N4GFV/273 N4SF/320 N4VG/303 NM4L/280 W4DMV/299 W4EJH/279 W4FNS/279 W4JTL/291 W4LZW/250 W4MGX/306 W4PNY/250 W4BEC/306 W4BKD/132 W4A0B/308 W4SSM/146 W4CSC/269 W4JTL/275 W4ZD/275 KU5L/256 N4DAZ/299 N4JR/309	N05R/302 W5JQC/315 W5JFI/281 W5XG/144 W5AGD/305 W5SCRG/209 K6LY/150 K6X/251 K6GS/280 N6VI/293 W6SWD/304 W6CTL/300 W6GYM/279 W6KVF/310 W6MND/307 W6TFO/312 W6RSE/308 W6RUV/205 W6G/251 K7LJQ/284 KE7CR/128	KY7M/249 N7MW/307 W7FF/251 W7ID/300 ABK/316 K8BXD/130 K8BFJ/202 K8DHX/201 K8JY/235 K8Rv/241 KR8W/301 N8AVK/284 N8BEF/152 N8CEO/207 W8GWC/272 W8KDL/159 W8NPF/320 W8UJ/317 W8WU/307 W8YMB/249	W8SXM/125 K9HLG/283 K9JS/299 K9US/301 K9JUL/144 K9OTD/129 K9DL/125 K9M/281 KE9U/301 KM9L/300 N9BOK/251 N9CAS/152 W9FZ/270 W9MCR/316 W9SRC/312 W9VOC/377 W9XZN/264 K9BY/174 W0JMJ/318 W0RUD/176
---	---	---	---	--	---	---	---	---

### Radiotelephone

CT1TM/204 CT1TZ/217 CT2CE/268 CT2CJ/205 DL6NX/317 DL6QW/314 DL7MAE/287 F48AKN/262 E17CC/285 F6AXP/312 F6FYD/138 G4GED/262 GM3CSM/271 HB9GN/299 HIBJ/259 I2KJ/252 IV3VER/312 J4CSP/279 J8TOH/225 JA1DM/332 JL1BLW/255	JM1KYK/163 JR1AIB/313 JR1EBE/302 JA3FYC/245 JH4KMA/199 JA7ZF/317 JA0CAK/294 JA0GZ/313 LU1SE/262 J7MAJ/299 OE2KGM/215 OK1VK/306 OK2QR/238 PT2TF/295 PY4OD/294 PY5WD/310 SM5BFC/311 SM5AOB/325 SM6CAK/319 SM5CSS/240 SM6HPB/308	SM5HYL/285 SM6AHS/292 SP6EAQ/305 SV1CS/283 VE3CWE/252 VE3HG/157 VE3HO/307 VE6WQ/307 W2IOQ/318 W2SSC/285 W3MNO/231 N3CWD/156 W3NB/215 AK1A/277 K1ZLA/175 W3ZNI/314 AA4KT/306 AA4VK/306 AE4X/326 K4HGG/200 K4ZTP/308 K4RIG/304	KC2WQ/230 N2BAT/269 N2CIC/167 N2LW/313 NK2H/265 NN2G/245 W2GZA/268 W2HNN/279 W2IOQ/318 W2SSC/285 W3MNO/231 N3CWD/156 W3NB/215 AK1A/277 K1ZLA/175 W3ZNI/314 AA4KT/306 AA4VK/306 AE4X/326 K4HGG/200 K4ZTP/308 K4RIG/304	K4SE/308 K4JRK/303 K4ZCQ/167 KB4CWO/199 KB4FQ/306 KD4RH/252 KF4NO/257 KQ4O/304 KV4F/304 N4AVV/303 N4BYU/298 N4CID/290 N4CRI/261 N4DDZ/199 N4NX/315 N4SR/316 N4VG/301 N4ZC/324 NY4H/262 W4BOY/326	W4DMV/260 W4HUU/177 W4JZ/273 W4KHL/200 W4PNY/228 W4RNV/230 W4UNP/303 W4UW/294 W4WWM/310 W4BEC/305 W4A0B/302 W4A0EJ/300 W4APL/303 W4QNP/316 W4JTL/250 W5QCP/319 KCSZ/225 K6V5E/273 N5JR/272	N05N/306 N05R/302 W6SWD/304 NY5L/301 W5LVD/305 W5MUG/314 W5UFI/281 W5UJR/146 W5SCRG/302 W6SINB/153 K6CBL/274 K6LM/301 K6UD/310 N6HVZ/184 N6MU/314 W6GYM/279 W6OMR/315 W6TFO/297 W6V8/323 W6AALC/149	W6RSE/284 W6LAW/204 W6EKR/271 K7GEY/305 K7LJQ/284 KB7DA/256 KY7M/204 W7EDA/297 W7FF/249 W7RSE/275 W6SINB/153 K6CBL/274 K6LM/301 K6UD/310 N6HVZ/184 N6MU/314 W6GYM/279 W6OMR/315 W6TFO/297 W6V8/323 W6AALC/149	W8RSE/284 W6LAW/204 W6EKR/271 K7GEY/305 K7LJQ/284 KB7DA/256 KY7M/204 W7EDA/297 W7FF/249 W7RSE/275 W6SINB/153 K6CBL/274 K6LM/301 K6UD/310 N6HVZ/184 N6MU/314 W6GYM/279 W6OMR/315 W6TFO/297 W6V8/323 W6AALC/149	W8WQJ/287 W8MGQ/310 W8PJK/314 K9HLD/316 K9HLD/282 K9MK/301 K9PJZ/204 K9SI/300 KE9U/301 KM9L/298 W9XX/309 W9JZ/237 K0FL/307 K0JZM/200 K0BFW/126 W8MCH/251 W8MCD/318 W8JZ/313 W0PT/307
--	---	---	--	---	--	--	---	---	--

### CW

DL1KB/258 DL2GBB/151 DL6QW/270 DL7MAE/278 DL7WL/284 HB9GC/204 J0MU/200 J1VDDQ/249 JA1FNA/298 JA1HGY/285 JR1EBE/300 JR1FY/306	JA3BQE/305 JA3JQR/160 JA4LX/285 JA5PUL/281 JA6RSM/307 JH7LMZ/292 JA8CAQ/253 JA8UNJ/286 JA0CAK/296 JA1AA/126 LA9XG/201 OE2KGM/125	OK1MG/296 PY5WD/300 SL0AS/281 SM5CSS/186 SM5DQC/294 SM6DYK/281 SM6CVX/232 SM0CCM/265 SP6EWY/288 SM5CVZ/267 VE3HO/213 VE6WQ/268	VE7AAQ/266 YU2WQ/225 YU2TW/298 4Z4DX/278 4Z4KX/191 AK1A/180 K1RHH/296 K1SA/273 K1VJH/174 W3ZQJ/128 W1FZ/303 W1GNR/258	W1KEE/188 W1ZW/184 K2SHZ/276 KF2F/201 W2Y/235 413E/226 K23B/161 N3EU/264 W3AP/300 W3ZQJ/128 AA4KT/303 K4CEF/268	K4HTY/201 K4MG/199 KB4S/255 N4ERM/145 N4JZ/207 N4NX/316 N4YH/221 W4BA/250 W4BFL/285 W4JTL/272 W4MGX/166 W5RRC/306	W5AS/198 W5LJ/274 W5B/156 K6JG/306 K6LM/289 K6VL/217 N6MU/285 N6E/193 NS6E/133 N6VR/263 W6CTL/167	W6SN/257 W6TFO/296 W6RSE/306 K7Z/295 N7CM/260 N7MW/293 W7EDA/286 W7LUV/297 K8DY/305 W8MCA/315 W8GKM/267	W8HO/259 W8SW/307 W8UJ/205 K9BWO/275 K9JM/156 KE9U/276 KM9L/260 W9W/307 W9KQD/298 W9X/270 KE9Y/153
---	---	---	--	--	--	---	---	--

### RTTY

W0HAH/150	W0LYM/150	160 Meters OZ1LO/127	4X4NJ/138	F3JIA/125	N4WW/182	K9JWA/126
-----------	-----------	-------------------------	-----------	-----------	----------	-----------

## Annual Listing Correction

CW: VE3BX/287

# DXCC Honor Roll

Administered by Don Search, W3AZD

The DXCC Honor Roll is comprised of those calls signs that have been credited with at least 307 of the 316 current countries on the DXCC list. Total DXCC credits including deleted countries, are shown after each call sign. The large, boldface numbers indicate total DXCC credits not including deleted countries.

## Mixed

### 316

DJ1XP/338  
DJ2BW/359  
DJ7ZG/343  
DL1BO/358  
DL1HH/351  
DL1JW/354  
DL3BK/354  
DL3RK/359  
DL7FT/343  
DL7HU/311  
DL8NU/338  
DL9OH/353  
F3AT/353  
F8RU/336  
F9RM/351  
G3AAE/361  
G3FKM/359  
G3MFB/359  
G3IVJ/356  
G6M3ITN/350  
G73AHN/381  
GW3DX/347  
HB8MQ/359  
HB8NQ/352  
HB9PL/351  
I2KMI/342  
I4AMU/360  
JA1BK/349  
JA1BRK/345  
JA4ZA/343  
LA9CE/337  
LU5DO/356  
LU8DJ/366  
OE1ER/364  
OE1LO/346  
OH2BH/344  
OH2BZ/343  
OH2OQ/354  
OH2OV/347  
OK1ADN/347  
OK1MP/347  
OK3MM/356  
ON4DM/356  
ON4IZ/347  
ON4NC/362  
OZ3Y/349  
PA0LU/354  
PT7YS/357  
PY1HX/355  
PY2PA/343  
PY2PE/343  
SM5BBC/336  
SM7ANB/352  
SM8AJ/354  
SP7HT/339  
VE3MU/340  
VE3SR/359  
ZS6LW/355  
4X4DK/360  
4X4FO/348  
4X4JU/357  
W1AA/355  
W1AFF/348  
W1AXA/358  
W1BH/365  
W1CKA/352  
W1DGJ/347  
W1FZ/360  
W1GKK/368  
W1HH/353  
W1HX/362  
W1HZ/360  
W1JNW/357  
W1JR/358  
W1NQ/356  
W1OQ/341  
W1UW/348  
K2BK/356  
K2BS/344  
K2FB/349  
K2FL/358  
K2LWR/356  
K2MU/340  
K2PXX/346  
K2TCC/349  
W2AG/352  
W2AGM/366  
W2AO/359  
W2AY/360  
W2BHM/355  
W2BMM/353  
W2BOK/358  
W2BXA/366  
W2FXA/354  
W2FZY/355  
W2GK/343  
W2GKZ/344  
W2GT/360  
W2HZ/338  
W2JVU/363  
W2LPL/359

### 314

K8OHG/346  
K8ONV/350  
W8A/H/358  
W8BF/363  
W8CUT/349  
W8DMD/363  
W8DT/365  
W8GZ/365  
W8JBI/360  
W8JIN/366  
W8KJ/342  
W8KPL/358  
W8LKH/361  
W8MPO/360  
W8PHZ/357  
W8PFR/344  
W8QY/355  
W8RSW/343  
W8RT/360  
W8TCC/355  
K9AB/355  
K9ECE/351  
K9RJ/339  
W9C/H/349  
W9DWC/355  
W9DY/354  
W9GIL/359  
W9JUV/360  
W9RCJ/354  
W9SFR/357  
W9SM/365  
W9WBV/363  
W9WLA/365  
W9WMLY/363  
W9PGI/358  
W9QGJ/358

### 314

W1AX/363  
W1DK/359  
W1OT/333  
W1RLQ/348  
K2BZ/358  
K2JMY/343  
K2LE/341  
K2YLN/341  
W2CP/346  
W2FG/338  
W2GW/359  
W2HTI/357  
W2PN/342  
W2TP/335  
W2XN/355  
K3KP/340  
W3AFM/354  
W3GRS/353  
W3VT/361  
A4AMM/336  
A4AS/331  
K4CIA/341  
K4DY/337  
K4IKR/339  
K4MZU/338  
N4EA/337  
N4PN/326  
N4WW/337  
W4BBI/346  
W4DRK/347  
W4EEU/342  
W4GD/361  
W4GT/S/337  
W4JD/331  
W4NKK/339  
W4OM/362  
W4QQN/342  
W4WV/352  
W4XR/334  
W4AWIP/340  
K5DJ/357  
N5AR/344  
W5HE/342  
W5KGX/357  
W5LCI/351  
W5OB/351  
W5PQA/359  
W5QK/352  
W5SDA/347  
HB9AA/335  
HB9BA/337  
HB9TL/357  
I1ZL/353  
I8AA/339  
I8KDB/354  
I19TA/357  
I19ZG/356  
JA1BN/347  
JA1BWA/341  
JA1DM/355  
JA1JRK/334  
JA1MCU/337  
JA2XW/341  
JA3DY/349  
W6GMF/349  
W6HYG/353  
W6KH/353  
W6KUT/360  
W6QL/339  
W6RGG/341  
W6RKP/356  
W6SQP/357  
W6TJD/361  
W6WGF/340  
K7ABV/339  
K7KG/336  
N7EB/353  
N7RO/330  
W7C/MO/351  
W7DY/340  
W7JFO/335  
K8YJ/340  
K8FF/345  
K8FL/342  
K8BVM/358  
W8BKP/354  
W8DCH/338  
W8GKM/334  
W8XNO/357  
W8OK/352  
W8OFR/335  
W8R/CM/336  
W8YGR/345  
K9CJ/340  
K9MM/335  
K9RA/334  
N9AB/333  
N9ZN/346  
W9AQ/341  
W9DC/338  
W9FKC/360  
W9GU/351  
W9KUN/347  
W9KOD/339  
W9NDA/364

### 314

W9TKD/350  
W9ZP/333  
JA3BG/337  
W8AH/356  
W8AX/362  
W8DU/363  
W8LWG/352  
W8SYK/359  
W8ZV/349  
K4MOG/344  
K4RA/329  
K4XG/334  
N4KG/335  
N4MM/336  
N4ZC/337  
W4AXR/354  
W4BAA/356  
W4EO/354  
W4FX/351  
W4FPW/332  
W4OEL/337  
W4OO/350  
WB/OSS/333  
K5OS/332  
K5RC/337  
K5UC/360  
K5UR/334  
N5RR/334  
W5AL/359  
W5DOZ/319  
W5EJ/345  
W5GO/335  
W5IR/334  
W5MMK/361  
W5TO/339  
W5UN/354  
W5UR/346  
K6EC/354  
K6PU/342  
K6QH/340  
N6MU/329  
N6UC/333  
W6BA/359  
W6BJH/329  
W6BVM/354  
W6CHV/359  
W6GR/337  
W6HL/345  
W6SC/340  
K1KI/326  
K1NA/338  
W1DA/327  
W1G/G/336  
W1JZ/332  
W1KG/325  
W1SP/348  
K2SHZ/350  
K2VJ/328  
W2FP/333  
W2GLF/352  
W2VUF/336  
W2CBB/359  
W2YQH/331  
K3AV/345  
K3NL/331  
K3TUP/330  
K3ZF/330  
W3BL/331  
W3PL/333  
W3XM/338  
AB4H/329  
K4BBF/333  
K4HJE/333  
K4IVS/347  
K4SM/357  
W9TK/335  
N4CC/328  
N4TO/338  
W9ZRX/333  
K0BUR/336  
K0CD/349  
W0CD/333  
W0DE/351  
W0GL/351  
W0PAH/336  
W0SD/334  
W0UD/336  
W0OAH/334

### 314

JA1JAN/331  
JA1OCA/332  
JA3BG/337  
JA3BQE/328  
JA3GM/326  
JA3MNP/325  
JA8EAT/325  
KP4RK/349  
KV4FZ/333  
LA3X/342  
LABL/324  
OE2EGL/335  
OE3WWB/329  
OH2BCV/328  
OH2LU/328  
OH2VB/334  
OK2RZ/322  
ON5KL/331  
OZ3PO/340  
OZ7JZ/331  
OZ7YY/325  
PP5UG/336  
PY1DH/347  
PY1HQ/354  
SM6CST/328  
SM7DMN/324  
SM7EXE/331  
VE2WA/347  
VE3TU/340  
VE4OX/341  
Y03JU/334  
YS1O/353  
YU7BCD/342  
YV5AIP/348  
ZL4BO/346  
ZS6W/345  
4Z4DX/322  
K1BW/329  
K1JO/329  
K1KI/326  
K1NA/338  
W1DA/327  
W1G/G/336  
W1JZ/332  
W1KG/325  
W1SP/348  
K2SHZ/350  
K2VJ/328  
W2FP/333  
W2GLF/352  
W2VUF/336  
W2CBB/359  
W2YQH/331  
K3AV/345  
K3NL/331  
K3TUP/330  
K3ZF/330  
W3BL/331  
W3PL/333  
W3XM/338  
AB4H/329  
K4BBF/333  
K4HJE/333  
K4IVS/347  
K4SM/357  
W9TK/335  
N4CC/328  
N4TO/338  
W9ZRX/333  
K0BUR/336  
K0CD/349  
W0CD/333  
W0DE/351  
W0GL/351  
W0PAH/336  
W0SD/334  
W0UD/336  
W0OAH/334

### 314

W7ADS/357  
W7AO/354  
W7BGH/348  
W7EDA/332  
W7FLA/333  
W7OM/334  
K8CH/332  
K8LJG/326  
W8CNL/333  
W8DA/348  
W8TA/331  
W8YA/331  
W8EUN/334  
K9GM/332  
W9AZP/342  
W9RF/332  
W9RN/328  
W9WM/344  
AJ0XS/350  
K0BLT/338  
K0BS/331  
K0GV/331  
K0IA/328

### 314

N4KE/325  
N4RA/328  
N4SA/328  
N4UH/335  
N4XO/344  
W4AVY/349  
W4WG/330  
W4XJ/340  
W4YN/340  
W4ADR/329  
W4AJT/321  
W4AQX/321  
K5AAD/341  
K5AQ/333  
K5BZU/325  
K5LIL/335  
N5AU/328  
N5DX/336  
W5FFW/353  
W5GJ/345  
W5JW/334  
W5MMD/357  
K6CH/356  
K6XT/326  
W6AE/330  
W6DN/328  
W6ID/357  
W6JZU/328  
W6KPC/337  
W6OMR/327  
W6TWR/345  
W6US/325  
W6XJ/331  
W6XP/328  
DL1PM/347  
EA3NC/333  
F2BS/340  
F2IU/336  
G3PUX/328  
GM3BQA/335  
GM3BQA/335  
HB9K/351  
I1RB/343  
I1RBJ/334  
I2ZZZ/327  
JA1ADN/342  
JA1EOD/332  
JA1GTF/328  
JA1GW/335  
JH1GZE/323  
JA2AAQ/330  
JA3AQ/331  
JA3CMD/322  
JA3EMU/325  
JA4CQS/332  
JA6BSM/328  
JA7AD/347  
JA8XJ/319  
KH6CD/360  
LA5HE/349  
LA7JO/321  
OK1MG/330  
O2BZ/339  
PY2BW/329  
PY2ELV/321  
PY5ATL/328  
PY7ZZ/324  
N4CC/328  
N4TO/338  
W9ZRX/333  
K0BUR/336  
K0CD/349  
W0CD/333  
W0DE/351  
W0GL/351  
W0PAH/336  
W0SD/334  
W0UD/336  
W0OAH/334

### 314

DJ4AX/336  
DK3G/328  
DL6WQ/332  
EA1BC/347  
F2VX/326  
F5VU/327  
F9YZ/330  
G2DMR/332  
G3GIG/338  
G3RCA/317  
HB9AJ/329  
HB9AMQ/325  
HB9AQW/325  
I2LD/323  
I2PA/322  
I2VGU/323  
I3EVJ/334  
I3VRV/326  
I4MKN/330  
I5AR5/342  
JA1GO/323  
JA1HGY/327  
JA1NRH/313  
JA1PJK/318  
JH1EIG/330  
ZS6YQ/347  
K1BW/331  
W1G/335  
W1PM/352  
K2AGZ/334  
K2BT/332  
N2SS/331  
W2IRV/353  
W2SAW/354  
W2ZZ/333  
K3HPG/331  
W3AC/339  
W3EYF/344  
W3SC/330  
W3VRT/322  
W3ZNV/329  
AA4CJ/326  
K4BVQ/345  
K4CEF/331  
K4LSP/326  
K4TO/328

RY2SO/338  
RT5UJ/326  
SM3EVR/319  
SM3BL/328  
SM6CTO/322  
SMOKV/352  
SP9PT/329  
V36CVZ/324  
VE3FRA/321  
VE3LGO/342  
VE4SK/328  
YU1DZ/320  
YU2YM/318  
YV5BBL/334  
YV5DFI/327  
K1CC/323  
K1HZ/319  
K1NUE/327  
K1TN/323  
W1FJ/340  
W1KGH/334  
W1OHA/339  
W1AER/320  
K2LQ/336  
K2UJ/325  
K2M/329  
K2VQ/327  
K2YQ/337  
N2AP/326  
N2LM/334  
W2GA/327  
W2LYX/322  
W2LNB/340  
W2SY/329  
A3FE/324  
K3UA/320  
K3WS/323  
N3JL/322  
W3CV/347  
W3EKN/335  
W3A3TP/333  
W3AIK/331  
A3AD/331  
K4EWF/330  
K4RD/322  
K4UEE/324  
K4XP/319  
KE4I/329  
N4OL/325  
N4WJ/326  
N4XX/329  
W4RUH/331  
W4ML/342  
W4M/356  
W4PZV/330  
W4K/326  
K5GH/326  
K5GO/328  
K5KLA/326  
K5OJA/325  
K5VT/322  
K5SRP/330  
N5NW/337  
W5GC/344  
W5GEL/352  
W5JC/341  
W5LZ/335  
K6AO/337  
K6LOA/329  
K6PZ/328  
K6SVL/327  
K6UD/331  
K6DPY/323  
W6KZS/339  
W6MUM/336  
W6QNA/346  
W6TC/326  
W6UY/326  
W6ZYC/329  
AC8K/324  
K8IP/334  
K8NR/321  
K8RA/325  
W8CFG/329  
K9XJ/325  
W9FD/350  
W9PN/343  
W9RY/325  
K9ALL/323  
K9YRX/328  
N9AY/349  
W9BL/332  
W9BD/349  
W9JZ/328

JA2HNP/330  
JA2JSF/321  
JA2KLT/327  
JA3AAW/333  
JA3BFX/323  
JASJOF/317  
JA4RF/323  
JA7GLB/320  
JRTTEQ/316  
JABBMK/322  
JH6DNZ/319  
K8JL/355  
OE1UZ/333  
QH2BAD/330  
QH2BGD/327  
QH8SR/326  
ONNT/324  
Q2SS/347  
PA6F/355  
PS5C/321  
PYSWD/318  
SM6CMU/321  
SM6VR/336  
SMQCC/350  
SP9AU/325  
T77C/314  
UJ2AR/347  
UJ4NH/323  
Y1KG/331  
Y1JW/322  
Y2ACBM/321  
ZS4MG/338  
K1ST/317  
W1BR/329  
W1ELR/346  
W1EOA/329  
W1HGA/330  
W1JWB/334  
W1LQC/332  
W1NHL/342  
W1RR/321  
K2AGJ/326  
K2KGB/329  
K2OF/328  
K2XA/324  
K2ZL/322  
W2AZX/342  
W2LJ/343  
W2LZX/318  
W2MIG/322  
W2PD/321  
W2PDU/324  
W2RS/324  
W2SM/322  
W2JVB/331  
W2BHXD/336  
W2BNYM/328  
K3SGE/328  
N3ED/329  
W3BTX/324  
W3FPV/332  
W3TV/343  
K4MG/325  
K4PI/320  
K4RZ/321  
K4YT/325  
K4ZYU/326  
N4JJ/321  
N4NO/330  
W4OTX/329  
W4OWJ/341  
W4WRM/326  
W4YA/329  
K5JW/330  
K5KX/327  
W5EDX/331  
K6AAW/323  
K6AXC/322  
K6KX/338  
N6ET/330  
N6OC/316  
N6QR/322  
N6RJ/325  
N6SG/321  
W6BFW/336  
W6BYH/337  
W6HX/359  
W6XL/342  
W6YHT/328  
W6ADUG/332  
W6AWZ/318  
W6BAPX/326  
K4AS/331  
K4XH/324  
N4OM/316  
N4VZ/319  
W4FD/331  
W4NNH/347  
W4WD/332  
W4XCP/329  
W44FFW/328  
W4QNP/325  
K5JM/320  
K5LM/326  
K5OR/318  
K5R/325  
K5YCP/323  
K5KQ/320  
W5FR/320  
W5NR/345  
W5VT/327  
K6CAL/319  
K6JAD/322  
K6JR/330  
K6LM/314  
K6MB/319  
N6AN/330  
N6MG/322

W9GRF/342  
W9GW/329  
W9HZ/342  
W9KB/329  
W9SS/325  
W9TKR/331  
W9EBO/326  
K9AB/338  
K9JLF/324  
K9LFY/334  
W9HZ/340  
W9MYN/329  
W9CQK/334

N6VR/321  
W6EJ/332  
W6PHF/339  
K7LAY/317  
W7DQ/320  
W7FP/318  
W7XA/323  
K8BV/326  
W8BE/333  
W8CT/338  
W8ZCK/338  
W8PPL/342  
K9WBQ/322  
K9HMB/318  
K9IUF/331  
W9EQP/320  
W9HK/335  
W9LNQ/345  
W9NGA/320  
W9A9WJE/326  
W9TJ/353

W5ZWX/326  
K6AC/315  
K6RK/321  
K6UFT/324  
K6ID/347  
N6M/340  
N6JV/319  
N6MM/322  
N6ND/317  
W6HT/322  
W6JRY/323  
W6PLK/338  
W6RF/319  
W6OGW/317  
W6BDU/325  
K8RD/315  
K8VUR/333  
K8WVV/311  
N8TN/323  
W8HN/341  
W8HO/313  
W8COJ/323  
K9BB/322  
K9CT/321  
K9MK/312  
K9KT/325  
K9PQ/322  
K9BZ/322  
K9OC/319  
W9FR/317  
W9VNE/327  
W9XX/312  
W9XY/312  
A8BX/314  
K8CL/320  
K8TP/315  
K8WV/325  
W8LV/326  
W8NB/314  
W8KDI/327

W5ZWX/326  
K6AC/315  
K6RK/321  
K6UFT/324  
K6ID/347  
N6M/340  
N6JV/319  
N6MM/322  
N6ND/317  
W6HT/322  
W6JRY/323  
W6PLK/338  
W6RF/319  
W6OGW/317  
W6BDU/325  
K8RD/315  
K8VUR/333  
K8WVV/311  
N8TN/323  
W8HN/341  
W8HO/313  
W8COJ/323  
K9BB/322  
K9CT/321  
K9MK/312  
K9KT/325  
K9PQ/322  
K9BZ/322  
K9OC/319  
W9FR/317  
W9VNE/327  
W9XX/312  
W9XY/312  
A8BX/314  
K8CL/320  
K8TP/315  
K8WV/325  
W8LV/326  
W8NB/314  
W8KDI/327

K6AG/318  
K6LU/339  
K6JV/331  
N6CR/315  
N6HR/328  
W6ABA/325  
W6GO/319  
W6GPB/354  
W6VBL/325  
W6LTK/317  
K7UR/322  
K7UT/319  
W7JYX/339  
W7BABK/336  
K8CMO/318  
K8RD/315  
K8VUR/333  
K8WVV/311  
N8TN/323  
W8HN/341  
W8HO/313  
W8COJ/323  
K9BB/322  
K9CT/321  
K9MK/312  
K9KT/325  
K9PQ/322  
K9BZ/322  
K9OC/319  
W9FR/317  
W9VNE/327  
W9XX/312  
W9XY/312  
A8BX/314  
K8CL/320  
K8TP/315  
K8WV/325  
W8LV/326  
W8NB/314  
W8KDI/327

EA4JL/335  
F5I/336  
HB9AA/335  
I2KMG/339  
I4ZSQ/335  
I5TDJ/344  
I8AA/339  
I8KDB/354  
JA1BK/346  
LU4DMG/352  
LU9DAH/352  
OK1ADM/341  
ON4DH/336  
ON4NU/357  
OZ3SK/346  
PT7Y/351  
PY2CK/363  
SM5BHW/335  
SM5CY/344  
SM6CK/337  
VE3WW/332  
VE5RU/352  
VK6RU/363  
XE1AE/350  
XL1HY/344  
ZP5CF/357  
K1DNN/339  
W1CKA/349  
W1FZ/352  
W1JFG/356  
W1JWX/339  
K2BZ/351  
K2MJY/343  
W2HT/356  
W2LV/351  
W2TP/347  
W2YU/346  
W3AZD/347  
W3JK/339  
W3MP/341  
AA4MM/336  
K4YU/339  
W4JW/339  
W4PL/350  
W4SKO/355  
W4UWQ/343  
K5D/352  
W5JWM/352  
W5KQ/353  
W5PQA/355  
W5UAW/337  
F9RM/356  
K6YRA/341  
W6AM/364  
W6BAF/351  
W6EL/344  
W6HYG/349  
W6KTE/349  
W6RKP/348  
K8CFU/350  
K8DYZ/341  
K8BVM/357  
W8GMF/345  
W8MPW/350  
W9DC/335  
W9DWC/344  
W9UT/340  
W9N2M/345  
W9SFR/347  
WA9NUQ/338

W4EPZ/337  
W4LXM/350  
W4MGN/340  
W4NKI/338  
WA4WIP/339  
K5UC/355  
W5SZ/338  
WA5IEV/334  
K6CCY/344  
K6JG/337  
N6UC/333  
W6BSY/351  
W6FW/343  
W6GP/337  
W6HFL/345  
W6RGM/338  
W6ZKM/336  
W7CMO/342  
W7JFO/334  
W7JY/348  
W7JPF/335  
W8CUO/344  
W8GKM/333  
W8JUN/354  
W8ZET/345  
K9AB/337  
W9HPS/342  
W9NDA/359  
W9GAA/343  
W9GKL/350  
W9GSI/346  
W9SFU/339  
WA9OAH/334

K9MM/333  
W9TKD/338  
W9YSX/350  
W9YB/329  
AJ6X/335  
K5UC/355  
K9BUI/335  
K9CD/331  
K9EPE/335  
W9YDB/330

**312**

DJ6VM/329  
DU6NKA/327  
DL8FL/328  
F2BS/335  
F9GJ/341  
F9MD/340  
K63BCQ/335  
I1RB/343  
I1RBJ/334  
I2YBC/323  
I7CA/336  
I7JTT/332  
I7SJT/341  
I7WPF/332  
JA1AA/332  
JA1EL/333  
JA1IBX/335  
JA1OCA/329  
JA1UQP/331  
JA2JW/332  
JA3BQ/326  
JA3MNP/324  
JA4FT/329  
Kf6BB/336  
LA1Z/327  
LA3X/324  
LJ3YLJVA/322  
OJEFU/334  
PA0HB/353  
PFSU/335  
PY5GA/329  
SM4E/331  
SM5DCC/328  
SM5FC/331  
VE3GS/332  
VE3NE/334  
VE3WT/338  
VK4QM/347  
Y5T/345  
Y5TRRD/324  
Y5SAJ/345  
Y5AWO/340  
Y55CW/325  
Z13O/331  
Y1FXD/332  
W2FSD/338  
W2F/329  
W2MPK/328  
W2VQ/327  
W2XN/348  
W3GM/328  
W3XN/337  
K4J/334  
K4XJ/330  
N4K/323  
N4MM/332  
W4BR/334  
W4EUE/337  
W4SSL/342  
W4CXZ/321  
W4MMO/332  
K5OS/330  
K5OV/331  
W5UJ/333  
N6AN/330  
W6AR/332  
W6CCB/330  
W6KQ/336  
W6KPI/328  
K7NR/329  
W7KR/341  
W8KST/335  
N9AF/333  
W9BW/336

**311**

DJ2YU/351  
OK35F/320  
DK6KR/319  
DK9KX/318  
F5VU/327  
F6AJA/327  
HB9AA/335  
I1Y/326  
I1BGG/328  
I2PA/321  
I7GUJ/323  
I8A1/321  
K6A/333  
W6LDC/336  
W6TC/343  
W6YV/343  
W7ADS/352  
W7EPA/339  
W7LFA/333  
W7QK/337  
K8DF/337  
K8LJF/333  
K8JG/326  
W8JBI/346  
W8JTD/334  
K9KA/332  
K9LKA/335

**Phone**

**316**

CT1BH/333  
DJ2BW/352  
DL6EN/355  
DL9OH/353  
F8RU/336  
F9RM/356  
K6YRA/341  
W6AM/364  
W6BAF/351  
W6EL/344  
W6HYG/349  
W6KTE/349  
W6RKP/348  
K8CFU/350  
K8DYZ/341  
K8BVM/357  
W8GMF/345  
W8MPW/350  
W9DC/335  
W9DWC/344  
W9UT/340  
W9N2M/345  
W9SFR/347  
WA9NUQ/338

**314**

OJ9ZB/329  
DK2BL/332  
DL7FT/341  
EA2HX/344  
F2MO/343  
G3JEC/337  
G3NLY/338  
G3TJW/331  
G3UML/338  
G5VT/359  
HB9L/355  
I1APQ/330  
I2LAK/333  
I5FLN/332  
I5WTT/342  
I6FLD/346  
I8X/334  
JA1JRK/332  
JA4ZA/339  
JA4OS/334  
OH3SP/340  
OK1MP/340  
ON4SZ/353  
ON8XA/335  
OZ3PZ/328  
P2PC/338  
PY4KL/347  
SM3BIZ/356  
SM6AJ/341  
W6BWF/337  
VE3GM/334  
VK5MS/359  
YV1KZ/333  
YV5ANF/345  
ZL3NS/340  
ZS6RM/347  
W1MMV/356  
W2GK/340  
W2OWS/343  
W3EVM/346  
K4AM/350  
K4HF/359  
K4JRB/343  
W4DPS/334

**315**

DJ7ZG/342  
DL1KB/353  
DL7HU/348



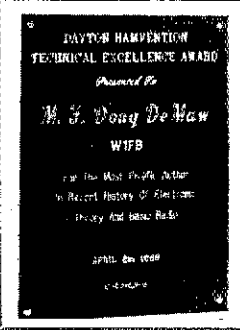
- PY2CYK/335
- PY3CB/331
- SM6AEK/332
- VE3SR/340
- VE7AAQ/332
- VE7WJ/322
- YB5DFI/327
- YV5BBU/334
- ZL1AV/328
- ZS6YQ/345
- W1NGR/324
- WA1AER/320
- KM2V/326
- N2SS/320
- W2FXA/334
- W2GBC/335
- W2IYX/323
- K4LSP/325
- N4CC/324
- W5GC/344
- W5LZ/335
- W5RRK/330
- W5SJ/332
- K6EC/333
- K6XJ/326
- W6KUT/341
- W7EKM/325
- KNBZ/330
- W8CNL/328
- W8VHY/331
- W9GU/328
- W9LA/331
- W9LQ/333
- W0CSZ/340
- 310**
- CT1RM/321
- DJ4PT/327
- DL1JW/338
- DL1AYH/312
- DL8KS/320
- DL9DY/331
- EA3NC/326
- EA3TT/318
- F5JA/324
- G3RCA/316
- HUW/325
- I2AT/333
- I2ZGC/318
- I3ADI/325
- I3VRV/325
- I8JN/324
- JA1MCU/326
- JA1OYY/319
- JA2AAQ/331
- JA2AH/327
- JA2APA/318
- JA7HZ/324
- JA7JH/325
- JA7MA/330
- ON6NT/324
- PT2BW/324
- PY2BU/325
- SM5BCZ/340
- SM6EOC/326
- VE3BX/326
- VE6HD/329
- VK6LH/327
- K1LHT/328
- K1RAW/322
- W1DNZ/326
- W1DGC/330
- W1HGA/330
- K2UU/324
- W3RX/330
- WA3ATP/331
- WA3IKK/330
- K4IKR/333
- KE4I/327
- N4KE/323
- W4QTX/329
- W4VQ/325
- K5GH/325
- K5QA/324
- NY5F/343
- W5JJA/340
- W5QOU/334
- W5RNG/337
- K6AXC/322
- N6OC/316
- NS6C/320
- W6AXH/323
- WA6RTA/327
- WA6WZO/318
- W8CFG/327
- W8COG/327
- WB1XM/331
- WB8AJ/337
- WB8EUN/327
- K9FN/323
- W9AMM/325
- W9DNE/331
- W9SS/325
- N0RR/321
- NA0Y/341
- W0MYN/329
- 309**
- DJ6LA/335
- DJ5VQ/326
- DJ6FN/319
- DK6HL/320
- DL6KG/329
- EA3IV/325
- EABL/D/314
- G3KMA/327
- G3MCS/325
- G3SJH/321
- I1FNX/315
- I2SLA/325
- I5AFG/321
- I5UA/349
- I7TG/320
- IBACB/316
- IT9KZV/318
- JF1PJK/320
- JA3APL/327
- JA7GLB/319
- JA7IL/318
- KP4CL/338
- LA8CJ/316
- LU2AH/317
- OE2GK/324
- PY2DSC/327
- PY2TM/313
- SM5AZU/335
- SM5RK/334
- UA1CK/340
- UA9VB/331
- VE1YX/318
- XE1KS/329
- K1NJE/325
- K1QMV/326
- W1J1J/315
- W1LQQ/324
- K2KGB/326
- KM2P/326
- W2FG/331
- W2MIG/321
- W2SY/325
- W3AC/335
- K4CEF/323
- K4MEZ/323
- K4MG/324
- K4XG/325
- W4BFR/326
- W4NYY/337
- WA4JT/317
- K5JEA/342
- W5TIK/333
- K6DT/322
- K6JAD/322
- K6JR/330
- W6KON/335
- W6KZS/331
- W6YB/331
- K7IRO/320
- W7DQ/320
- W7EZ/325
- W7FP/318
- W7YR/318
- WA7DRP/321
- K8NN/319
- K8PYD/325
- K8ZR/320
- W8ILC/329
- K9BWO/322
- K9HMB/317
- K9RF/323
- W9ZRX/328
- W9QLX/324
- W9SR/320
- 308**
- DK3PO/328
- EA7GF/339
- F6BFH/321
- G3TOE/320
- G4DYQ/314
- I1TBE/320
- I3EVK/330
- I4BAC/321
- I5KWL/312
- ISPAC/330
- IK8NT/313
- I8OL/328
- JA1FNA/320
- JA5PUL/315
- JA7BS/316
- JR7TE/314
- JA9BJ/327
- LA5HE/343
- ON6HE/312
- PP5YC/318
- SM2EKM/324
- VE3EJ/316
- VE3MC/317
- VE3UJ/332
- XE3EB/327
- 9H4G/321
- K1UO/315
- K2UFM/322
- K2UO/315
- K2YI/319
- WB2NYM/326
- KB3PJ/321
- N3UN/314
- W3ACE/317
- W4XP/318
- K4GJD/320
- K4KC/334
- K4SM/344
- K4YT/323
- W4AVY/330
- W4AXP/338
- W4BBL/330
- W4PZV/327
- WB4OSS/325
- K5AQ/327
- K5JW/328
- N5AN/320
- W5RO/331
- W5VJP/318
- W6GTL/321
- K8NA/317
- K8SQE/321
- K9IKP/318
- W9BEK/336
- W9KQD/320
- 307**
- CT1UE/324
- D4CBS/324
- DJ3QX/327
- DL7AA/343
- DL7FP/320
- EA4JF/324
- EA7IR/328
- F2VX/321
- F6DLM/312
- I1BSN/311
- I1HAG/315
- I2BOX/322
- I2BVG/318
- I7IVL/312
- I7KBI/312
- IDUUD/314
- JH1EIG/325
- JA2KLT/324
- JA3AQ/316
- JA3GM/317
- JA5AOC/311
- JA8BIO/321
- JA8ZO/325
- KP4CK/334
- LA7ZO/316
- LA9GV/311
- OK2RZ/322
- PA0LE/311
- SM6VR/327
- SM0ATN/325
- YV5AHR/334
- 4Z4DX/315
- K1CMI/317
- K1MM/314
- K1ST/312
- W1SD/333
- K2GPL/322
- K2YLM/332
- W2CC/321
- W2GQF/324
- W2LZX/313
- WA2VEG/325
- WB2BNJ/319
- WB2HXD/333
- K3KA/312
- W3FWD/338
- W3IF/320
- AA4AR/312
- K4AE/319
- N4XX/324
- W4BAA/326
- W4ELB/325
- W4MWT/314
- WA4WTG/321
- WB4NDX/317
- K5FJ/341
- W5EDX/328
- W5YU/331
- AA6AA/312
- K6EXO/331
- K6PZ/321
- KM6B/317
- N6CF/315
- I7IVL/312
- W6UY/322
- N7US/318
- W7JYX/339
- W7OM/325
- K8LZ/319
- K8NW/313
- W8NGO/345
- K9DXO/318
- KB9OC/319
- W9BM/327
- W9HB/345
- W9HZ/337
- W9HLW/338
- W9OQ/320
- K0ALL/319
- K0KTP/315
- CW**
- 312**
- W9KNI/320
- 311**
- K2TQC/315
- K6GA/318
- 310**
- N4RJ/316
- N4WW/318
- K9MM/318
- 309**
- DL9EN/315
- K3FN/314
- W8AH/315
- 308**
- W1NG/312
- K2FL/313
- K4PI/314
- 307**
- DJ2BW/313
- PY2TM/311
- SM5BHW/313
- W1DA/313
- AA6AA/309
- W6PT/314
- 306**
- DLBAN/311
- JA3FY/311
- ON5NT/311
- OZ7BW/310
- K4XO/310
- K5UI/312
- K5VT/311
- K8MFO/311
- W9DWQ/312
- 305**
- JA1JRK/313
- JA8LJ/310
- OZ1LO/313
- SM3EVR/311
- SM0AJU/311
- TG9NX/308
- K1MEM/309
- K2UC/309
- WA6TLA/310
- K9QVB/309
- W9ZM/310
- N0RR/310
- W0WP/310
- 304**
- JA1ELY/310
- W9SFR/308
- 303**
- F3AT/308
- JA1MCU/309
- JA8EAT/308
- K1MM/307
- W2FP/308
- W4VQ/308
- K8CV/308
- K8NW/306
- K8WV/307
- K9AJ/308
- W9ZR/307

# Straits



## WIFB HONORED

Doug DeMaw, W1FB, was named the recipient of the 1986 Technical Excellence Award at the Dayton HamVention® this year. For this award, Doug received this plaque.



As stated on the plaque, Doug is indeed one of the most prolific electronics authors in recent history. He retired as ARRL Senior Technical Editor in 1983, but has continued writing material each month for *QST* on basic radio and electronic theory. His recent series of 19 articles, "First Steps in Radio," has just been reprinted in an 88-page ARRL book with the same title. His book,

*QRP Notebook*, has also just been published by the ARRL.

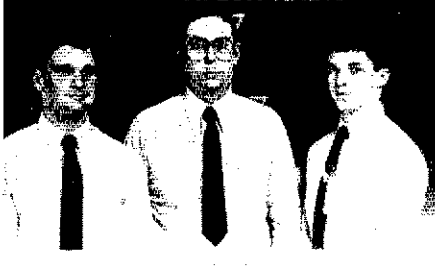
During his career at ARRL Headquarters, W1FB wrote scores of articles for publication, most containing construction information on many different receivers, transmitters, antennas and useful items of test equipment for the ham shack. He was the editor of *The Radio Amateur's Handbook* for several years in the late 1960s and early '70s. He also contributed a wealth of material to other ARRL publications such as *The ARRL Antenna Book*, *Solid State Basics*, *ARRL Electronics Data Book*, *Understanding Amateur Radio*, and others. He was coauthor of *Solid State Design for the Radio Amateur*. In his spare time, Doug wrote articles for gardening magazines and professional engineering reference books.

In light of this information, *prolific* may be an understatement. Our congratulations to Doug DeMaw, W1FB, for earning the 1986 HamVention Technical Excellence Award! —Jerry Hall, K1TD

### I would like to get in touch with...

□ anyone who has information on how to convert a Pierce Simpson Super Panther A-18 11-m transistor to 10 meters. C. J. Beaupre, WA5MJB/YB0ARB, c/o MOI, PO Bag 400, Jakarta Pusat, Indonesia.

## POST 73 FORSYTH AMATEUR RADIO CLUB



*QST* congratulates three members of Explorer Post 73 of the Old Hickory Council, Boy Scouts of America, chartered to the Forsyth ARC, Winston-Salem, North Carolina, who earned top Exploring Awards. William E. Batts III, KB4EAK (center), post committee chairman, was honored with the Council Exploring Division Award of Merit. R. Gwyn Armfield, KA4SJV (right), past Old Hickory Council Explorer Officer Association and Southeastern Region Area 7 Explorer youth chairman, received the Exploring Leadership Award. C/Opt Jaime Burcham, KB4MZU, current chairman of the Old Hickory Council Explorer Officer Association, was named the Council Explorer of the Year.



## CRRL Officers and Directors

**President:** Thomas B. J. Atkins, VE3CDM  
**Vice President and Secretary:** Harry MacLean, VE3GRO  
**Honorary Vice President:** Noel B. Eaton, VE3CJ

**Directors:** G. Andrew McLellan, VE1ASJ  
Albert G. Daemen, VE2IJ  
Raymond W. Perrin, VE3FN  
William A. Gillespie, VE6ABC  
William Kremer, VE7CSD

**Counsel:** B. Robert Benson, QC, VE2VW  
Suite 1600, 2020 University Ave  
Montreal, PO H3A 2A5

**CRRL Headquarters Office:** Box 7009, Station E  
London, ON N5Y 4J9, Tel 519-225-2188  
**General Manager:** Raymond Staines, VE3ZJ  
**CRRL Outgoing QSL Bureau:** Box 113, Rothesay, NB E0G 2W0  
**Bureau Manager:** Donald Welling, VE1WF

## Who Decides What CRRL Will Do?

You do! As a Full member, your vote in CRRL elections determines the direction that CRRL will take. This fall, CRRL members will elect five Regional Directors to represent them on the CRRL Board for two-year terms that will begin on 1987 January 01. The CRRL Board has seven members. Two members, the President and Vice President, are elected "at large" in odd-numbered years. The other five, the Regional Directors, are elected on a geographic basis in even-numbered years.

The CRRL Regions are Pacific (formerly Western), consisting of British Columbia and the Yukon Territory; Midwest (formerly Prairies), consisting of Alberta, Saskatchewan, Manitoba and the Northwest Territories; Ontario; Quebec; and Atlantic, consisting of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador.

Under CRRL Bylaws, candidates for Regional Director must (1) reside in the Region they intend to represent, (2) have been a CRRL Full member for a continuous term of four years at time of nomination, (3) have held a Canadian Advanced Amateur certificate throughout that four years, and (4) be

at least 21 years of age. Additional information can be found in the CRRL Bylaws, available on request.

To be valid, a nominating petition must carry the signatures of 10 or more CRRL Full members residing in the Region concerned. It is advisable to have more than 10 signatures. Photocopied signatures are not acceptable. Signatures must be *on the petition*.

Petition forms (EDC-1) are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is acceptable:

(Place and date)

Elections Committee, CRRL,  
Box 7009, Station E  
London, ON N5Y 4J9

We, the undersigned CRRL Full members residing in the . . . Region, hereby nominate . . . (name and call sign) as candidate for Director of this Region for the next two-year term of office.

. . . (Signatures and call signs) . . . (Addresses including postal codes)

Nominating petitions will be received at the CRRL Headquarters office in London, Ontario, until 1200 EDT 1986 August 20.

Eligibility of candidates will be determined shortly after that. If only one eligible candidate is nominated in a Region, that candidate will be declared elected. If more than one eligible candidate is nominated in a Region, a balloted election will take place. On or before 1986 October 01, the CRRL Elections Committee will send ballots to every person who on 1986 September 10 was a CRRL Full member in the Regions where the elections are being held. The ballots will carry a copy of the CRRL Bylaws governing the election and biographical material, up to 300 words in length, supplied by each of the candidates. Marked ballots will be received at the CRRL Headquarters office in London, Ontario until 1200 EST 1986 November 20, and will be counted shortly after that in the manner prescribed in the CRRL Bylaws. Results will be announced on WIAW, in the CRRL News bulletins and in QST.

Over the next two years, CRRL will need the best leadership possible. You are urged to take the initiative and file a nominating petition immediately.

Harry MacLean, VE3GRO  
CRRL Secretary, for the  
Elections Committee

## SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Quebec and Saskatchewan Sections: You are hereby solicited for nominating petitions pursuant to elections for Section Manager. Names of the incumbents appear on page 8 of this QST.

A petition, to be valid, must carry the signatures of five or more CRRL Full members residing in the Section concerned. It is advisable to have more than five signatures. Photocopied signatures are not acceptable. Signatures must be *on the petition*.

Petition forms, FSD-129-D, are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is acceptable:

(Place and date)

CRRL Secretary  
Box 7009, Station E  
London, ON N5Y 4J9

We, the undersigned CRRL Full members residing in the . . . hereby nominate . . . (name and call sign) as Section Manager for this Section for the next two-year term of office.

. . . (Signatures and call signs) . . . (Addresses including postal codes)

A Section Manager must be a resident of his or her Section and a licensed radio amateur holding a Canadian Amateur Certificate or

higher, and have been a CRRL Full member for a continuous term of two years at the time of nomination. Petitions will be received at the CRRL Headquarters office until 1600 EDT 1986 September 05. If only one valid petition is received from a Section, the person nominated will be declared elected. If more than one valid petition is received from a Section, a balloted election will take place. Ballots will be mailed from CRRL Headquarters on or before 1986 October 01. Returns will be counted after 1986 November 14. Section Managers elected as a result of these procedures will begin their new two-year terms of office on 1987 January 01.

If no valid petition is received from a Section, that Section will be resolicited in 1987 January QST.

You are urged to take the initiative and file a nominating petition immediately.

Harry MacLean, VE3GRO  
CRRL Secretary

## JACK RAVENSCROFT UPDATE

Jack Ravenscroft, VE3SR, has decided to appeal the Ontario District Court decision that put him off the air and made him responsible for damages and costs arising from "interference" in a neighbour's home. The actual appeal was filed on May 6. Although no additional court

appearances will be involved, the appeal will take many months and cost between \$10,000 and \$20,000. Most amateurs understand the danger of leaving the court decision unchallenged. Any one of us could be next. It is unfair to expect Jack, who has incurred financial obligations of about \$40,000 to date, to carry the burden for all of us. If you have not yet made a donation, please make one now. If you have made a donation, please consider making another one. Send your cheques to the JRSD Fund, Box 8873, Ottawa, ON K1G 3J2.

One reason for the unfortunate outcome in the Jack Ravenscroft case is that Canada has no RF susceptibility standards for consumer electronic equipment. Bill Loucks, VE3AR, CRRL representative at a recent meeting of RABC's EMI Committee, reported little enthusiasm for such standards among most RABC members. Nevertheless, the work goes on. CRRL has endorsed an initiative by the executive of Ottawa Valley Mobile Radio Club, who contacted the Minister of Communications and the Minister of Consumer and Corporate Affairs, calling for standards to protect radio users and users of consumer electronic equipment. In addition, CRRL people are now working on a document, similar to one prepared by ARRL for FCC, calling not only for standards but for labels on consumer equipment, warning of possible RF susceptibility.



**President:** Richard L. Baldwin, W1RU  
**Vice President:** Carl L. Smith, W0BWJ  
**Secretary:** David Sumner, K1ZZ  
**Assistant to the Secretary:** Naoki Akiyama,  
 N1CIX/JH1VRQ

**Regional Secretaries:**  
 John Allaway, G3FKM  
 Secretary, IARU Region 1  
 10 Knightlow Rd  
 Birmingham B17 8QB  
 England

Alberto Sairo, HK3DEU  
 Secretary, IARU Region 2  
 9 Sidney Lanier Ln  
 Greenwich, CT 06830  
 USA

Masayoshi Fujioka, JM1UXU  
 Secretary, IARU Region 3 Association  
 PO Box 73, Toshima  
 Tokyo 170-91  
 Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

## Regional Administrative Radio Conference

At WARC-79, Region 2 (North, Central and South America) was allocated a new broadcast band at 1605-1705 kHz. During this past April, some 70 delegates from 20 of the Region 2 administrations met in Geneva to decide what planning principles should govern the use of this new band, and what some of the technical standards should be. It was not a conference that had any direct effect on the Amateur Radio Service, but IARU was there (represented by G3FKM, VP9IM and W1RU) to maintain visibility in the international arena. As it turned out, 10 of the delegates were licensed amateurs—LU3HAP, LU7DRV, 9Y4WR, 8P6CD, K3WL, N4FK, W3ICM, CO2RX, VE3CDF and XE1MFQ (who was dean of the conference). During the second week of the conference, IARU sponsored a reception for the delegates and some of the key ITU people, and the accompanying photographs show some of our guests.



VP9IM (left), a member of the IARU Region 2 Executive Committee, and 8P6CD, of the Barbados delegation.



CO2RX, of the Cuban delegation, and T. M. Beiler, from Brazil. She chaired one of the technical working groups.



E. D. Ducharme (left), head of the Canadian delegation, and R. E. Butler, Secretary-General of the ITU.



Jim McKinney of FCC (left), head of the US delegation, and Al Sikes, Administrator of the US National Telecommunications and Information Administration.



Jean Jiguet, Deputy Secretary-General of the ITU, and Susan Kumenius, of the Secretary-General's office.



Left to right are G3FKM, Secretary of IARU Region 1; W3ICM, of the US delegation; and EA2ADO, president of the International Amateur Radio Club (4U1ITU).

### Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

#### Advisory Committee

Members	May 1986, p 48
Club Contest Rules	Jan 1986, p 94
DX Contest Awards Program	Feb 1986, p 83
Emergency-Traffic Committee	Apr 1986, p 69
Frequency/Mode Allocations	Jan 1986, p 62
Great Armadillo Run of 1986	Apr 1986, p 73
Hamfest Calendar Rules	Feb 1986, p 72
IARU HF Championship Rules	Apr 1986, p 78
License-Renewal Information	Jan 1986, p 62
Major ARRL Operating	

#### Events and

Conventions—1986	Jan 1986, p 61
MARS Information	Jul 1985, p 46
Novice-Enhancement NPRM	Jun 1986, p 49
QSL Bureaus	
Incoming	Jun 1986, p 56
Outgoing	Mar 1986, p 71
Reciprocal-Operation Agreements	Jun 1986, p 52
Spread-Spectrum Rules	Apr 1986, p 45
Third-Party-Traffic Agreements	Jun 1986, p 52
10-GHz Cumulative Contest	Jun 1986, p 84
902-MHz Interim Band Plan	Jan 1986, p 74

## Beacons: Where Do We Go from Here?

It's been 3½ years since FCC allowed US hams to join those of many other countries and set up unattended beacons. The Commission's decision was announced in this column for January 1983. It, and a subsequent column five months later, challenged VHFers to install beacons and asked that those doing so, submit information about them. The intention was to publish a directory that could be made available to anyone interested. Since the FCC rule change went into effect, a number of beacons have been put on the air, but we have yet to derive the full benefit that a system of beacons can provide. This lack of complete success can probably be attributed to three causes. First, insufficient information has been made available on those beacons that have been put on the air. Second, not enough beacons, in the right places, have been set up. This is especially true for 2 meters and above. The third problem is probably part of the cause of the second. It has to do with developments since the subbands were designated by FCC for beacon operation. These three problems will be discussed one at a time in the order presented.

The list of 6-meter beacons published in last month's column represents an attempt to provide the best information available at a most useful time of year, as well as to elicit additional data. It is somewhat easier to get information needed to put together a list of 6-meter beacons than it is for those on the higher bands, as propagation on this band results in them being heard quite frequently by many people. Therefore, word filters in as to their frequency and transmission mode. However, other important data such as power, antenna type and directivity and exact QTH (grid locator) are not available from off-the-air monitoring. That data is available only from the beacon operators themselves or through organizations that have obtained it from them. Some of the information on the 6-meter beacons listed last month was gleaned from my own monitoring and that of several others who submitted reports. In addition, several foreign newsletters and VHF columns, most notably the Six-Metre News from the UK and VHF/UHF—An Expanding World from Australia, were consulted. In a few cases, information directly from the beacon operators was used. If obtaining information pertaining to beacons coming on the air is difficult, receiving word that they have ceased operation is almost impossible. A number on last month's list are probably in that category.

K1ZZ has informed me that the IARU is attempting to compile a worldwide directory of 6-meter beacons and indicates that he has been asked to forward information relative to those operating in the US by August 1. Dave requests that I provide him with any new information I may receive, as a result of publication of the list in last month's column, prior to that date. In order to comply, I must have inputs from anyone with additions, corrections, deletions, etc by July 15.

While off-the-air monitoring may be fairly effective for 6-meter beacons, it doesn't fill

the bill for 2 meters and up. For several years, I have been attempting to collect sufficient information to put together beacon lists for these bands, but so far have not enough inputs to do a credible job. Two years ago, the Central States VHF Society resolved to assemble a data base of North American beacons and appointed Barry Buelow, WAØRJT, to do the job. He presented a preliminary list at last year's conference and says that he has a few additions and corrections to present this year. He indicates that he, too, has had difficulty in gathering complete and up-to-date information. Improved means of collecting and disseminating beacon information is almost certain to be discussed at this year's conference in St Louis at the end of this month. I will pass along results in a forthcoming column.

As to the second problem, it is certain that we need more beacons on 2 meters and above, particularly in certain parts of the country. Ideas for implementing a nationwide system of beacons, with suggestions for locations aimed at providing the best geographical coverage, were contained in the May 1983 column. Additional thoughts were put forth in December 1984. Setting up one or more beacons and keeping them on the air is no easy task. Having been involved with the W3VD beacons, I have some appreciation of the problems. For one thing, there is little suitable equipment available. You either have to "roll your own" or adapt gear designed for some other applications. Probably the least expensive and most reliable approach is to use cast-off land mobile FM equipment modified for whatever keying scheme is to be used. Sometimes used amateur gear such as old models of transceivers or transverters can prove useful. No matter what approach to building the beacon, the effort takes time from the many other tasks we are all confronted with. It's easy to understand why those who have completed such a job may not get around to reporting their success to the rest of the world. Nevertheless, if the beacon program is to be really effective, information on them must be available far and wide. This conductor will be happy to facilitate this process, either through publication in *The World Above 50 MHz*, space permitting, or by providing lists directly to those requesting them. The third problem concerns the very narrow slices of spectrum authorized by the FCC for beacon operation on 6 meters, 2 meters, 1¼ meters and 70 cm. For 10 meters, a 100-kHz segment is set aside, which should be sufficient. However, there are other allocation problems coming up on that band that I will not deal with at this time. For 23 cm and up, beacon operation is authorized anywhere that amateur operation is permitted. Particularly on 2 meters, where the allocation consists of 10 kHz between 144.050 and 144.060, the allocation is possibly misplaced. It has led to concern being voiced with respect to potential interference to other amateur activities, particularly EME. This is highlighted in an item appearing in the April

issue of the *Midwest VHF Report*, a monthly newsletter published by WBØDGF. It cites a case in which feared interference to EME operation led to a decision not to establish a 2-meter beacon in a part of the country where one would prove quite useful. An editorial appearing in the same issue broaches the idea that a petition be filed with FCC requesting additional beacon subbands. Specifically, 144.300 to 144.350, 220.200 to 220.250 and 432.200 to 432.250 are offered as the minimum additional allocation space needed. Beacons have operated for years in Europe between 144.900 and 145.000 and 432.900 to 433.000. In this country, packet and other specialized communication modes seem to be taking over the area from 144.9 to 145.1, so it wouldn't appear that beacons could be accommodated there. Besides, there is always the question of whether people would tune so far to check for beacons. Aside from potential interference to EMERs, the 10-kHz slice presents some QRM difficulties between beacons themselves. For these reasons, WBØDGF's proposed band segments seem to be worthy of consideration. Aside from the occasional 2-meter MS sked, there is little SSB in them. Let's hear what you think. As always, this column will be available to air various contrasting opinions.

A system of well-placed and well-publicized beacons offers several benefits to VHFers, including fewer missed openings and the availability of always-present signals for checking receivers and antennas. Perhaps, by attacking these three problems, we can yet enjoy these benefits.

### THE NEW COMPUTER SYSTEM

Beginning with the EME Annals, published in May, all of the data for the standings boxes is now on a new computer system. Both the hardware and software have been changed. Even though the transfer between the two machines was accomplished electronically, some errors have crept in. I have checked all of the entries in the 2-meter box appearing in this column, but may have missed a few. Therefore, I ask for your assistance in correcting any goofs that may remain. While you're at it, this would be a good opportunity to update your listing and provide some of the missing information. Many have not submitted grid-square totals. Others have not supplied information on call areas worked. For those who use the special box update forms, I can count the call areas, but in the case of those who write letters merely noting their state totals, I have no way of knowing and must leave that column blank. However, many providing complete rundowns of their states worked do not list any VEs. Even though many are located such that they must have worked a number of stations north of the border, my only alternative is to count only those call areas actually listed. Note how call areas are defined in the heading that accompanies each box.

Also, please note the schedule for box updates which appeared in last February's column.

## 2-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grid squares worked. For others, call, state, U.S. states worked, call areas worked and grid squares worked. Call areas are the 10 U.S. continental call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico. Grid squares are those Maidenhead designators worked since the VUCC Award was instituted January 1983. In order to make the standings a true reflection of current 2-meter activity, those not reporting within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of continued activity. It is not necessary to show additional states, call areas or grid squares worked to be reinstated. WAS holders are listed in any case. Compiled May 9, 1986. Updates for next listing must be at the address listed at top of column by November 5, 1986.

WAS Holders		85 WD5CRK*		OK		---		W3OTC		MD		32		11		51		N7EJU		ID		13		6		---								
1	K0MQS*	IA	---	66	WB8PAT*	OH	49	39	W3OTC	MD	32	11	47	---	---	---	---	---	W7EPU	AZ	12	6	---	---	---	---	---	---						
2	K5CM*	OK	---	67	KX80**	CO	30	103	W3OTC	MD	32	11	68	---	---	---	---	---	N7AKB	NV	12	4	---	---	---	---	---	---						
3	N8JA*	MO	---	68	W7HAH**	MT	35	43	K3HCE	MD	29	11	---	---	---	---	---	---	W7IDZ	WA	9	4	30	---	---	---	---	---						
4	K9HMB*	IL	---	69	K7KOT*	WA	---	---	W3IUW	PA	28	11	---	---	---	---	---	---	W88PAT**	OH	49	39	---	---	---	---	---	---						
5	K1WHS*	ME	---	70	K8BRQ*	OH	---	---	W4Z0*	FL	43	22	81	---	---	---	---	---	K8EUR*	OH	41	11	---	---	---	---	---	---						
6	W4AMV1**	NC (1)	---	71	W7BBM*	AZ	---	---	K4EG*	KY	41	13	---	---	---	---	---	---	N180	OH	40	12	145	---	---	---	---	---						
7	K5JL*	OK	---	72	SM2GGF*	---	---	---	WB4NXY	KY	41	9	125	---	---	---	---	---	---	K8WKZ	MI	39	14	---	---	---	---	---	---					
8	W9DOT**	WI	---	73	KD8SI	OH	---	---	W54F	GA	40	14	135	---	---	---	---	---	---	W82DIN/8	WV	36	13	---	---	---	---	---	---					
9	W8ZXU*	IA	---	74	K2OS-1	NY	17	---	W4AFCS	KY	40	11	---	---	---	---	---	---	W8NJR	OH	33	11	124	---	---	---	---	---	---					
10	K9CA*	IA	---	75	K1GVM*	MA	34	---	W4GJO	GA	39	11	---	---	---	---	---	---	---	K8SSG	MI	29	8	---	---	---	---	---	---					
11	W6SD*	SD	---	76	W9OZM*	IL	---	---	W4ADKH	KY	39	11	---	---	---	---	---	---	---	W9BOZ	IL	47	21	---	---	---	---	---	---	---				
12	W8RRY*	IA (2)	---	77	W4MGZ**	CA	49	176	W4HHK	TN	38	9	---	---	---	---	---	---	---	W9UD	IL	45	12	---	---	---	---	---	---	---				
13	K5GW*	TX	---	78	W05AGO*	OK	38	---	W4QWC	FL	37	10	---	---	---	---	---	---	---	K89NM	WI	43	14	---	---	---	---	---	---	---				
14	W85LUA*	TX	23	79	WD4DGF*	TN	36	174	K4KAE	SC	37	8	---	---	---	---	---	---	---	W9D9FSA	IL	43	9	138	---	---	---	---	---	---				
15	K4GL*	SC	23	80	VE1UT*	NS	---	---	W4ISS	GA	37	8	---	---	---	---	---	---	---	W89MSV*	IL	42	12	158	---	---	---	---	---	---				
16	W0VB*	MN	14	81	W8RRY5*	OK (3)	30	---	K4QIF	VA	37	8	---	---	---	---	---	---	---	N9AQ	IL	42	11	150	---	---	---	---	---	---				
17	W85LBT*	LA	50	82	W8VYV*	IA	---	---	W5HJQ/4*	FL	36	13	---	---	---	---	---	---	---	W3EP/9	IN	41	13	105	---	---	---	---	---	---				
18	K4PKV*	NC	---	83	W5RCI*	MS	12	---	W4LJG	GA	36	8	30	---	---	---	---	---	---	N9KC	IL	41	11	130	---	---	---	---	---	---				
19	W8RWH*	MO	23	84	W42GSX**	NY	27	---	N4VC	TN	35	9	126	---	---	---	---	---	---	K9SM	IL	36	8	---	---	---	---	---	---	---				
20	W8IDU*	MI	23	85	W40TKJ*	KS	25	171	W4SBC	VA	34	13	---	---	---	---	---	---	---	W9HAD	IL	33	9	112	---	---	---	---	---	---				
21	K1MNS**	NH	48	86	K8TQ*	MT	---	---	W4FJ	VA	34	8	---	---	---	---	---	---	---	---	W9JAD	IL	31	---	106	---	---	---	---	---	---			
22	W8SVEN*	IL	---	87	AB3D*	DE	25	32	W3YJ4	VA	32	8	---	---	---	---	---	---	---	---	KD9HQ	IL	33	---	---	---	---	---	---	---	---			
23	K5FF**	NM	18	88	KF8M*	KS	18	151	K4CKS	GA	31	11	100	---	---	---	---	---	---	W9YCV	WI	29	---	100	---	---	---	---	---	---	---			
24	W5FF**	NM	20	107	---	---	---	---	W4KNF*	TN	31	11	33	---	---	---	---	---	---	N9CUE	IN	27	10	28	---	---	---	---	---	---	---			
25	W7FN*	WA	---	---	W1OUB*	NH	40	19	104	W4CFZ	SC	30	11	21	---	---	---	---	---	N9CEX	IL	26	9	---	---	---	---	---	---	---	---			
26	W1JR**	MA	33	130	K1PXE	CT	35	13	---	W3Z7/4	FL	30	9	77	---	---	---	---	---	K9BQL	IL	23	8	40	---	---	---	---	---	---	---			
27	W8QMN*	CO	---	---	N1AIS	MA	34	12	---	W4CFZ	SC	30	11	21	---	---	---	---	---	---	KX80**	CO	50	30	103	---	---	---	---	---	---	---		
28	W84EXW*	NC	18	---	W1AIM*	VT	32	11	72	K1FJM/4	FL	29	9	---	---	---	---	---	---	---	W8RT*	KS	48	20	109	---	---	---	---	---	---	---		
29	K9KFR*	IN	---	---	K1VMI	CT	31	12	---	N4EJW	FL	28	12	76	---	---	---	---	---	---	K8LL	ND	48	16	---	---	---	---	---	---	---	---		
30	K3VGK*	PA	---	---	W1GXT	MA	30	11	---	W4OFS	FL	27	7	15	---	---	---	---	---	---	W8MS	NE	48	11	---	---	---	---	---	---	---	---		
31	SM7BAE*	---	21	---	W2SZ/1	MA	26	19	154	NA4I	GA	24	10	---	---	---	---	---	---	---	W8MS	NE	48	11	---	---	---	---	---	---	---	---		
32	W47BJU*	OR	---	---	W1RHL	MA	28	12	---	W4RUA	GA	22	7	69	---	---	---	---	---	---	K8DAS*	IA	47	13	---	---	---	---	---	---	---	---	---	
33	VE7BOH**	---	57	---	KA1DHO	MA	28	11	33	N14Z	FL	21	9	---	---	---	---	---	---	---	N8LL	KS	46	11	169	---	---	---	---	---	---	---	---	
34	W6PO*	CA	---	---	W41AYS	MA	26	10	---	K4LFF	GA	19	9	56	---	---	---	---	---	---	W8OHU	MN	45	12	---	---	---	---	---	---	---	---	---	
35	W3SVJ*	PA	27	---	W1QXX*	MA	26	9	81	W5UWB*	TX	48	15	---	---	---	---	---	---	---	W8PN	MN	43	11	52	---	---	---	---	---	---	---	---	
36	AL7FS*	AK	20	---	K5MA/1	MA	25	10	91	K5WE*	OK	47	13	---	---	---	---	---	---	---	W8FY	MO	43	10	124	---	---	---	---	---	---	---	---	
37	W8YSG*	NE	---	---	KA1BRD	CT	24	11	---	K5SW	OK	47	12	170	---	---	---	---	---	---	W8DGF	NE	43	10	85	---	---	---	---	---	---	---	---	
38	N7NW*	WA	---	---	W2PGC*	NY	47	16	---	K5YV	OK	46	12	202	---	---	---	---	---	---	K8TLM	MO	42	10	132	---	---	---	---	---	---	---	---	
39	W8LUU*	TX	---	---	K2QR*	NY	45	28	66	W5HN	TX	42	12	---	---	---	---	---	---	---	K8DA	MO	42	10	126	---	---	---	---	---	---	---	---	
40	W4HJQ*	KY	---	---	W42PVV*	NY	40	13	---	K8SMR	OK	40	14	140	---	---	---	---	---	---	W8SJR	MO	41	9	---	---	---	---	---	---	---	---	---	
41	K5UGM*	TX	---	---	K2TXB*	NJ	39	---	117	K5UP	AR	40	12	174	---	---	---	---	---	---	K8CR	NE	40	11	132	---	---	---	---	---	---	---	---	
42	W5UN*	TX	---	---	W2RS	NJ	38	13	---	W5DDBY*	TX	40	11	---	---	---	---	---	---	---	W8DRL*	KS	39	34	116	---	---	---	---	---	---	---	---	---
43	W44LYS**	FL	49	---	W2BLV	NJ	37	10	---	W5HFV	OK	38	10	---	---	---	---	---	---	---	K8JUS	NE	39	11	125	---	---	---	---	---	---	---	---	
44	W1JXN7**	MT	58	---	W2ORI	NY	37	8	---	N8SO	OK	38	9	109	---	---	---	---	---	---	W8RAP	IA	39	10	114	---	---	---	---	---	---	---	---	---
45	W5JTL*	MS	14	---	KE2N	NY	36	13	102	W85JAR	AR	37	10	---	---	---	---	---	---	---	W8PW	CO	38	9	---	---	---	---	---	---	---	---	---	
46	W4ANH*	MN	---	---	W82CUT	NJ	36	13	---	W4SHNK	TX	36	10	---	---	---	---	---	---	---	W8SIL	MO	36	13	---	---	---	---	---	---	---	---	---	---
47	W44JMP*	GA	---	---	NB2T	NY	36	12	40	AASV	OK	36	9	---	---	---	---	---	---	---	W8ZK	IA	36	10	---	---	---	---	---	---	---	---	---	
48	W5HM*	NM	---	---	K2OVS	NY	36	12	35	K5VJV	TX	31	10	---	---	---	---	---	---	---	W8VJF	KS	34	11	59	---	---	---	---	---	---	---	---	
49	W7CI*	AZ	26	---	WATIF	NY	36	12	---	K5DHU	TX	30	10	50	---	---	---	---	---	---	W8Z	IA	34	10	120	---	---	---	---	---	---	---	---	---
50	N5KW*	OK	13	---	W42FGK	NJ	35	11	---	W45YX	TX	27	9	---	---	---	---	---	---	---	N8AJU	NE	32	9	102	---	---	---	---	---	---	---	---	
51	W8OTEM*	IA	23	---	K2GK	NY	34	11	91																									

## 6-CM ACTIVITY IN OKLAHOMA

Of all the amateur bands, the allocation at 6 cm (5650-5925 MHz) is probably least used. It is especially welcome, therefore, to hear of activity on that band and even more welcome to hear of SSB and troposcatter work. Lawrence Nichols, W5UGO, has sent along the following good news.

After years of inactivity, but not total isolation from amateur radio, I have been bitten by the bug again. Last summer, while assisting Gerald Handley, WA5DBY, in giving my long-term (not old) friend Tony Bickel, K5PJR, three new grids on 2304 MHz, I was intrigued by the progress made in equipment over the last 15 years. Subsequent visits with K5PJR and Jim Crew, WA5ICW, showed that 5760 might be a band that could use some activity. Tony had not heard a signal on the band in over eight years! This seemed to present as enjoyable and meaningful a challenge as 2 meters was 20 years ago.

It took several months of study, search and construction to make the first contacts. The three of us took advantage of a mild winter to make many contacts over line-of-sight and obstructed paths of up to 26 miles. The 70-mile path from Tony to Jim took 1 watt, but only Jim had that much power. About March 1, a second TWT was put in service by Tony, and 80- to 85-mile paths were quickly worked via scatter. I put a GaAsFET pre-amp in service about March 8, and soon our activity sparked the interest of Tommy Henderson, WD5AGO. On March 22, K5PJR worked grid no. 5 and state no. 5 in the same QSO over a 23-mile obstructed path using 24-inch dishes, diode mixers and 1-mW output on SSB! All four of us are looking forward to a summer of tropo ducting. You don't have to have mountains!

There is not much published information on equipment for 6 cm. One source is the *Microwave Newsletter Technical Collection*, which describes a scaled-up version of the G3JVL waveguide-based transverter (originally designed for 10 GHz). A waveguide-based receive mixer for the 6-cm band was described by R. Heidemann, DC3QS, in the spring 1980 edition of *VHF Communications*. A 5760-MHz to 28-MHz converter was described by DL7QY in the June 1978 edition of the *DJVBUS Handbook* (p 163). The latter two articles use hard-to-find European devices, but may be useful for ideas.

## RELATIVE SYSTEM PERFORMANCE ON THE MICROWAVE BANDS

One of the most common questions asked about microwave operation is "How far can you work on 'X' cm?" (where X is your favorite microwave band). As with many simple questions, there is no simple answer. Many factors are involved, including equipment performance, frequency and mode of propagation. If some of these factors are fixed, however, it becomes possible to estimate the relative performance of systems on different frequencies.

Of the many possible propagation modes,

Table 1

Relative Change in Signal Strength with Increasing Frequency for Line-of-Sight and Troposcatter Propagation†

Frequency (MHz)	Line-of-sight	Troposcatter
1296	0 dB	0 dB
2304	+ 5 dB	+2.5 dB
3456	+ 8.6 dB	+4.3 dB
5670	+12.8 dB	+6.4 dB
10,368	+18 dB	+9 dB

†Between two stations using the same dish antenna, transmitter power and receiver sensitivity on all bands.

the most common are line-of-sight, troposcatter, ducting and refraction/reflection. Of these, the loss/frequency relationship of the first two can be generalized, and will be dealt with here. The loss/frequency dependence of ducting and scatter/reflection can be calculated for specific situations, but there is no generally applicable relation. To a first approximation, neglecting such factors as atmospheric absorption, troposcatter path losses are proportional to the third power of the frequency, and line-of-sight path losses are proportional to the second power of the frequency.

Consider a path between two stations using the same antenna on all bands (a typical situation for portable stations on the microwave bands, where a single parabolic dish is used on many bands). The gain of each dish is proportional to the square of the frequency, so the overall antenna gain counting both dishes is proportional to the fourth power of the frequency.

Thus, it can be seen that under these conditions while total antenna gain goes up by the fourth power of the frequency, path loss goes up only with the third (for troposcatter) or second (for line-of-sight) power of the frequency. Thus, for a constant receiver sensitivity and transmitter power, signals get stronger (or go farther) as the frequency goes up. The "catch," of course, is that it is more difficult to generate power and build sensitive (low noise) receivers as frequency goes up. Table I shows the relative increase in signal with increasing frequency for commonly used microwave frequencies.

Thus, it can be seen that under these conditions over a line-of-sight path, signals would be 18 dB stronger on 10.368 GHz than on 1296 MHz, or (18-12.8) = 5.2 dB stronger on 10.368 GHz than on 5.67 GHz (with the equipment specifications described above).

Although it has been difficult to generate power and achieve low noise figures on the higher bands, devices are now becoming available at reasonable cost and will allow this. It is not unreasonable to consider a 100-mW output, 3-dB noise-figure system for 10 GHz using GaAsFET devices being built by amateurs. Such a system in conjunction with 4-ft dishes should be capable of troposcatter contacts over 300 km using CW and 100-Hz bandwidths, or about 170 km using a wider bandwidth and SSB.

For more information on system performance and microwave propagation see *The New Frontier*, Dec 1980 *QST*, and an article in *Radio Communication* (Aug 1981) by G3YGF on troposcatter propagation losses.

## Strays

### AMO, AMAS, AMAT, AMATEUR

From *The Montgomery* (Maryland) *Journal*, January 27, 1986: "Sometimes words undergo pejoration, meaning they take on negative meanings. For example, amateur from the Latin verb 'amare,' meaning 'to love,' means 'one who engages in pursuit, study, science or sport for the love of it rather than for pay.' However, some people use the word amateur to describe someone who lacks experience or competence. If you've earned a letter in your sport or watched Olympic athletes compete, you know that one reason most amateurs love what they do is because they are so good at it." (tnx K3WX)

### QST congratulates...

□ Ronnie Milsap, WB4KCG, of Nashville, Tennessee, on winning the 1985 Male Country Vocal Grammy Award.

□ Jim George, N3BB, of Austin, Texas, on being promoted to General Manager of Motorola's MOS Memory Division.

□ Robert Kurth, W5IRP, of Lufkin, Texas, on being elected president of the Texas Society Sons of the American Revolution.



Presenting Lady Liberty and Field Day through the eyes and pen of the late Phil Gildersleeve, W1CJD. Some good news for Gil fans: Hundreds of his cartoons, which appeared in *QST* over a 40-year span, have been compiled into a brand new book. See page 96 for ordering information.

## Software for the Ham Shack

In the "good" old days (back around the turn of the decade), few hams included computers in their line of radio-room equipment. Those few who did use computers in their shacks had a hard time finding Amateur Radio software to run on their Model Is, Apple IIs and Commodore PETs. The only choice they had was to write their own software. (A lot of those early homebuilt efforts are among the programs with low catalog numbers in the PX Library.)

Things change. As more and more hams added computers to their shacks, the demand for Amateur Radio software increased. To meet this demand, professional programmers began writing software for Amateur Radio applications. As a result, the ham who owned a computer had an alternative to homebuilt software.

As the quantity of Amateur Radio software increased, the quality of the software increased as well. Today, there is a good selection of sophisticated software available for Amateur Radio applications. Some of that software crosses this writer's desk and what follows is a summary of some of the offerings I have seen, but not necessarily tested, recently.

### Sweepstakes Contester

If you are a Sweepstakes fanatic and have an IBM<sup>®</sup> PC or compatible computer, SCORE, the Sweepstakes Contest Operating Results Enhancer program, is for you. Besides the logging and duping functions you would expect to find in any contest program, SCORE offers more, including the ability to control your transceiver (if it is a Heath SS-9000) and your antenna system (if it is configured with a Pro-Search rotator).

Menus guide you through the installation and configuration of the program, and an array of windows appear as you use the program's Contest Control Panel. This panel always includes a window in which you enter new contacts and a window that continuously displays the current scoring information. Other windows may be displayed by using the computer's function keys. These include a

window that displays the last five entries in the log, a window that displays a list of ARRL Sections (highlighting Sections yet to be worked) and a window that allows you to browse through the log to edit entries as required. When the contest is over, SCORE generates a complete log, ARRL Sections status report, operating profile report and contest summary report. These reports may be displayed, printed or saved to disk.

SCORE requires an IBM PC, XT, AT or compatible computer with 128 kbytes of RAM, DOS version 2.1 or above, and a monochrome or color monitor. Two serial ports (for the SS-9000 transceiver and Pro-Search rotor) are optional and can be at non-standard port addresses. SCORE is available from MJC Technologies, 3704½ Foothill Blvd, Suite 524, La Crescenta, CA 91214. By the way, this program does dupe, generally in less than one second!

### Software for Examination

If you are preparing for a Novice, Technician or General class Amateur Radio license examination, you won't go wrong using Don Middleton's Computer Self-Test Program, which drills you on questions you are likely to encounter when you take the examination. The program displays each question, and the user selects an answer with a cursor key. If the answer is incorrect, second guessing is allowed. If the second answer is incorrect, the program indicates the correct answer. At completion, the program grades your performance and reviews incorrectly answered questions.

The Self-Test program runs on an IBM PC, IBM PC compatibles or any MS-DOS computer with DOS 1.1 or above and BASICA or GW-BASIC. It is available from Don Middleton, W0NIT, 920 W Adams, Pueblo, CO 81004, and includes a beginner's Morse code training tape.

### CoCo Hamming

An array of Amateur Radio software for the Radio Shack Color computer is available from SPEC-COM (the Amateur Radio Specialized Communication Journal). Two of

the most interesting programs in the SPEC-COM catalog are CoCoRTTY and Sloscan. CoCoRTTY receives and transmits 60-WPM RTTY without any external terminal unit, while Sloscan receives SSTV signals without any external interface! And the price is right, too!

Besides those two goodies, SPEC-COM also offers disks and cassettes full of Amateur Radio application software that are bound to fill the need of any ham who owns a Color computer. A catalog of CoCo software may be obtained by sending an SASE to SPEC-COM, PO Box H, Lowden, IA 52255.

### Packet-Radio Interface

A packet-radio communication program, written by Tom Bray, WB8COX, features 36 user-defined buffers for five-line canned messages, a call-sign data base with routing information, and simple uploading and downloading of ASCII files. The program is designed to interface with a TAPR TNC I or compatible with the standard TAPR TNC I or WA8DED firmware; it requires an IBM PC or compatible with a minimum of 192 kbytes of RAM, PC DOS 2.0 or above, a serial port and one disk drive. A free copy of the program may be obtained by sending a formatted disk and a self-addressed, stamped disk mailer to Tom Bray, WB8COX, 3373 E Fairfax Rd, Cleveland, OH 44118.

### Osborne I Keyboard Keyer

Turn an Osborne I computer into a Morse code keyer with a CP/M<sup>®</sup> program written by Phil Pflager, WB6CGW (22380 Palm Ave, Cupertino, CA 95104). A simple circuit consisting of an IC, transistor, diode, relay and three resistors is connected to the Osborne's parallel port to allow Phil's program to key a transmitter. Phil is distributing his program for free via landline bulletin-board systems. Check your favorite BBS to download a copy.

### PACKET-RADIO PRIMER

Get \*\*\*CONNECTED to Packet Radio by Jim Grubbs, K9EI (QSKY Publishing, Springfield, IL), is the first book about amateur packet radio to be published in five years. In that intervening time, packet radio has undergone drastic changes, and this new book brings ham radio literature up to date. In doing so, K9EI has managed to cover the state of packet radio as it exists in 1986. The book is a good primer for the packet-radio novice, and it is highly recommended to anyone who wants to find out what packet radio is all about and how to best utilize packet-radio hardware without being overwhelmed by the technical intricacies of the mode.

### HELP

If anyone has adapted the SM6CPI CAT control system (for the Yaesu FT-757) to a Commodore 64 or 128 computer, please contact John Shidler, N5SZ, 4001 Pkwy, Bossier City, LA 71112.

Do you operate RTTY or CW with your IBM PC? Ron Parry, ZL3VX, would like to know how you do it. Please write to him at 18 Sunvale Terr, Christchurch 2, New Zealand. [EPC]

### PX Potpourri

A variety of programs are featured in this month's PX.

Program 122: a program that finds nonresonant lengths of coaxial cable for specified frequency bands, written in BASIC-11 for a DEC LSI-11/12 computer by Terry Shankland, KC7UV. Terry used "generic" BASIC so that the program will run on almost any computer.

Program 123: a QSL-card-generator program written in MBASIC on an Epson QX-10 computer by Brian Jacobson, KA1FXV.

Program 124: Great Circle Bearing distance program for the Texas Instruments TI-57, TI-58 and TI-59 programmable calculators written by Richard Brunner, AA1P.

Program 125: Morse Code Teacher was written for the Texas Instruments TI-99/4A computer in Extended BASIC by Stanton Smart, K8VIF.

Program 126: L and C calculator written in BASIC for the Radio Shack TRS-80 Model III or IV computer by Harry Neben, W9QB.

To obtain a listing of any PX program, send a business-size SASE with 39 cents postage (unless noted otherwise) to ARRL, Dept PX, 225 Main St, Newington, CT 06111 (CRRL members can send their SASEs to CRRL, PO Box 7009, Stn E, London, ON N5Y 4J9). Use a separate SASE for each program request and write the PX program number of the desired program at the lower left-hand corner of the SASE. Please do not send correspondence other than PX requests to Dept PX.

A list of all 126 programs in the PX library is also available by sending a business-size SASE with 22 cents postage to ARRL, Dept PX, 225 Main St, Newington, CT 06111.

## Hot Stuff at Dayton

The temperature hovered around 90 degrees at the HamVention® this year, and the weather was truly representative of happenings in the FM repeater world—hot!

### Novices on 220?

While some of us were packing our bags for our annual trek to Ohio, news was received that the FCC announced its intention to issue a Notice of Proposed Rule Making that would expand Novice operating privileges to include voice and digital communications on certain portions of the 28-MHz, 220-MHz and 1240-MHz bands. (See June QST for the full text of this NPRM.)

At this time, there are two petitions for rule making pending before the Commission seeking accommodation for land-mobile operations in the 216-225 MHz band. Also, the Commission, in General Docket 80-739, decided to maintain the Fixed, Mobile and Amateur Services as coprimary allocations until the FCC/National Telecommunications and Information Administration working groups develop an appropriate allocation plan for this band. As a result, the FCC will not finalize the 220 Novice privileges until the fate of these matters is determined. However, the potential inclusion of 220 as a Novice privilege is a timely shot in the arm for amateur 220, as still another nonamateur interest (Association of Radio Reading Services, Inc) has cast a hungry eye on that band.

### The Power of Coordination

As some of us were pounding the pavement around the Dayton Hara Arena, the next news was received that the FCC had adopted rules to make amateur stations in repeater or auxiliary operation mutually responsible to resolve interference between them, except when one repeater or auxiliary operation is coordinated and the other is not. Then, the station engaged in noncoordinated repeater or auxiliary operation has primary responsibility for resolving any interference. The FCC took this action to reduce the number of repeater disputes requiring FCC intervention. The FCC decided against requiring coordination as a prior condition to repeater operation and also decided against adopting more detailed repeater coordination rules. Also, the FCC has decided that acceptable power levels and heights above average terrain for repeaters and auxiliary station operations is now a matter for determination by frequency coordinators. (See this month's Happenings for the full details concerning this FCC action.)

Essentially, what the FCC has done is codify its stated policy concerning interference between coordinated and noncoordinated repeaters. In the recent past, whenever an interference dispute between a coordinated and noncoordinated repeater was brought before the FCC, the Commission supported the position of the coordinated repeater because the FCC considered it to be good amateur

practice for stations in repeater operation to abide by the local band plan and to seek coordination. By codifying this policy, the FCC hopes that it will no longer have to be the arbiter between coordinated and noncoordinated repeaters in an interference dispute. When the rule is in black and white, the noncoordinated repeater has no argument; he has to resolve any problems, and he knows it.

Some hams may feel that the new rule does not go far enough, that coordination should be required. Although the FCC will not require coordination for repeater operation, the Commission still must consider it good amateur practice since its new rule favors the coordinated over the noncoordinated. So, any station contemplating repeater operation today would be foolish not to seek coordination as insurance for future interference problems.

### The Contents of Bob's Pocket

Meanwhile, back at the convention, one of the hottest selling items was a new publication that looks like a small, red prayer book, but, in reality, is the 1986-1987 edition of *The ARRL Repeater Directory*. Bart Jahnke, KB9NM, edited this newest edition, which contains listings for 10,321 repeater operations! The new feature of this ever-improving directory is its size (3.25 × 5.25 × 0.5 inches), which is designed to fit conveniently in the shirt pocket of the mobile ham. It is highly recommended for all repeater users.

### FREQUENCY-COORDINATION NEWS

□ The Alabama Repeater Council executive committee announced the results of their Council's recent 20 kHz vs 15 kHz referendum. As certified by the ballot commission headed by ARRL Assistant Director Joe Smith, WA4RNP, the motion to accept the current 20-kHz band plan for the 146-148 MHz spectrum was overwhelmingly approved: 42 for the motion, 26 against the motion and 2 abstentions, with 70 out of a possible 140 repeater owner/trustees returning ballots. (from Tom Ingram, K4OOV, Alabama Repeater Council president)

□ New England Spectrum Management Council (NESMC) President Gordon B. LaPorte, K1VHR, wrote that NESMC has a very good relationship with Tri-State Amateur Repeater Council (TSARC), the coordinator for Connecticut, metropolitan New York City and northern New Jersey. In fact, TSARC has a representative (John Ronan, K3ZJJ) on NESMC's board of directors, who is invaluable in providing guidance to the NESMC president. There is no contention for Connecticut; all its repeaters are coordinated by TSARC. Also, NESMC has recognized Vermont Independent Repeater Coordinating Council (VIRCC) as the coordinator for Vermont. VIRCC occupies a secondary status on NESMC's board of directors.

□ Oregon Region Relay Council (ORRC) has elected to change its 450-MHz band plan from low in/high out to high in/low out. This puts the entire West Coast, with the exception of

Southern California, on the same band plan. Western Oregon systems using the old band plan may continue to use that plan if desired; only newly coordinated systems are required to follow the new plan; however, existing systems are encouraged to use the new plan as well. (from the newsletter of Western Washington Amateur Relay Assn)

### REPEATER LOG

According to reports received in March, repeaters were involved in the following public-service events: 282 vehicular emergencies, 43 drills/alerts, 29 medical emergencies, 24 fire emergencies, 6 weather emergencies, 5 public-safety events, 3 power failures, 2 search-and-rescue emergencies and 1 criminal-activity report.

The following repeaters were involved (followed by the number of events): WA1DGW 16, W2UL 46, WA2ZWP 13, WB3GDH 3, K4GSO 19, WD4JWO 3, WA6BJY 6, W6FNO 248, KH6H 2, WB6JPI 10, K8DDG 5, KD8GL 5, WD8IEL 6, WA8ULB 5, WA0FYA 8. □

## Strays

### IF YOU HAPPEN TO BE IN THE NEIGHBOURHOOD

□ Wireless history buffs visiting England should find the following of interest.

• Inside Southampton Post Office, on the east side of High Street, is a small memorial to the British and American telegraphists who died on the *Titanic* in 1912.

• In London, these buildings carry commemorative plaques: to Guglielmo Marconi at 71 Hereford Rd; Samuel Morse at 141 Cleveland St; John Logie Baird at 22 Frith St; Michael Faraday at 48 Blandford St; and James Clerk Maxwell at 16 Palace Gardens Terr.

• And on the wall of Bush House, facing onto the Strand, is this notice: "Within this building, Marconi's Wireless Telegraph Company Ltd operated their famous broadcasting station, 2LO, from May 11 to November 15, 1922, when it became the first station of the British Broadcasting Company."—Allan Herridge, G3IDG

### I would like to get in touch with . . .

□ anyone who has interfaced a Digital Robin or Rainbow computer to a ham radio. Stephen Craven, KQ1P, PO Box 5, Gilbertville, MA 01031.

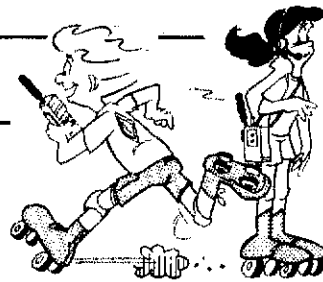
□ anyone interested in joining a college/university club-station net. Bill Bishop, N0EBA, c/o U of Iowa ARC, 4900 Engineering Bldg, Iowa City, IA 52242.

□ veterans of Camp Forrest in Tullahoma, Tennessee, willing to help operate the First National Reunion commemorative station. George Stone, WD4CYV, 712 First Ave, Tullahoma, TN 37388.



# Making Waves

Conducted By Scott Springate, N7DDM  
2095 Broadview, Eugene, OR 97405



## TWO HAMS BRANCH OUT

*The following story, submitted by the Rev R. J. Ritter Sr, KA3CSM, concerns Randy Shriver's ascent in ham radio. But just as Randy didn't limit himself to only one form of ham radio, neither did he limit himself to just ham radio.*

### Determination and Dreams

Randy's interest in radio began at the age of 13. I was then the pastor of the church across the street from Randy's house, and occasionally I would talk to him on CB channel 14. It wasn't long before he bought a Sears CB. I helped him construct a dipole for his antenna, and Randy was on the air. Soon a Rohn 25G tower had been erected with a 4-element quad sitting on top.

CB soon became too dull for someone who had big dreams. Two years later, Randy began studying for his Novice license. Two months passed by, with a lot of time spent with the Heathkit study guide. The big day came on February 9, 1981, when he passed his first exam, at age 15. Continuing through the Heathkit studies, Randy passed the General exam, on June 5, 1981. He allowed nothing to stand in his way as he continued to the top. On July 2, 1981, he passed the Advanced exam and went on to the Extra and the call he currently holds, KG3N, on November 9, 1981.

Determination has always been the key to Randy's success. I moved from Randy's hometown of Hanover, Pennsylvania, before he began studying for the Novice license, and all Randy's studying has been on his own. He did not attend licensing classes, so the only encouragement and help I could give was by telephone. His determination really showed when he went to Baltimore for the exams.

Each time, Randy would rise early in the morning and take a bus from Hanover to Baltimore. The ride was then followed by a long walk to the Federal Building to take his test. The bus would leave the city in the evening and that meant Randy had to wait most of the day for his trip home. He had little help from anyone to achieve what many people only dream about. After the Extra Class license, Randy decided to continue his studies. On July 19, 1982, at the age of 16, he received his General Radiotelephone License. Determination and perseverance paid off again when the Ship Radar Endorsement was granted on November 22, 1982.

With all his studies completed, Randy began building his station. This included a lot of research to find the perfect rig for someone with big dreams and high hopes.

We continued to keep in touch, even though we lived more than 100 miles apart. He would call me when there was a problem, but usually he did research to find the answer, and had the problem worked out before he called. His mind was always active and this helped him to achieve his goals.

It wasn't long before the dipole wasn't big enough. So Randy began doing his homework again. Soon he was building a 60-ft Rohn 45 tower. This project needed a little help. After the tower was erected, he enlisted the services of the Pennville Fire Department, which lifted the Hy-Gain



Randy sits at the station he used to successfully reach Tony England, WØORE, four times. (W3KGN photo)

tribander and Cushcraft 2-meter beams into place.

You would think most hams would be satisfied with this setup, but not Randy. An ICOM R70 was added to his station along with a Kenwood TL922 amplifier to complement his Kenwood 830. Later, an Atari 800 computer found its way into the shack. Things were beginning to materialize, and the dreams would soon be real. Randy's big break came on August 3, 1985, at 10:55 PM, with his first contact with WØORE aboard the Space Shuttle *Challenger*. Randy went on to get three more confirmed contacts with the Space Shuttle Amateur Radio Experiment (SAREX). He also made a contact via slow-scan television. Occasionally, when Randy is not building (or dreaming), he will be working 20-meter phone. But that doesn't happen too often. He is a Volunteer Examiner with the ARRL VEC and holds Novice, Technician and General classes.

### K-80 in California

*The following story was submitted by Norm Goodkin, K6YXH. It is about the activities of his son, Daniel, KA6VSS.*

Daniel Goodkin, of Woodland Hills, California, became the youngest member of the Los Angeles County Disaster Communications Service (DCS) on March 25, 1986. RACES is part of DCS in LA County. Daniel is only 11 years old, but has completed all the requirements for membership. DCS consists of volunteer groups attached to each Sheriff's Station within LA County. Daniel is attached to the Malibu Station and was issued the tactical call K-80.

Daniel has earned two commendations from the Sheriff's Department for his work during the Lake Sherwood and Carbon Canyon fires. Although he was not yet a member of DCS at the time of those fires, he worked for several days carrying messages between the Malibu Station

Message Center and the Intelligence Officers. Daniel also contributed by listening to the tactical radios and updating the Message Center personnel to the status of the fire. The Message Center is also a part of DCS and is manned by volunteers from the community. There are approximately 140 volunteer members in the Malibu DCS. Many of them are licensed Amateur Radio operators who provide emergency communications between county agencies during disasters such as fire, flood and earthquake. If anyone in LA County has called the Sheriff's Station for information during a disaster, they have probably talked to

DCS Message Center personnel who often assist on the switchboard and answer routine questions.

Daniel is a student at A. E. Wright Middle School, plays the tuba in the school band and plays club soccer. He currently holds a General class license. When Daniel isn't using his radio station to pass along messages in emergencies, he likes to just ragchew. Daniel has plenty of support from the rest of his family in his radio achievements because many other family members are also licensed hams. His father, Norm, is K6YXH; his mother, Naomi, is WB6OHW; his grandfather, Erv, is N6NEF; his brother, Brian, is N6FKG; and his sister, Mari, is KA6PTV.

[Editor's Note: Anyone interested in volunteering their time to assist with communications like this should contact his or her Section Manager for the name and address of the appropriate ARRL Field Organization official. The name and address of your Section Manager is on page 8 of each issue of QST.]

### SURVEY REMINDER

If you have not yet sent in your questionnaire from the May issue of Making Waves, I would really appreciate it if you would because it is not too late.

## Amateur Radio Leads to Career in Electronics for KA1DNB

In 1979 Ann Carro had no idea what a capacitor was, and now she is KA1DNB as well as an assistant engineer with a leading electronics company. Not only is she making electronics her lifetime career, but she is half-way to earning enough credits for a Bachelor of Science degree in Computer Engineering as well as a BS in Electrical Engineering Technology. Not bad for the YL who in her senior year of high school had no idea what she would do when she graduated. Ann Carro, KA1DNB, says, "It all started during my last year of high school when I became involved with Amateur Radio. I always liked radio, but did not know anything about it as a hobby." It took very little persuasion from teachers and peers for Ann to enroll in a Novice class taught by AA1Q, earn her call in 1979 and within six months save enough money to buy her first rig. With encouragement from her newly found amateur friends, Ann pushed forward. When she upgraded to General, she took the 20-WPM code test and passed. "It took me more than one try to upgrade to Advanced, but I finally made it in October of 1980. Not only did I pass my Advanced, but 20 minutes later I also had passed my Extra." She credits her unusually rapid upgrading to K1QVF, who instructed the code and theory classes, and also to WA1ZCD, who gave her moral support in Boston when she made the final grade. But it was Robert Poniatowski, AF1I, Ann's high school principal who followed her progress, recognized the talents of this energetic young woman and encouraged her to investigate the possibilities of a career in electronics.

During her senior year Ann was granted permission to sit in on an advanced electronics class as an observer, just to see what it was all about. As a part of the course as well as continuing-education orientation, the class went on a trip to Rhode Island School of Electronics (RISE). "I was impressed by the whole thing and decided to take a chance at a career in electronics." The day after Ann graduated from Tiverton High School, she began attending RISE, and two years later graduated at the top of her class with a 96% average.

Her first job was with a Foxboro company as an electronic troubleshooter. "My job was to test and troubleshoot analog measurement instruments. It was challenging for a while, but I didn't want to do this for the rest of my life so I decided to go back to school part-time and pursue my BS degree in Electrical Engineering Technology." Ann's enthusiasm and determination were enhanced by incentive from her employer and the company's 100% tuition reimbursement for courses passed with a C average or better. She returned to school and also continued her work as a troubleshooter. About two years went by when she recognized that it was time for a change. She decided to apply for other jobs within the company, with the hope of moving upward. "I went through several in-

terviews before I finally settled for a lateral move onto the second shift with the promise that if I could show I could do more complex work, I would get a promotion." Sure enough, three months went by, and she was given a special evaluation review with an excellent performance rating. Ann was offered a promotion and an impressive salary increase. Another three months passed, and she was transferred to a different plant, where she returned to the day shift with another promotion to Senior Equipment Maintenance Technician. "My job as a Senior Equipment Maintenance Technician was to repair printers, disk drives, color and black/white monitors, terminals, computers and tape drives. I really enjoyed this job the most because I was constantly doing different things. It was different from troubleshooting and testing the same product day in and day out. This new job was much more interesting and rewarding."



Ann Carro, KA1DNB, takes time out from a rigorous college and job schedule to enjoy operating HF mobile.

Holding down a full-time job as well as going to school evenings, Ann didn't put Amateur Radio on the back burner. Instead, she became active on the HHH Net and MARS. There was still time to earn WAS on 40 meters with an SSB endorsement and WAS on the HHH Net. Over the past six years, Ann has become affiliated with the Raytheon ARC, Foxboro ARC, Dayton ARC, Women Radio Operators of New England (WRONE), YLRL, Apple Valley ARC and YLISSB. She enjoys hamfests and made 1986 her sixth consecutive year at the Dayton HamVention®. When she is not working, in school or ham-

festing, KA1DNB is a familiar voice in Rhode Island for the Red Cross and civil defense communication networks. During last summer's Hurricane Gloria, Ann was instrumental in helping homeless families find places to stay.

Just over a year ago, Ann was called by a local company to be interviewed for a job. "I had been trying for over four years to get the attention of this particular company and had just about given up. They were seeking experienced people to fill certain positions so they were going through all the old applications that they had on file. It was a surprise to me because I thought they threw away my application a long time ago." Ann went in for the interview and was offered a job as an assistant engineer. In this position she designs test adaptors and writes programs for testing circuit boards. Ann admits that this is just another stepping stone because she hopes to eventually become a design or computer engineer with a specialty in software development.

KA1DNB works in electronics all day, goes to school nights to learn more about her hobby and job, yet admits that in her spare time she enjoys tinkering with radios and televisions. "I make an effort to attend most of the radio flea markets in the New England area in addition to Dayton and a few in New York. I'm always looking to see what bargains I can snatch up to fiddle with on the side."

Ann may be conscientiously committed to her advanced schooling goals as well as her job, but she still finds time to let down from the pressure of her strenuous routine with bowling, skiing and fishing. During the winter months there is enough time to experiment with her home computer when she is not using it for homework. (She has a working knowledge of BASIC, HPL, FORTH, C, FORTRAN, Assembler, Motorola M6800, MC68000 and GR227X.)

Recently she became a homeowner and is still in the throes of assembling her station, which consists of an FT-101 and a TS-430. Two-meter operation keeps her in routine touch with a certain OM in New Hampshire as well as in supply of gas for her car! "While I was traveling through Kentucky with a rented car, I ran out of gas, but all it took was one call on a local repeater to get assistance."

If all this activity wasn't enough, KA1DNB is also a Volunteer Examiner with ARRL and makes herself available to local clubs who need an extra hand. Ann hasn't taken her Amateur Radio beginnings for granted. She recognizes that the Amateur Radio operators who reached out to her in high school are responsible for where she is today and where she is going. She says, "Amateur Radio has a great deal to do with not only my career but my life as well. I have found that amateurs are a unique group of people, always willing to lend a helping hand. As the word HAM implies: Helping All Mankind or Woman-kind, whichever the case may be!"

It is with deep regret that we record the passing of these amateurs:

NIADA, George T. Siddall, Hyannis, MA  
 W1AXF, Malcolm J. MacDonald, Chatham, MA  
 KA1BGA, Willard C. Goldthwaite, Gloucester, MA  
 K1FJT, Leonard F. Linley, Easton, CT  
 KB1NF, George W. Pinkham, Wayland, MA  
 W1PP, Roger A. Sykes, Largo, FL  
 W1TT, Milton W. Mix, Wayland, MA  
 W1WTH, Harold S. Chapman, Augusta, ME  
 WA1ZCR, Clinton E. Barton, Plainville, MA  
 \*N2BPI, Bobby G. Robbins, Flats, Bermuda  
 WB2KQ, Charles B. Dalton, Tonawanda, NY  
 WB2CNA, Henry R. Blakeley, Tully, NY  
 W2GS, Edwin F. Ehlinger, Utica, NY  
 WA2JVB, Louis E. Podewas, Nassau, NY  
 WB2KQ, Charles B. Dalton, Tonawanda, NY  
 WA2KOJ, Richard A. Bohall, Oswego, NY  
 W2MFS, Daniel W. Keele, New York City, NY  
 W2ORI, John G. C. Miller, Lockport, NY  
 W2PFQ, Joseph J. Blaker, Pennsauken, NJ  
 K2PQX, James B. Frye, Jr., Homer, NY  
 W3AKO, J. Raymond McCracken, Westover, MD  
 N3AO, Stanley Gritsevich, Sr., Nanticoke, PA  
 \*K3CA, Virgil E. Neilly, State College, PA  
 KB3GJ, Mark E. Sickmeyer, Doylestown, PA  
 W3IMN, Harold L. German, Camp Hill, PA  
 W3KQM, Forrest Campbell, Jr., Hathaway Pines, CA  
 W3RUM, Ernest H. Voss, Clairton, PA  
 \*W3UYN, Derald E. Rogers, Lancaster, PA  
 W3ZK, Zell G. Fenner, Newtown Square, PA  
 N4AH1, George D. Fisher, Arlington, VA  
 KQ4B, Douglas A. Richards, Kingsport, TN  
 K84JDX, Eva Pilson Wimmer, Roanoke, VA  
 W4DUZ, Clyde C. McClymonds, Miami, FL  
 W4DZK, Cothlyn Q. Penley, Charlotte, NC  
 N4GHR, Eugene W. Blum, Lake Worth, FL  
 WA4GXF, Robert H. Fitzgerald, Miami Springs, FL  
 WA4FX, K. B. Chappell, Louisiana, VA  
 K4JD, Lyttleton W. Ballard, Virginia Beach, VA  
 W4JFV, John T. Aldhizer, Roanoke, VA  
 N14L, Harry M. Brown, Fairdale, KY  
 \*K4ND, Michael J. Sefcik, Zephyrhills, FL  
 WY4O, Timothy McKenna, Casselberry, FL

W4ODC, Jacob R. Ross, Boca Raton, FL  
 WA4PFZ, Henry D. Kennedy, Dawson, GA  
 W4PJ, Louis A. Bonner, Carrollton, GA  
 WB4QWJ, Donald Reese, Cookeville, TN  
 N4SI, Fred M. Niell, Memphis, TN  
 W4UDN, Luther C. "Boots" Mercer, Roanoke, VA  
 N4UY, Christopher R. Tompkins, Richmond, VA  
 WA4WHT, Harold C. Warlick, Sr., North Augusta, SC  
 W4ZMQ, Marvin B. Carter, Eagleville, PA  
 \*W4ZZ, Herrick B. Brown, Greeneville, TN  
 WA5DDQ, George Turner, Wichita Falls, TX  
 W5LOM, Leon V. Day, Albuquerque, NM  
 W5NDE, Arthur C. Sweeny, Tulsa, OK  
 W5XZ, William Rocholl, Willis Point, TX  
 W6CHV, Ralph H. Culbertson, La Jolla, CA  
 WD6CSH, Edward Plante, Santa Ynez, CA  
 W6DYB, Willard B. Tallmon, Menlo Park, CA  
 W6FY, George E. Thompson, Sonoma, CA  
 KA6INM, Harry R. Nelson, Crescent City, CA  
 W6INQ, Ross D. Cade, Santa Clara, CA  
 W6JXU, Beatrice M. Felts, San Luis Obispo, CA  
 W6MBD, Harry M. Leonard, Los Angeles, CA  
 WA6PKF, Clyde R. Brown, Berkeley, CA  
 KA6JZM, Roscoe C. Neeley, Jr., Palmdale, CA  
 W6QXB, Albert K. Sargent, Upland, CA  
 WB6UEB, Ernest K. Admann, San Francisco, CA  
 W6WEQ, Paul Williams, Santa Cruz, CA  
 WB7AFD, Everett R. Baughman, Rockaway, OR  
 WA7AZJ, Edward J. Hruska, Scottsdale, AZ  
 \*W7BMC, Leavenworth Wheeler, Yuma, AZ  
 KT7C, James Tusa, Tucson, AZ  
 W7CV, Carroll W. Short, Jr., Boulder City, NV  
 N7EYC, Jack H. Schmidt, Port Orchard, WA  
 W71Z, Howard Warren Godfrey, Sr., Mesa, AZ  
 W7KNO, Leonard J. "Pep" Huber, Green Valley, AZ  
 W7KWQ, Leo Erickson, Vancouver, WA  
 W7PJJ, Earl A. Link, Aberdeen, WA  
 W7RDI, Bert W. Browne, Mountlake Terrace, WA  
 WB7VAQ, Robert W. Wasson, Post Falls, ID  
 WD8ABI, Truman Copley, Rittman, OH  
 N8ATO, Vance G. Newton, Swartz Creek, MI

W8DEI, Ralph K. Jordan, Batavia, OH  
 K8MYK, Paul E. Bender, Brighton, MI  
 W8NPE, Paul L. Gregory, Redington Shores, FL  
 W8QO, Robert J. Neff, Medway, OH  
 W8WAV, Charles L. Foster, Cuyahoga Falls, OH  
 W8ZGS, E. Lowell Kelly, Ann Arbor, MI  
 WB9EXP, Lawrence C. Root, Richton Park, IL  
 WB9JVI, Charles N. Tindell, Peoria, IL  
 \*K9MD, D. B. Pili, Jr., Clinton, WI  
 W9MF, Robert E. Beam, Evanston, IL  
 W9TFS, Albert E. Otterman, Hammond, IN  
 KB0DV, John W. Thomas, New Ulm, MN  
 W0EHI, William H. Lounsbury, Duluth, MN  
 WA0FOI, Robert A. Kroner, Kansas City, MO  
 W0GBN, Alfred Monkkonen, Duluth, MN  
 W0KJZ, Lydia S. Johnson, Lead, SD  
 W0LQY, Lyell J. Moore, Mason City, IA  
 W0OKR, Otis Johnson, Kansas City, KS  
 W0PUY, Orville Boddy, Keokuk, IA  
 \*VE1BAF, Douglas A. Collings, Milton, NS  
 VE1BZZ, George C. Coffin, Charlottetown, PE  
 VE3NYS, James N. Leach, Fort Erie, ON  
 VE3YJ, George L. Foster, London, ON  
 VE7ANS, Philip Enright, Vancouver, BC  
 VE7BOV, George A. Fowler, Nanaimo, BC  
 I8PLH, Hildegard Pellicone-Goldstein, 89100  
 Reggio Calabria, Italy

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ.

Note: All Silent Key reports sent to HQ must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

## 50 Years Ago

### July 1936

East Coast and Midwest v.h.f. enthusiasts had a ball one evening in early May when the 5-meter band opened with S9 signals both ways. QST's report reminds us that the same thing happened about a year ago. Wonder if that will lead to any theory to cover the phenomenon?

A single-stage crystal rig seems to be the hot item these days. W3EHE uses a pair of 802s with push-pull input and with output switchable to push-push (plates in parallel) for better doubling. Forty watts makes it a respectable little unit.

W1SZ aims at bigger game, with a crystal-controlled 42-RK20-805s setup to produce a half kW. The exciter is band switchable, but plug-in coils are used in the final.

The Federal Communications Commission is undertaking an evaluation of every U.S. radio activity, with particular attention to frequencies above 30 Mc., looking toward a revised allocation table for that portion of the spectrum. Hq. has been extra busy gathering data and other material to comprise a presentation for the amateur service.

The League's new officers are President Eugene C. Woodruff, W8CMP, and Vice-President George W. Bailey, W1KH. "Doc" Woodruff is a professor of electrical engineering and eminent in the field of railway electrification, as well as being senior in service among the League directors. W1KH is a New Englander all the way, an industrialist, but like W8CMP also an active and enthusiastic amateur.

Furthering the campaign to improve the quality of our voice signals, W9QK first points out that modulation peaks that cause splatter can occur throughout the normal voice range, not just in the lower audio frequen-

cies as some have thought; then he describes a simple neon tube monitor almost as accurate as the elaborate and expensive jobs the b.c. stations are being required to install.

The 6th (1935) Sweepstakes contest had an enthusiastic turnout, but to date no station has ever worked all 69 1eague sections despite the full 10 days of operating time.

We normally use capacitive neutralization in our amplifiers, but Messrs. Craft and Collins of the latter's radio company point out that an inductive system is easier to adjust, is simple and more compact, and is seldom bothered by parasitic oscillations.

Engineers hams involved in the design and construction of a 326-foot wooden tower for broadcast station WRVA got sufficiently inspired to create a ham version for W3ZD—a 70-foot self-supporting structure.

Receiver crystal selectivity can be turned up so high that c.w. marks and spaces become almost indistinguishable. W1EYM remedies that problem by using a Class-C audio amplifier with bias adjusted to read only signal peaks, effectively restoring readability of the signal.

## 25 Years Ago

### July 1961

Expansion of the U.S. phone band through the top 50 kc. of 20 meters has effectively chased out foreign hams from that sector, reducing DX possibilities. The League's Board recommends we here stay out of at least the top 15 kc. so that we may provide a reasonably clear spot to hear DX.

One more step in promoting greater use of v.h.f. is WIHQD's project of a complete two-band station

"for the beginner," covering both 6 and 2 meters. The first installment covers a simple tuner for use with converters.

We now know that sporadic-E 6-meter propagation is not uncommon in the early summer months, but how do we predict it for wintertime openings? W0PME says monitoring Channel 2 is not the best answer as the frequency is too high, but a 40- to 50-Mc. monitor unit such as those used by law-enforcement authorities is ideal. Just remember the secrecy of communications law.

Broadcast television has now been around long enough that secondhand or junked receivers are becoming plentiful. K4ATG bought one for \$5, and after disassembling it estimated the salvaged parts to be worth \$71!

W6EMD suggests that a screen-current meter is a better indicator of operating conditions than the plate reading, particularly in adjusting linear r.f. amplifiers.

Semiconductor power rectifiers are becoming cheaper, so we appreciate WA2ANU's suggestions on how to handle them differently from the customary tube setup.

An electronic key can be improved by an actuating switch in which independent arms for dot and dash contacts are provided. W2BIO shows a simple and inexpensive way to do that job.

"OSCAR" satellite fever is building. The W6 contingent behind the project provides us with extensive info on tracking and reporting procedures, position and time coordinates for a typical OSCAR orbit, and how to construct a simple "computer" to figure it all out.

Responsive to Board instructions, Hq. is starting early to "lobby" for an amateur radio commemorative stamp hopefully to be issued on the League's 50th anniversary (1964).

Most of today's commercial rigs are designed with pi-network tank circuits to work into a 50-ohm load, and a mismatch can cause serious problems. WHCP combines a reflectometer and a band-switching adjustable r.f. transformer in one cabinet, a unit capable of handling mismatches of about 5 to 1.—W1RW

# Coming Conventions

## DELTA DIVISION CONVENTION

August 9-10, Shreveport, Louisiana

The Shreveport ARA will host the ARRL Delta Division Convention at the Shreveport Convention Center on the riverfront. Top guest speakers, exhibitors, forums and other activities will be presented. A flea-market area will be set up with tables available for a small fee. Also, Volunteer Examiner testing will be held for all license classes. As this convention is held during the racing season at Louisiana Downs, motel accommodations should be made as early as possible. Admission is \$1 if preregistered, \$2 at the door. For more information, contact the SARA Hamfest, PO Box 37632, Shreveport, LA 71133-7632.

## SOUTHEASTERN DIVISION CONVENTION

July 19-20, Atlanta, Georgia

The Atlanta Radio Club invites you to the Atlanta Hamfest and 1986 Southeastern Division Convention at the fabulous Georgia World Congress Center. The entire exhibit hall and flea market are housed in one huge air-conditioned building. All major manufacturers and area dealers will be on display. The flea market is the envy of the South. Forum speakers include Wayne Green, W2NSD/1, Lew McCoy, WIICP, Mike Riley, KX1B, and Don Search, W3AZD. Forum topics cover all areas of amateur interest with emphasis on packet, DX and antennas. Unique to this or any other convention is the Elmer forum, an all-day seminar for new hams on how to succeed at our hobby. Exams given both days, no advance registration necessary. Headquarters hotel is the OMNI International. Write for brochure to Atlanta Hamfest, PO Box 77171, Atlanta, GA 30357.

## TEXAS STATE CONVENTION

July 11-13, San Antonio

The Texas State ARRL and Texas VHF/FM Society

July 5-6

West Virginia State, Weston

July 11-13

Texas State, San Antonio

July 19-20

Southeastern Division, Atlanta, Georgia

August 1-3

West Gulf Division, Oklahoma City, Oklahoma

August 9-10

Delta Division, Shreveport, Louisiana

August 10

Rocky Mountain Division, Denver, Colorado

August 23-24

Roanoke Division, Virginia Beach, Virginia

## ARRL NATIONAL CONVENTIONS

September 5-7, 1986—San Diego, California

July 10-12, 1987—Atlanta, Georgia


August 19-21, 1988—Portland, Oregon

jointly will sponsor a convention at El Tropicano Hotel, 110 Lexington, 6 PM Fri, 8 AM-5 PM Sat and 9 AM-12 PM Sun. Hospitality suites, licensed day-care during the day on Sat and Sun, QCWA breakfast on Sat morning. Banquet on Sat evening. ARRL forum: Larry Price, League President and Ray Wangler, West Gulf Director. VHF/FM Society summer meeting. 18,000-sq-ft indoor areas for amateur swap, dealer and manufacturer displays. Other amateur programs/meetings: Shuttle Amateur Radio Experiment (SAREX), FCC Watch, Amateur Radio—A Long Range Outlook, NTS forum, linear amplifiers, cellular radio, personal computers, printers, AMSAT, packet, satellite (working OSCAR), MARS, SPAM, plus more. License exams—limited walk-ins. Women's programs: health, colors and clothes, crime and safety awareness, flower arranging. Convention registration \$5 in advance, \$7 at the door; family \$2 in advance, \$3 at the door. Dinner reservation \$15; QCWA breakfast \$7 in advance. Amateur swap tables \$5, vendors \$20 and manufacturer booths \$100. Send advance reservation to PO Box 18506, San Antonio, TX 78218, tel

512-698-1712 or 512-698-0560. Include SASE for return confirmations. Talk-in on 146.88 simplex. For more info, contact Melvin H Anderson Jr, 8932 Saddle Trail, San Antonio, TX 78255.

## WEST GULF DIVISION CONVENTION

August 2-3, Oklahoma City, Oklahoma

Central Oklahoma Radio Amateurs, Inc host Ham Holiday at Lincoln Plaza Hotel and Conference Center, 4445 North Lincoln Blvd, Oklahoma City. The fun begins Fri evening with eyeball QSOs. Dealer exhibits and flea market open at 9 AM Sat. Come have fun collecting parts of gear for your favorite project, meet the guys from ARRL or reap the reward of all that extra hard study by attending the VE session. YEs, too! Preregistration is \$10, \$12 at the door. Smorgasboard dinner tickets \$8 each, children 6-12, \$3. QCWA breakfast \$7.25. Send preregistration check or money order postmarked before Jul 23 to Ham Holiday, PO Box 60084, Oklahoma City, OK 73146. 

# Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ  
Convention Program Manager

**Attention:** The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.

**California (Torrance)—Jul 16-19:** The Los Angeles ARC is proud to be the host of OMIK's 34th annual convention. The convention will be held at the Torrance Marriott Hotel, 3635 Fashion Way, Torrance, CA 90510. The OMIK convention rates for this luxurious hotel are \$64 for singles, doubles or triples. The rates are normally \$116 for singles and \$126 for doubles. The convention site is adjacent to the Del Amo Fashion Center, one of the largest shopping malls in the world. Adjacent to the hotel is free parking for 200 vehicles. Please check with the hotel's doorman for information on parking recreation vehicles and motor homes. For more information, or for preregistration information, write Los Angeles ARC, 10232 - 4th Ave, Inglewood, CA 90303.

**Colorado (Glenwood Springs)—Jul 26:** The Ski Country ARC will be hosting their 5th annual hamfest in conjunction with the Colorado Council of ARC summer meeting, inside the CMC building behind City Market, 9 AM-3:30 PM. Talk-in on 146.07/67. Admission free, tables \$5, refreshments and lunch will be available. VEC exams at 9 AM (send \$10, \$4, and copy of license to NDØE, 5387 Road 1564, Glenwood Springs, CO 81609). Videotapes and packet demonstrations throughout the day, EC meeting in the morning, Grand Mesa Contesters Group meeting in the after-

noon. Campout at Ruedi Reservoir after hamfest. For further information, contact any club member, or write SCARC, PO Box 802, Carbondale, CO 81623.

**Colorado (Woodland Park)—Jul 26-27:** The Mountain ARC will hold their 5th Annual Swapfest Campout in the beautiful Colorado Rockies at the Red Rocks Campground, 3 miles north of Woodland Park on Colorado 67. Gate opens 4 PM July 25. Fee is \$5 per night for camping and/or selling. Potluck dinner on July 26. Refreshment stand available. Talk-in on 146.37/97 and 144.56/145.16. For information and campsite reservations, call Jack Huston, WØJAW, 303-687-2146, or write PO Box 151, Woodland Park, CO 80866.

**Illinois (Belvidere)—Jul 27:** The Big Thunder ARC is sponsoring their Belvidere Hamfest at the Boone Co Fairgrounds, 7 AM-2:30 PM. Admission in advance is \$2.50, \$3 at the door. Activities include flea market for amateur radio and electronics. Free camping Sat night for early birds. Fee for electric hook up if desired, fee for tables also. Services include an ARRL booth. Talk-in on 52 and 147.975/375. For information and reservations, contact Jim Grimsby, W9HRF, 210 Oak Lawn La, Poplar Grove, IL 61065, tel 815-765-2573.

**Illinois (Downers Grove)—Jul 13:** The DuPage ARC is sponsoring a Hamfest/Computerfest at the American Legion Post 80, 4000 Saratoga, Downers Grove. Outdoor flea market and swappers row. Indoor tables available (dealers welcome). VEC exams for all license classes (please bring copy of your license). Free parking, food and drink available. General admission \$3 at the gate, \$2 in advance. Gates open at 8 AM. Talk-in on 52. For tickets or reserved tables, SASE to: Hamfest Chairman, W9DUP, PO Box 71, Clarendon Hills, IL 60414, or call 312-985-9527 evenings or weekends.

**Indiana (Angola)—Aug 3:** The Steuben County Radio Amateurs present the 28th Annual FM Picnic and

Hamfest at Crooked Lake. There will be a picnic-style BBQ chicken, inside tables for exhibitors and vendors, overnight camping (fee charged by county park). Communications on 52 and 147.81/21. Admission \$2.50.

**Indiana (Indianapolis)—Jul 12-13:** The 16th Annual Indiana ARRL Convention and Indianapolis Hamfest will be held at the Marion County Fairgrounds. The Indianapolis Hamfest has the largest electronic flea market and new Amateur Radio equipment display in the state. ARRL and technical forums will be held all day, both days. Inside tables are available for \$8 per table. Four buildings will be devoted to the indoor flea market, providing even more covered flea-market space. A professionally decorated building is provided for those commercial dealers who prefer not to be in the flea-market area. A 2-meter fox hunt will be held on Sat, and a 450 fox hunt will be held on Sun. Plan to submit your display for the homebrew contest. A QSL card contest will be held for the best personal and the best received cards. Free camper hookup and overnight facilities are available on the grounds, provided by the hamfest association. Food is available on the grounds, and many restaurants and motels are close by on the I-465 loop. Gate fees are \$5, and free parking is provided on the grounds. The gates will open at 6 AM both Sat and Sun. For information about the Indianapolis hamfest, contact Bill Evans, WB9BEN, 317-745-6389.

**Kansas (Hays)—Jul 27:** The Hays ARC is sponsoring their Swapfest and Auction at the Sheridan Coliseum Fort Hays, State University, 9 AM-5 PM. Admission is \$2, tables \$1. Activities include VE testing, packet, OSCAR, ATV, videotapes, fox hunt. Talk-in on 147.78/18. For information or reservations, contact Andy Oldham, NØFBS, 117 N 8th St, Wakeeney, KS 67672, or call 918-743-2712.

**Maryland (West Friendship)—Jul 27:** The Baltimore

Radio Amateur Television Society presents the famous BRATS Maryland Hamfest and Computerfest at the Howard County Fairgrounds, Rte 144 at Rte 32, adjacent to I-70 in West Friendship. Indoor tables with ac power, along the wall of our spacious exhibit hall, are \$20 each or 4 for \$75. Wall tables, without ac, are \$10 each or 10 for \$95. Advanced reservations are a must, since no tables will be sold on the day of the hamfest. Dealer setup begins on Sat at 2 PM, with overnight security provided. The fairgrounds open at 6 AM on Sun, at which time tailgating space will be available at \$4 per space. There will be free VE exams at 11 AM on Sun, with no advanced registration required. Talk-in on 63/03, 16/76 and 52. For information and reservations, write to WEGXK, BRATS, PO Box 5913, Baltimore, MD 21208.

**Michigan (Escanaba)—Aug 2:** The 38th Annual Upper Peninsula Hamfest sponsored by the Delta County Amateur Radio Association will be held at Bay de Noc Community College, 9 AM-5 PM. Admission \$2. Activities include meetings, swap, food and a banquet. Talk-in on 147.75/15. For more info, contact Aileen Gagnon, 9159 Bay Shore Dr, Gladstone, MI 49837, tel 906-428-9789.

**Missouri (Washington)—Jul 20:** The 24th Annual Zero-Beaters ARC hamfest will be held at the Bernie H. Hillerman Park (Washington Fairgrounds), 8 AM-3 PM. FCC exams, free flea-market space, limited rental space available. Free parking. Talk-in on 84/24 and 52. Food and refreshments will be available. For more info, write to Zero-Beaters ARC, Box 24, Dutzow, MO 63342, tel 314-239-2072.

**North Carolina (Asheville)—Jul 26-27:** The WCARS is sponsoring a Hamfest and Computer Fair, 8 AM-5 PM. Free admission. Activities include license testing, playground for the kids, working HF and CW, and packet with information booth. Booths \$10 per day, 2 tables furnished. Talk-in on 146.16/76. Telephone or written requests must be made in advance. For information or reservations, write to PO Box 430, Enka, NC 28728, tel 704-258-0060, 704-665-2217, 704-665-1877.

**North Carolina (Cary)—Jul 19:** The Cary ARC will hold their 14th Annual Mid-Summer Swapfest 9 AM-3 PM at the Lions Club shelter (near Cary High School). Activities include buying, selling, bartering, haggling, visiting and open auction. Food and drink available. Free admission. Talk-in on 146.28/88 (80-30 mi), 147.75/15 (30-2 mi), 52 (2-0 mi). For more info, write to Cary ARC, PO Box 53, Cary, NC 27511.

**North Dakota (Dunseith)—Jul 13-13:** The 23rd International Hamfest and Computerfest will be held at the International Peace Garden between Dunseith and Boissevain, Manitoba, 6 PM Fri-12 PM Sun. Admission is \$12 for hams, \$6 for non-hams. Activities include transmitter hunts, mobile judging, swapfests, commercial vendors, computer user's groups with public domain libraries, 2-meter and 75-meter mobile hunts, QLF contest and activities for the women, children and non-hams also. Talk-in on 146.25/85 and 52. Excellent camping facilities. Motels within 30 minutes. Free space for vendors and flea market. For more info, write M.A.R.A., Box 64, Minot, ND 58702, or Dave Snyder, VE4XN, 25 Queens Cr, Brandon, MB R7B 1G1, tel 701-838-1694.

**Nebraska (Anselmo)—Jul 26-27:** The Central Nebraska ARC is sponsoring their Victoria Springs Steakfry Hamfest at the Victoria Springs State Recreation Area. Admission \$5 at the door. Activities include a Weiner roast on Sat night, charcoal-broiled steak at noon on Sun. Church services will be offered on grounds. Talk-in on 146.40/147.00. Camping and hookups will be available for RVs. For more info, write to L.D. Dunbar, HCBO, Box 24, Milburn, NE 68813, tel 308-942-3555.

**New Jersey (Augusta)—Jul 19:** The Sussex County ARC will sponsor SCARC '86 at the Sussex County Fairgrounds, Plains Rd, off Rte 206. Doors open at 8 AM. Registration \$3. Indoor tables \$7 each. Tailgate space \$5. Food and refreshments. Acres of free parking. Write: Donald R. Stickle, K20X, Weldon Rd, RD 4, Lake Hopatcong, NJ 07849, tel 201-663-0677.

**New Jersey (Moorestown)—Jul 18:** The Hamfest USA will be held at the Moorestown High School at the corner of Bridgeboro and Stanwick Roads. Doors open 6 PM-11 PM, setup for sellers starts at 4 PM. Admission for all activities \$2. XYL and harmonics free unless they are licensed. About 150-200 tables and spaces indoors, displays, VEC testing and some forums. Tables are \$9, \$6 if you bring your own. Handicap parking and parking for over 2000 cars. Limited electricity and a fee for its use. Talk-in on 144.69/145.29, 52 and 223.50. For information and reservations for tables, write Hamfest USA, 15 East Camden Ave, Moorestown, NJ 08057, or call 609-234-3926.

**New York (Alexander)—Jul 13:** The Genesee Radio Amateurs is sponsoring their Batavia hamfest at the Alexander Firemen's Grounds on Rte 98. Doors open

6 AM-5 PM. Admission \$4 at the door. Activities include breakfast 6 AM, OM/YL programing, flea market, chicken BBQ, free camping (electricity \$2). Services include VEC exams. Talk-in on 144.71/145.31 and 52. For info and reservations, write to GRAM, PO Box 572, Batavia, NY 14020, or call Dave at 716-343-6770.

**New York (Lagrange)—Jul 12:** The Mt Beacon ARC Hamfest will be held at the Arlington Senior High School, Poughkeepsie/Lagrange. Tickets \$3 for hams and computer hobbyists, children free. Tailgating space \$4. Tables \$6 (one free table and admission). Doors open at 8 AM (for sellers 7 AM). Talk-in on 146.37/97 and 52. For more info, call or write Julius Jones, W2IHY, RR2 Vanessa Ln, Staatsburg, NY 12580, or call 914-889-4933.

**Ohio (Bowling Green)—Jul 13:** The Wood County ARC will hold their Ham-A-Rama at the Wood County Fairgrounds. Free parking, free admission, mobile talk-in, indoor exhibits, trunk sales and manned test table. Talk-in on 147.78/18 and 52. For table info, write to Chuck Dicken, 1002 Revere Dr, Bowling Green, OH 43402, or call 419-352-0856.

**Ohio (Wellington)—Jul 26:** The Northern Ohio ARS is holding their NOARS Fest at the Lorain County Fairgrounds. Doors open 8 AM-3 PM. Admission \$3 in advance. \$4 at the door. Activities include VE program (for info, call Dave, AIRM, 216-324-4574). Also included are non-ham activities. Overnight parking, no hook-ups. Breakfast served and a full food service is available. Talk-in on 146.10/70. For more info, write to John Paul Jones, WA8CAE, 4612 Timberview Dr, Lorain, OH 44052, or call 216-282-4256.

**Ontario (Milton)—Jul 12:** The 12th Annual Ontario Hamfest will be held at the Milton Fairgrounds, 7 AM-4 PM. Admission \$2.50 in advance, \$4 at the gate. Free parking and flea-market tables. Commercial exhibits and refreshments. Camping with hydro available. Talk-in on 21/81, 52 direct. For details and advance tickets, write to Hamfest, Burlington ARC, PO Box 836, Burlington, ON L7R 3X7 Canada.

**Pennsylvania (Harrisburg)—Jul 4:** The Annual Firecracker Hamfest sponsored by the Harrisburg RAC will be held at the Bressler Fire Co Picnic Grounds (near exit 1 of I-283, Rte 441, and follow signs to the site). Three motels and three restaurants are at this exit. Parking on the grounds, shade trees and large pavilion with tables. Tailgating no charge with admission of \$3, XYL and kids free. Talk-in on 52 or local repeaters. For additional details and table reservations, contact Dave, KC3MG, 131 Livingston St, Swatara, PA 17113, or call 717-939-4957.

**Pennsylvania (Mifflin)—Aug 3:** The 49th Annual Hamfest of the South Hills Brass Pounders and Modulators ARC will be held at the south campus of Allegheny Community College, located about seven miles south of Pittsburgh. Indoor air-conditioned facilities, outdoor flea market, forums and refreshments will be offered. Talk-in on 146.13/73 and 52. For further information, contact Doug Wilson, WA3ZNP, 185 Orchard Ave, Emsworth, PA 15202, or call 412-761-1851.

**Pennsylvania (Newtown)—Jul 13:** The Penn Wireless Assn is sponsoring the Bucks County Hamfest at the Bucks County Community College on Swamp Rd. General admission \$5, wives and children free. Refreshments available. Doors open 8 AM-4 PM (6 AM for setups). Tables provided for \$1, sale space \$5, with power \$8. Tailgating, weather permitting. Talk-in on 146.115/715 and 52. For more info, write to PO Box 734, Langhorne, PA 13.

**Pennsylvania (Pittsburgh)—Jul 13:** The North Hills ARC will open their doors 9 AM-3 PM at the Northland Public Library, 300 Cumberland Rd. Talk-in and info on 147.69/09 and 146.28/88. For more info, contact Robert Ferrey, N3DOK, at 412-367-2393.

**Pennsylvania (State College)—July 12:** The Nittany ARC will hold its annual Mt Nittany Ham Festival at the Firemen's Carnival Grounds in Pleasant Gap, 10 miles north of State College off Rte 26. Doors open 8 AM-4 PM. Admission \$3 per ham, spouses and children free. Flea-market space \$5 includes admission. Talk-in on 146.16/76 from the north and west, on 146.25/85 from the south and east, and on 52. For further info, contact Chuck McMullen, K3CM, 7 Holly Cir, State College, PA 16801.

**Pennsylvania (Warrington)—Aug 10:** The Mid-Atlantic ARC announces its annual hamfest to be held 8 AM-3 PM, rain or shine. Tailgate set up begins at 7 AM. Hamfest located at the Bucks County Drive-In Theatre, Rte 611 (5 miles north of the Willow Grove exit of the Pennsylvania Turnpike.) Admission \$3 with \$2 additional for each tailgate space. Bring your own table. Ample parking, refreshments. Talk-in on 147.66/06 or 52. For further information, write MARC, PO Box 352, Villanova, PA 19085, or call Bob Joshiweit, WA3PZO, 215-449-9727.

**Pennsylvania (Wilkes-Barre)—Jul 6:** The Murgas ARC

will hold their 7th annual hamfest at Ice-a-rama in the Coal St Sports Complex. Gates open for set up at 6 AM, for general admission at 8 AM. Talk-in on 146.61, 53.61 and 52. Tables will be available, but must be reserved in advance. VE exams given. For more info or reservations, call 717-388-6863.

**Vermont (Burlington)—Aug 9-10:** The Burlington ARC International Hamfest has outgrown its previous location (Charlotte) and has moved to bigger and better facilities at the Champlain Valley Fairgrounds in Essex Junction. We now offer a total indoor flea-market capability (outside also available), on-site food/camping, VE exams, RC model-aircraft demos, ATV/packet demos and Vermont in summer! For reservations or information, write to Frank Saitor, 727 North Ave, Burlington, VT 05401, or call 802-863-5907 or 802-657-6793.

**Virginia (Berryville)—Aug 3:** The 36th Annual Winchester Hamfest, sponsored by the Shenandoah Valley ARC, will be held at the Clarke County Ruritan Fairground, Rte 7, 2 miles west of Berryville, 7 AM-3 PM. Admission \$4, women and children under 12 free. Tailgaters and limited tables, \$5. Donations from major manufacturers. Breakfast snack bar and chicken barbecue lunch. Women's activities. Talk-in on 146.22/82 and 52. For further info, contact Bob Kinsley, NT4SA, at 703-869-5113, or SVARC, PO Box 189, Winchester, VA 22601. VE exams, Aug 2 at 9 AM, contact Walt Quitter, NC4B, at 703-869-5241 or 367 Buckingham Dr, Stephens City, VA, 22655.

**Washington (Renton)—Jul 25-27:** The Western Washington DX Club, Inc will host the 34th Annual Pacific Northwest DX Convention at the Sheraton Hotel. Activities include special presentations, films, a contest panel, slide presentations and a tour of ICOM America, Inc's corporate headquarters. Bob Winters, KD7P, portable KH4, will be one of the featured guest speakers. Tickets at the door \$42.50 per person, \$33 for programs and banquet, and \$13 for programs only. For further info, contact Andrew Isar, NN7L, Convention Chairman, 206-467-1277, or write to PO Box 224, Mercer Island, WA 98040.

**Washington (Tacoma)—Aug 16-17:** The Radio Club of Tacoma invites you to help us celebrate our 70th anniversary at the 18th annual Tacoma hamfair at Pacific Lutheran University. The Banquet speaker will be Dr Tony England, W0ORE, the second ham-astronaut to operate from space. Other activities include technical seminars, forums, commercial exhibits, flea market, women's activities and displays, VEC testing (all classes). RV space. Registration \$5, banquet \$10 (banquet deadline Aug 6). Dormitory rooms \$14 single, \$20 double. Register with Grace Teitzel, AD7S, PO Box 45079, Tacoma, WA 98445, or call Eva Anderson, WB7QNS, 206-564-8347.

**West Virginia (Charleston)—Jul 27:** The Charleston Area Hamfest and Computer Show will be held at the Charleston Civic Center. Doors open 9 AM-4 PM. Admission \$3 in advance, \$4 at the door. Activities include technical forums. Services include all-day parking, tailgating \$1 and concessions. Talk-in on 146.28/88. For more info, write to HAMFEST, PO Box 9076, South Charleston, WV 25309, tel 304-346-6006.

**West Virginia (Wheeling)—Jul 20:** The Triple States RAC is sponsoring their Wheeling Hamfest and Computer Fair at the White Palace. Doors open 9 AM-4 PM. Admission \$3 in advance, \$4 at the door. Activities include flea market (free space except for admission charge). Many commercial dealers, 30,000 sq ft under cover; refreshments and family park activities. Services include packet-radio forum, ATV demo. Talk-in on 146.31/91 or 146.115/715. For more info, contact Jay Pautovicks, KD8GL, RD 3, Box 238, Wheeling, WV 26003, tel 304-232-6796, or TSRAC HQS, Box 240, RD 1, Adena, OH 43901.

**Wisconsin (Eau Claire)—Jul 12:** The Eau Claire ARC will hold its annual hamfest at the 4-H buildings in Eau Claire, 8 AM-4 PM. Talk-in on 31/91 and 52. Free tables and coffee. Tickets are \$3 at the door. For info and tickets send SASE to Gene Lieberg, KA9DWH, 2840 Saturn Ave, Eau Claire, WI 54703.

**Wisconsin (Oak Creek)—Jul 12:** The South Milwaukee ARC will hold its annual "Swapfest" at the American Legion Post 434, 9327 S Shepard Ave. Activities will begin about 7 AM and will run through approximately 4 PM. Parking, a picnic area, hot and cold sandwiches, as well as liquid refreshments, will be available on the grounds. We will have free overnight camping available on the grounds. Admission will be only \$3 and includes a "happy-time" with free beverages. The Milwaukee Volunteer Core Group will be conducting Amateur Radio exams during the day. Talk-in will be on 146.94. For more info, including a map, may be obtained by writing the South Milwaukee ARC, PO Box 102, South Milwaukee, WI 53172-0102.

(continued on page 86)

# Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN  
Club Program Manager, ARRL

## INTEGRATED TURBO PUBLICITY

Catchwords of the '80s! The new Club Services Department at ARRL HQ has several goals, all of them tied to the most valuable resource in Amateur Radio—the 1900 ARRL-affiliated clubs and the wealth of talent represented by their members and officers! One of our goals in Club Services is to support Affiliated Clubs while publicizing the best tried-and-true projects that come our way.

### A Goal for Us All

We must work harder than ever before to show off Amateur Radio, the hobby. This publicity thrust will take several wave fronts, all focused on bringing newcomers into our fascinating hobby: (1) increase the number of Amateur Radio demonstrations; (2) increase the effectiveness of those demonstrations; (3) increase the number of Amateur Radio clubs at local schools; and (4) reinforce the Elmer concept.

The Club Services Department is working on a number of publications that will help Affiliated Clubs toward these goals. On the drawing board is an expanded exhibit kit, with detailed guidelines for a variety of different demonstrations. We're also working on projects that will guide Amateur Radio operators from the moment of initial enthusiasm to the day the new amateur becomes a mature and contributing member of the Amateur Radio community.

### But We Need Your Help!

No one is an island, and we at ARRL HQ know only what we learn from the field. Does your club have any practical experience in Amateur Radio demonstrations to school groups? To Scout troops? At museums or malls? If you've ever had experiences that could be useful additions to our planned compendium of demonstration ideas, send 'em in! Don't be shy if you've never taken pen, pencil or word processor to paper. We'll look at your good ideas and maybe use them in our booklets.

If you've ever adopted a young sprout

who's interested in the hobby and Elmered him through his Extra Class ticket, we need your wisdom! Pass along your ideas and experiences. In turn, we might publicize them around the US and give credit where it is due. Write to us at the Club Services Department, League HQ.

## Renewing Special Service Clubs

After completing a year of Special Service, SSCs go through a review process with their respective Affiliated Club Coordinators (ACCs). With successful programs behind them, they plan their next 12 months of activities. Recently renewing SSCs, followed by their city, state and number of members:

Anderson Radio Club, Anderson, SC (77)  
Blue Ridge ARS, Greenville, SC (133)

## New Special Service Clubs

Becoming a Special Service Club (SSC) is not for every Amateur Radio group. It takes commitment, planning and, mostly, a membership that sets the highest standards for itself. A number of your fellow clubs have recently undertaken the commitment and become SSCs. Here's a rundown of each of these special groups, their city, state and number of members:

Champlain Valley ARC, Plattsburgh, NY (49)  
Edmond ARS, Edmond, OK (60)  
Mahoning Valley ARA, Youngstown, OH (67)  
Milford ARC, Inc., Cincinnati, OH (46)  
Radio Amateurs of Greater Syracuse, Syracuse, NY (273)  
Southwest Missouri ARC, Springfield, MO (139)

## Volunteer Examiner Information

from the ARRL/VEC, 225 Main St. Newington, CT 06111

**Locating A Test Session:** Sessions are advertised publicly via local Amateur Radio club newsletters and repeaters. A printout of sessions in any state and some overseas locations is available from ARRL HQ for an SASE. We list ARRL/VEC sessions plus those of other VECs who inform us of their testing schedules.

**Registering to Take an ARRL-Coordinated Test:** A completed FCC Form 610 application and a check or money order for the test fee, payable to the "ARRL/VEC," should be sent to the local VE Team where you intend to be tested. "Walk-in" candidates may be allowed at some sessions, but registering in advance helps. If you write to a VE Team, send an SASE to cover postage and handling.

**Test Fee:** For ARRL-coordinated sessions held during calendar 1986, the test fee is \$4.25, payable to "ARRL/VEC." A check or money order is preferred.

**What to Bring to the Session:** Bring the *original* plus a photocopy of your current FCC-issued Amateur Radio license, and the *original* plus a copy of any temporary upgrade certificate issued by a VE Team less than 1 year prior to the test date. (Duplicates of lost licenses are available through the FCC's Gettysburg office.) Also bring two forms of positive identification (including a photo ID, if possible) and at least two pencils and a pen. Scratch paper and answer sheets are provided.

**Calculators:** Nonprogrammable and "scientific" calculators are welcome. Pocket computers that store words are not allowed. Programmable calculators will be allowed only at the discretion of the VE Teams; be prepared to demonstrate that the memories have been cleared.

**Exam Format:** Written element exams are four-choice multiple-answer tests. A score of 74% or more is required to pass a written element exam. Most VECs assemble tests based on the ARRL-issued multiple-choice question pool. Code test transmissions are played from an audio tape prepared by the ARRL/VEC with message contents similar in format to an Amateur Radio QSO. The code test is "fill-in-the-blank" style and may be passed by answering at least 7 out of 10 comprehension questions correctly or by copying on paper at least one continuous minute of perfect copy from the code test transmission. The ARRL/VEC does not require a code sending test, based on the FCC's recommendation. Code tests may be copied on typewriters, but prior arrangement with the VE Team is required so that other candidates are not disturbed.

**Which Question Pool(s) to Use:** FCC revises the four written element question pools on a staggered basis, with one of the four pools revised every three months. The 1986 scheduling calendar that the ARRL/VEC will be using for putting into use the question pools revised by FCC is as follows:

Question Pool	Revised by FCC	ARRL/VEC Tests Will Change	ARRL/VEC Tests Good Through
Element 2 (Novice)	Jul 1985	Jan 1, 1986	Dec 31, 1986
Element 3 (Tech/Gen)	Oct 1985	Apr 1, 1986	Mar 31, 1987
Element 4A (Advanced)	Jan 1986	Jul 1, 1986	Jun 30, 1987
Element 4B (Extra)	Apr 1986	Oct 1, 1986	Sep 30, 1987

**ARRL/VEC Retest Policy:** A candidate who fails a written element and who has exhausted all code test possibilities at a session may not be retested during that same session. If a convention or hamfest test session schedules multiple sittings, a failed candidate may request that the VE Team retest him or her at a subsequent sitting. Retesting is allowed if the VE Team has a different test version available and the VE Team determines that it has the time and resources available to accommodate the retest. A candidate for retest is required to pay another test fee, and may be required to complete a fresh application Form 610 at the Team's request.

**Special Tests:** Candidates who require special assistance, materials or equipment because of physical disability must attach to the application a signed and dated physician's statement certifying the nature of the disability, plus a letter explaining what special assistance, materials and/or equipment must be used to conduct the examination. (See Section 97.26(g) of the FCC Rules.) Be sure to notify the VE Team well in advance so that special arrangements can be made. If Braille or tape-recorded written tests or special-pitch code tapes are needed, contact the ARRL/VEC at least one month in advance to ensure materials will be available. Further questions about testing persons with disabilities should be addressed to the ARRL Program for the Disabled at HQ.

**How to Become an ARRL-Accredited Volunteer Examiner:** Qualified Advanced or Extra Class licensers (see Section 97.31 of the FCC Rules) are invited to notify the ARRL/VEC of their interest in becoming an accredited VE. Send us your name, call sign, license class and full mailing address.

**Registering an Upcoming Test Session with the ARRL/VEC:** Complete a Test Session Registration Form and submit it to the ARRL/VEC office at least 30 days in advance of your session. We need four weeks or more advance notice of a session to serve you in the most cost-effective and accurate way.



The Edmond (OK) Amateur Radio Society, a newly appointed Special Service Club, happily sends along this photo of their recent graduating class of new amateurs. EARS frequently participates in emergency communications in the Edmond and Oklahoma City areas, working with Civil Defense tornado and severe-weather-spotting programs. Club members also provide communications for statewide events and local parades.

## “Trial by Flood”—A New EC Gets His Feet Wet

A longtime yearning to become a ham was realized when Rich Hanset (N6MJV) took time from his busy life to attend a Novice class at his local community college. With a special interest in emergency-communications work spurring him onward, Rich passed his Novice, Technician and General class exams within a few short months. Within a year, he received his Advanced class license. While working toward his Advanced, he found himself participating in the widespread Lexington fire emergency in the Santa Cruz mountains during the summer of 1985. With this valuable on-the-job training behind him, Rich joined the Santa Cruz Emergency Communications group (SCARES), which was to grow into three sections under the overall leadership of Susan Tracy, WA6OCV, ARES District Emergency Coordinator.

The county group was divided into three sections: (1) the San Lorenzo Valley (EC John Smith, N6IYA), (2) the city of Santa Cruz (EC Rich Hanset, N6MJV), (3) and the city of Watsonville (EC Al Derrick, KG6HS). While the other ECs were well-trained and experienced in past emergencies and public-service communications, Rich was new to ham radio and ARES. Keeping in mind the lessons learned during the Lexington fire, he began forming his group of Assistant Emergency Coordinators. With the able assistance of KH6PP, KB6IRS and seven others, Rich began pulling together approximately 25 volunteers.

Organization was the first order of

business, followed closely and almost simultaneously by training. To be effective, the Section had to be prepared to work and act as a team. Rich began immediately to gather organizational materials. The resources of the ARRL were called upon to provide standardized materials and the newly published Emergency Coordinator's Handbook was adopted as the primary working tool. Rich deputized KB6IRS as operations manager to begin development of a Santa Cruz County ARES emergency manual to augment the EC Handbook. Other Assistant ECs were assigned duties as member services, publicity and public relations, technical liaison, packet coordinator, ARES net manager, NTS liaison, served-agency liaison and training coordinator.

Much work had to be done, so weekly meetings were held to pull the organization together. During this time, local amateurs were recruited, the ARES 2-meter net was reestablished, telephone “calling tree” networks and frequency lists were set up; and a training program was begun. All local served agencies such as the American Red Cross, the Salvation Army, the County Office of Emergency Services, police, fire departments and hospitals were visited by ARES members to assess their communications resources and possible needs during emergencies. In some instances, funding was made available by these agencies and organizations for amateur equipment and antennas.

Almost before Rich had his team ready, the October 1985 Simulated Emergency Test presented a valuable first opportunity to test the working effectiveness of the three Sections within the county. This drill gave everyone a chance to learn how to respond to unexpected problems as the scenario, devised by DEC Susan Tracy and John Smith, included the changing of repeaters or the machines suddenly going off the air. Difficulties in communications between noncontiguous Sections were experienced and alternate solutions devised. Many lessons were learned and “wrinkles” were ironed out during the SET critique.

With the SET as an urgent reminder of the need for training, winter was fast approaching. California had experienced some severe emergencies in the past few years, namely earthquakes in the southern part of the state, the rains and accompanying mud slides as well as raging brush and forest fires.

To meet the demands of the coming rainy season, Rich stepped up his training exercises and organizational meetings. Special sessions were conducted for the coordination of traffic-handling with the National Traffic System, packet radio, maritime nets and others. A new roster was printed, a list of net

### Santa Cruz ARES (SCARES) Organizational Guidelines and Responsibilities

- I. *Publicity and Public Relations*
  - A. Seek coverage of SCARES activities in both ham and non-ham media.
  - B. Edit SCARES newsletter.
- II. *Membership Services*
  - A. Maintain SCARES member data base.
    1. Update telephone call-up tree system.
    2. Update resource list.
    3. Assist with newsletter.
  - B. *New Member Recruitment*
    1. Develop new member informational package.
    2. Develop new SCARES membership application.
    3. Develop SCARES membership or identification card recognized by other services.
    4. Increase Novice/youth involvement.
    5. Develop awards/certification program.
- III. *Technical Liaison*
  - A. Provide technical assistance to other services.
  - B. Perform maintenance on SCARES fixed and mobile stations.
  - C. Provide technical support to SCARES group.
- IV. *Packet Coordinator*
  - A. Provide training and assistance for packet operation to other emergency services.
  - B. Provide packet support to SCARES group and individual members.
  - C. Coordinate all SCARES packet users for emergency preparedness.
  - D. Provide liaison with adjacent ARES groups for intergroup packet communications.
- V. *Net Manager*
  - A. Coordinate all net activities, drills, net operator training, etc.
  - B. Provide rotating list of net control operators for the weekly SCARES net.
- VI. *National Traffic System Liaison*
  - A. Provide coordination and support for efficient message transfer between ARES and NTS.
  - B. Provide instruction and training in proper formal message procedures.
- VII. *Served Agency Liaison*
  - A. Coordinate SCARES staff and volunteers to attend served agency meetings.
  - B. Provide liaison between ARES and the various agencies.
- VIII. *SCARES Training Coordinator*
  - A. Develop a one-year training plan.
  - B. Coordinate and conduct classroom training sessions.
  - C. Coordinate and conduct net and other on-the-air training and drills.
  - D. Identify and obtain training material (films, slides, etc) for presentation at meetings.
- IX. *Operations*
  - A. Assist in the coordination of SCARES AEC activities.
  - B. Assist in the coordination of ARES within the district.



Rich Hanset, N6MJV, EC, Santa Cruz Section 2, presiding over an AEC training session. (WF6P photo)

control operators (with the NCS duties rotating) and the telephone tree emergency call-up procedure was tested. The first draft of the local emergency-operating handbook was printed and ready for review. It contained the input from ARES leadership officials, the section's communications guidelines and goals, definitions of emergencies, primary and secondary operating frequencies, net control and formal message-handling procedures, duties and limitations of ARES members, and pointers on how to respond during an emergency.

### When It Rains in California . . .

During mid-February, storms battered the California coast. Dozens of homes were affected by the onslaught, and families evacuated because of damage or rising floodwaters while many homes were swept downhill by mudslides. Afterwards, these storms

were called the worst in the past 100 years.

On the afternoon of February 17, a state of emergency was declared by the County Office of Emergency Services. Under the guidance of the DEC, the three Sections responded to requests for communications assistance. Section 1, the most isolated and mountainous area, was hardest hit. Commercial communications and electricity were immediately lost in several isolated communities. The operators in this Section were quickly deployed to the local fire station and two Red Cross emergency shelters.

Section 2, coordinated by N6MJV, immediately established several communication stations. One of the most important stations was responsible for the resource net, initially controlled by KG6VH. This net, on a secondary frequency, was vital to the tactical net in that it provided a pool of operators for the radio watches needed at all emergency stations.

These stations were spread over the entire county and included: the Office of Emergency Services, the Boulder Creek Fire Station (as net control), the Boulder Creek, Felton, Watsonville/Corralitos, and Aptos Red Cross emergency shelters, and the Santa Cruz Red Cross headquarters. Forty-six amateurs spent more than 326 logged hours providing emergency communications during the 41-hour period. Many amateurs helped long after governmental officials declared the emergency was over.

### Training For Tomorrow . . .

To be prepared for future disasters, the Santa Cruz ARES is continuing its training. With the earthquake disaster of Mexico City still fresh on the minds of everyone and the San Andreas Fault nearby, the next disaster could be only an earth tremor away!—*Arthur R. Lee, WF6P, AEC Santa Cruz ARES*

## YOUR CONDUCTOR'S CABOOSE

Although we haven't compiled all of your responses to our March readership survey, we've noticed that many of you want to see more "training-oriented" articles in this column.

Your wish is our command! Below is the first of a series of articles on the art of preparing for disaster communications. These articles have been submitted by one of the premier amateur emergency-communications groups in the nation: D-CAT (a Disaster and Communications Action Team) of Texas. D-CAT members include: K5CVD, N5IDD, N1S1, KA6JDT, WD4PPG, WB5TJV, WA5UZH, KE5QX, WA5WCY and KA5WV1. The combined emergency-communications expertise of this group is outstanding. Their professionalism is evident in the following.

### The Emergency Coordinator

Within any organization desiring to operate an emergency-communications team, there is one individual who must assume responsibility for leading the team in its activities. This person is called the Emergency Coordinator.

In the simplest words possible, the Emergency Coordinator is the person responsible for supervising the emergency operations and training of an Amateur Radio organization. He is the person of experience and knowledge of emergency-communications techniques that must guide and train those amateurs interested in working with the organization's emergency-communications effort. Let's look more specifically at the duties and responsibilities of an Emergency Coordinator.

First, an Emergency Coordinator may represent a portion or all of a community, a geographical area or a specific Amateur Radio organization (such as a local club). Regardless of the size of area or number of persons he represents as Emergency Coordinator, he must bring to those people all the resources for good, well-planned emergency-communications techniques his personal knowledge and experience can afford. This includes the following specific duties:

- Manage and coordinate the training, organization and participation of amateurs working in support of public and private agencies to be served.
- Establish a communications plan for agencies to be served that will effectively use amateurs who volunteer to help in an emergency- or disaster-communications situation.

- Establish a working relationship with all agencies that look to the Amateur Radio organization for assistance.

- Establish both local and long-range communication networks, operated and tested on a regular basis by realistic drills.

- In times of disaster, evaluate communications needs of served agencies and respond quickly to those needs. At these times, the Emergency Coordinator will assume both the authority and responsibility for the emergency response and performance of the amateurs who volunteer and serve in the effort.

- Do all that's possible to further favorable images of Amateur Radio by dedication to purpose and a thorough understanding of the mission of Amateur Radio.

In order to accomplish these and any other duties that may be implied or construed, the Emergency Coordinator needs a lot of help! This help comes from the people who volunteer to work with the emergency-communications effort. Some of these volunteers willing to assume more responsibility than mere participation in times of emergency may be appointed as Assistant Emergency Coordinators (AECs). These AECs each have a smaller portion of the overall responsibilities of the Emergency Coordinator and serve him to see that the entire emergency-communications effort is accomplished successfully.

An Emergency Coordinator should have as many Assistant Emergency Coordinators as needed for the effort to function effectively. AECs help the Emergency Coordinator in the areas of VHF and HF operations, liaison stations and coordination of these liaison stations and the overall logistics of the emergency- or disaster-communications efforts.

The AECs must be leaders in their own right and experienced amateurs capable of working smoothly with the Emergency Coordinator. With a willing team of Assistant Emergency Coordinators and volunteers behind him, the Emergency Coordinator stands an extremely good chance of fulfilling the mission of emergency communications entrusted to him.

One final thing to remember: If that mission fails, a good Emergency Coordinator will shoulder the responsibility, pick up the pieces and learn from the mistakes that were made. If the mission succeeds, a good Emergency Coordinator will see that the thanks and credits go to the people who make up the team.

Additional information on the role of an Emergency Coordinator and ARES in general

can be found in the Emergency Coordinator's Handbook (published by the ARRL).

## SPOTLIGHT ON SERVICE

The rugged California coastline was a backdrop during the Big Sur International Marathon on



W6TMG provided communications from his pickup truck at the starting line. (W6TMG photo)



Without the high elevation provided by Point Sur, reliable VHF communications along the marathon route might have been impossible. (N6JBV photo)



April 27, 1986. Twenty-eight members of the Monterey/Big Sur ARES provided communications along spectacular Highway 1 between Big Sur and Carmel. Since any vehicle on the road would affect the safety of the runners, the California Highway Patrol directed amateurs to track all automobile convoys and unauthorized and emergency vehicles on the course during the marathon. N6MLQ, N6GAI and WA6TVN were stationed at the Big Sur Lighthouse (elevation 500 feet above sea level), while WA1NHP and N6JBV provided communications at the finish line.—Bernard Bisnett, W6TMG, EC Monterey Peninsula/Big Sur

8RN	27	192	3.20	.270	87.0	93.3
9RN	55	238	4.00	.256	80.0	100.0
ECN						
TEN	60	673	11.20	.537	86.7	100.0
TWN	52	178	3.42	.336	98.8	100.0
TCC						
TCC Eastern	100	871				
TCC Central	84	504				
TCC Pacific	300	2018				

**Cycle Three**

**Area Net**

EAN	30	283	9.43	.566	92.8	
-----	----	-----	------	------	------	--

**Region Nets**

1RN	30	86	2.87	.280	87.0	93.3
2RN	30	163	5.40	.322	90.7	83.3
3RN	30	21	0.70	.112	64.4	100.0
4RN						93.3
8RN						96.6
ECN						90.0

**Cycle Four**

**Area Nets**

EAN	30	978	32.60	1.204	96.1	
CAN	30	1130	37.70	1.141	99.4	
PAN	30	695	23.20	.845	99.4	

**Region Nets**

1RN	60	231	7.70	.386	96.7	100.0
2RN	60	185	3.08	.302	95.0	100.0
3RN	60	453	7.55	.410	100.0	96.6
4RN	60	517	8.62	.545	77.4	100.0
RN5	60	334	6.00	.570	100.0	100.0
RN6	60	300	5.00	.704	92.5	100.0
RN7	60	286	4.77	.336	96.0	93.3
8RN	60	395	6.58	.478	96.7	100.0
9RN	60	257	4.30	.375	80.8	98.3
TEN	60	120	2.00	.305	70.0	96.6
ECN	60	190	3.27	2.890	83.6	98.3
TWN						

## Field Organization Reports April 1986

**ARRL Section Emergency Coordinator Reports**

Thirty-two SEC reports were received, denoting a total of ARES membership of 17,898. Sections reporting were: AB, CO, EMA, GA, IA, ID, KS, LAX, MDC, ME, MI, MN, NFL, NLI, NNJ, NV, OH, OK, ONT, PAC, SD, SDG, SCV, SFL, SJV, SK, SNJ, VA, WI, WNY, WPA, WV.

**Transcontinental Corps**

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
<b>Cycle Two</b>				
TCC Eastern	100	91.67	425	871
TCC Central	84	90.00	247	504
TCC Pacific	116	96.67	339	643
Summary	300	92.78	1011	2018
<b>Cycle Four</b>				
TCC Eastern*	226	94.17	546	1082
TCC Central	55	91.70	258	527
TCC Pacific	113	98.00	516	1032
Summary	394	94.62	1320	2641

**TCC Roster**

KB1AJ, K1BA N1BHH W1CE N1DMU W1EFW K1EIC K1EIR WA1FCD K1GRP WB1GXZ W1ISO KN1K KT1Q W1QYK KA1T W1TN KW1U AK1W W2EAT WB2EAG WA2FJJ W2FR W2GKZ KB2HM N2IC W2RQ N2XJ N3COV W3GZU W3PQ KQ3T KB3UD AA4AT WA4CCK W4CKS N4EXQ WD4FTK N4GHI WA4JDH W4JL K4JST N4KB WB4PNY WB4UHC W4UQ K4WJR K4ZK N5AMK N5BB N6BT WB5CIC W5CTZ N5DFO W5GHP K5GM W5JOV AJ5K N4KB W5KLV KD5KQ K5OAF K5OU KD5RC ND5T N5TC W5TFB K5TL W5TNT KB5W KV5X WB5YDD KU6D W6EOT K6LL W6INH W6GO K6UYK W6VZT W7EP KB7FE W7GHT KR7L KA7MUL K7OVK KF7R W7TGU W7VSE W8BO KA8CPS W8BLDY W8PMJ W8QHB AF8V N8XX W8YDZ W8EHS W9FC KW9J W9JUU WB9UYU NJ0B W0HI AD0D KA0EY K0EZ KJ0G N0IA WA0OYI VE3AWE VE3FAS VE3GSQ VE6CHK

**National Traffic System**

Net	Sess	Tlc	Avg	Rate	% Rep	% Rep to Area
<b>Cycle Two</b>						
<b>Area Nets</b>						
EAN	30	657	21.20	.584	90.0	
CAN	30	589	19.60	.383	100.0	
PAN*	54	483	8.94	.475	90.0	
<b>Region Nets</b>						
1RN	60	532	8.87	.560	96.6	100.0
2RN	54	192	3.60	.268	68.3	83.3
3RN	30	227	7.60	.470	95.0	100.0
4RN	60	386	6.43	.342	79.5	96.6
RN5	60	529	8.80	.427	86.5	100.0
RN6	45	160	3.48	.350	100.0	100.0
RN7	60	428	7.10	.342	69.3	100.0

**Public Service Honor Roll**

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 points or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

468	117	AA4HT	98
KA5RGC	KA8TIK	104	WB2VUK
391	115	W0KTT	WBFFPA
KC9CJ	VE4AJE	KA2DQA	AE5I
200	113	K4NLK	97
K0BZJ	KD0CL	WF4X	WA2FJJ
179	112	N4KFU	AA4AT
KK1A	KD7ME	N2XJ	W2PKY
165	WDBLDY	103	WDSGKH
K5CXP	KT1Q	KF4U	WB1CBP
149	111	WA2ERT	WB4ADL
KB4WT	W2MTA	K3JL	K2VX
147	W7VSE	KA2SPH	96
W7LRB	WA4QXT	102	VE4IX
142	KA0EPY	WA1FCD	N5AMK
N4GHI	110	WA4CCK	WB2RBA
139	N4GH	N7FXJ	WBBJGW
K2YQK	109	N8EFB	95
125	WB1CMQ	W6INH	N4EXQ
K4ZK	KW1U	101	WD4KBW
123	KA4TLC	WA4JDH	WA2SPL
W6PW	N3EMD	KA8VOZ	94
WB2OWO	N3EGF	KB1AF	KBJUM
121	108	W9FZW	W9YCV
KA9FFO	W9JUU	KT5Y	93
119	107	WA4PFK	K3RXK
W3FA	W9CBE	100	K0SI
K4SCL	KA2MVJ	WA4NK	92
KD7ME	KB4SO	N4KSO	W0FRK
118	KB0Z	N9BDL	N0BKE
N7BHL	106	99	WB4WQL
WX4H	KB4OGR	W6RNL	AJ5K
	105	WB2IDS	N0RA
	105	K4JST	91
	W6FO	K6UYK	NB6AWH

WD8KQC	KC2TF	W1TN	AE1T
K0GP	WA6WJZ	K14YV	64
W9DM	K2GCE	WB6OBZ	WA4DHB
KA1GWE	WA0TFC	KS7I	N8FWG/T
90	KJ9J	71	K4MOG
W4PIM	KZ3E	N1CVE	KC8UJ
89	VE3WM	KB1PA	KA8CB
W1RWG	N6HYM	K2YAI	W7GGJ
VE3DPO	KB9L	NK8B	63
WA4EIC	WD9GUF	KB5UL	K4ZN
W4TAH	KJ3E	70	KB4JPN
88	WD8OUO	WD8PAF	KF7R
WB4WII	K2ZVI	W5KLV	62
W7GHT	79	KA8KHS	WA7VTD
KV5X	N1AKS	WA1YNZ	WB4DBO
KB4MHH	K5OAF	KA1MOM	KA7MUL
87	ND25	W7LG	WD8KBW
W4CKS	WB4HRR	69	N1BJW
NNZH	78	KB7FE	KA0ODQ
VE3GT	KF8J	N2FIZ	61
KA8TIK	KC4VK	KQ3T	N0DZA
86	KC3Y	W3DKX	KF4FG
WA1TBY	W5VMP	KA4FZI	K8ND
N1CPX	77	68	WA4PUP
KK1E	WA4EYU	VE2EDO	WB0WNJ
N5DFO	N9CLS	KR7L	VE3GSQ
85	76	67	W0UOJ
NJ8R	KA9RII	VE4RO	60
WB5YDD	N7BGW	W5JMH	WD2AFI
W5CTZ	NJ4L	K8JDI	K4MLC
WA6ZUD	KA8TNT	W4YJ	K4SWN
WB5SRX	W4SME	NBGC	WA4MNR
W8OYH	75	WB7WVD	W4HCN
84	WB2MCO	WB2QMP	WB5MB
K6JXO	A100	66	59
KA8CPS	N4JOA	N1DDC	KA1HPO/T
AA4MP	74	N8AHA	58
KT9I	K1SEC	VE2FMQ	WB2NLU/T
KA8KPY	W2Z0J	W7LNE	50
83	KG2D	N57C	N4MMM/T
KN1K	WB8KWC	N4PL	49
WD8RHU	KB4LB	WA3UNX	KA7RFD/T
K4VWK	WA3GYW	K0PCK	47
KA7AID	W0KK	KA4YHS	N2EVG/T
KA5SPT	W2RRX	65	KA9RNY/T
KA4GUS	73	N1BGW	45
82	KB4BZA	WA4RNP	N9GBE/T
WBJMD	W4FMZ	K6TP	40
NG2T	K4EV	WAJWO	KA7VEE/T
81	NM8I	WB4TZR	
WD4NYL	72	K0ERM	
	KA4YEA	KP4DJ	
		N1DNA	

**Brass Pounders League**

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

Call	Orig	Rcvd	Sent	Divd	Total
W3CUL	992	906	1612	76	3586
N8BQP	0	1675	50	1038	2793
W3VR	315	439	584	26	1364
WB9YPY	0	761	66	511	1338
WA0HJZ	0	555	15	374	944
KC9CJ	10	447	39	290	786
K0FRX	0	319	72	231	662
N4GHI	67	246	262	16	591
W4DUG	273	3	274	1	551
N4EXQ	21	244	248	31	544
WBACH	0	271	271	0	542
KT1Q	4	260	257	11	532
WB0WNJ	0	245	253	2	500

BPL for 100 or more originations plus deliveries:

KA0CZW	203
K0JAN	116
WD4IIO	161

**Independent Nets**

Net Name	Sess	Tlc	Check-Ins
Amateur Radio Telegraph Society	56	169	231
Central Gulf Coast Hurricane Net	30	180	3089
Cleaning House Net	30	266	380
Early Bird Net	30	702	311
Empire Slow Speed Net	30	54	388
Golden Bear Amateur Radio Net	30	164	1839
Hit and Bounce Net	31	323	580
IMRA	26	933	1865
Midwest RTTY Net	30	20	173
Mission Trail Net	30	162	976
New England Novice Net	23	35	94
NYSPTEN	30	46	574
Southwest Traffic Net	30	223	1388
20ISSBN	27	838	299
75 Meter Interstate SB Net	30	240	1160
7290 Traffic Net	48	438	2783

# Preparing for the Unexpected

## Results, 1985 Simulated Emergency Test

By Steven Ewald, WA4CMS  
Assistant Public Service Manager

and Kim Hemmis  
Public Service Aide

In an emergency situation, there's a struggle to respond effectively to meet the demanding needs of the moment. How that struggle affects the overall outcome of the situation depends a great deal on preparation and teamwork, two hallmarks of the 1985 ARRL Simulated Emergency Test (SET). Radio amateurs throughout the United States and Canada practiced their responses to simulated local and area emergencies during October. This annual test was a chance to affirm the strong points and discover the weak links of a communications plan. Coordination with a variety of public-service agencies and emergency-response groups made the 1985 SET a public demonstration of Amateur Radio's role in providing emergency communications. The following results and scenarios show the enthusiasm and hard work of radio amateurs active in the Amateur Radio Emergency Service, the National Traffic System and other avenues of public service.

### SET Scenario

Clatsop County, in the northwestern corner of Oregon, was in the middle of a simulated disaster on Saturday, October 19. Emergency Coordinator Martin (Al) Dawson, W7YLV, coordinated Amateur Radio activity from the county's Emergency Operations Center in Astoria. As a learning tool and reference for future exercises, Al (as net control) logged all traffic on his computer by giving the time and a description of each message.

W7YLV described the scenario that SET participants faced: "An earthquake of 8 on the Richter Scale has hit the Pacific Northwest. The epicenter is located in the ocean approximately 10 miles due west of the Sunset Beach area. Large cracks in the earth's crust have opened in many parts of the county as well as counties north and south of Clatsop. Many roads are not passable, making travel around Clatsop County extremely difficult. High water wave action has caused major damage to coastal towns. The shock has knocked out commercial power, gas lines, telephone and water supplies for major towns. Many buildings have been seriously damaged, and many fires are burning out of control.

Communications on all radio channels are swamped. Amateur Radio operators are being asked to man the Clatsop County Emergen-

### 1985 ARES Analysis

	1985	1984	% Change
Total ARES members reported	14,933	18,500	-23.9
Members on CW	7,597	8,417	-09.7
Members on VHF	13,338	15,091	-13.1
Emergency-Powered (HF)	12,873	4,684	+275.0
Emergency-Powered (VHF)	10,395	11,316	-08.8
Members Mobile (HF)	2,908	3,054	-05.0
Members Mobile (VHF)	12,906	13,811	-06.5
Net sessions/drills per year	18,956	19,317	-01.8
NTS liaison	260	326	-20.2
RACES liaison	215	284	-24.4

### 1985 SET Top Ten

Local Activity	Total Points
1) Ohio	8208
2) Southern Florida	4082
3) Indiana	3511
4) Orange	2767
5) Eastern Pennsylvania	2734
6) Western New York	2209
7) Iowa	1838
8) Northern Florida	1734
9) Santa Clara Valley	1690
10) North Carolina	1486

### Section/Local Nets

1) Ohio	3744
2) Florida	3710
3) Indiana	3345
4) California	1952
5) Colorado	1222
6) Michigan	1102
7) North Carolina	952
8) New York	843
9) Kansas	808
10) Alabama	715

cy Operation Control center (EOC) and many other points around the county to provide vital communications."

This scenario was sent to all Assistant ECs

who, in turn, read the scenario to their team of operators over the air on previously-assigned simplex frequencies. Al described what happened next: "The Assistant Emergency Coordinators (AECs) discussed what effect the scenario could have on each one's area, and then the operators were assigned various tasks pertaining to the situations. The operators in the field reported information to their AECs, and the AECs relayed that information to the EOC via the repeater. (The Astoria repeater on 146.16/76 will shift to emergency power in case of commercial power failure.) The EOC would then react to the information received and reply with instructions. This communications plan allowed for maximum interaction at the local scene and minimum use of the county-wide repeater frequency. Communications between the AECs and EOC was great, allowing efficient traffic handling."

### Radio Amateurs and Agencies Interact

What happens when a community and surrounding area suddenly loses its telephone communications? This was the basic premise radio amateurs in northeastern Pennsylvania worked with during their SET on October 26, 1985. The emergency plan was in place and District Emergency Coordinator James Kelly, N3BFL, described the action that emphasizes cooperation between radio amateurs and emergency agencies within the SET-participating counties.

"10:30 AM Office of Emergency Management Director Marv Stuart receives call from Monroe County Control Center that an undetermined source has disabled telephone communications at the Stroudsburg Bell Telephone central facility. Service will be out for 3-4 hours. All incoming emergency calls will have to be relayed to OEM Radio Room by Amateur Radio operators, then be given to the Monroe County Control Center for dispatch.

"10:35 AM OEM Director notifies Jim Kelly, N3BFL, by county radio that an emergency exists. Jim commences to mobilize amateurs by calling on repeater frequency 146.865 while OEM sends runner to radio station WVPO to have announcement for amateurs to check into net, controlled at OEM Room. The first amateur who is near Mt Pocono to contact Net Control will proceed to station WPCN for same announce-

ment. The next operator to respond to N3BFL's call will go to OEM Radio Room and activate radios, repeater 146.865 and low-band rig to 3987.5 or 3917 for communications to Wayne County OEM.

"10:50 AM Net Control at OEM will dispatch operators as they check in to report to one of the following major locations: Pocono Mt Volunteer Fire Department to cover Barrett, Coolbaugh, Pocono and Tobyhanna Twp; West End to cover Brodheads ville, Polk, Jackson, Kunkletown, and Blue Ridge; Marshalls Creek to cover Shawnee, Bushkill, and Delaware Water Gap; Stroudsburg to cover East Stroudsburg, and Stroud Twp. As available amateurs respond, assign to hospital, State Police Barracks, Red

Cross office near Reeders. Have NCS coordinate all watches as to time."

The Simulated Emergency Test was up and running. The crew in Pennsylvania's District no. 5 had responded according to plan. The test continued when each agency with whom the radio amateurs were interacting directed their own simulated emergency situation. Since the scenario called for a failure in telephone service, it was up to the hams to step in to provide emergency two-way links and supplement police and fire department communications during the test period.

**The Results Are In**

The Simulated Emergency Test results are organized in three main categories: National

Traffic System Area and Region Nets, Section and Local Nets, and Local Activity. Each entry's total score was based on a pre-announced point system. Point values were assigned to a variety of categories and exercises related to emergency communications.

SET participation, operating emergency-powered equipment, exchange of SET traffic and interaction with community and service agencies figured prominently in the scoring guidelines. Digital-mode operations and contact with the media concerning the local SET were also recognized in the scoring system. Since ARES and NTS are separate divisions of Amateur Radio public service, ECs and Net Managers followed different scoring guidelines.



**National Traffic System**

**Area and Region Nets**

**Cycles One and Two**

Net	Reporter	Total Points	Last Year's Total Points
Eastern Area	WB4PNY	218	285
Central Area	W8KLV	187	188
Pacific Area			
1st Region			
2nd Region	W2XD	66	104
3rd Region			
4th Region			
5th Region	WB5YDD	204	341
6th Region			
7th Region	WB7WOW	108	
8th Region			
9th Region			
10th Region			
12th Region			

**Cycles Three and Four**

Net	Reporter	Total Points	Last Year's Total Points
Eastern Area			
Central Area			
Pacific Area	W7EP	203	268
1st Region			
2nd Region	W2MTA	145	144
3rd Region			
4th Region	K4JST	216	
5th Region	W4ZJY	196	
6th Region			
7th Region	W7VSE	158	
8th Region			
9th Region			
10th Region			
12th Region			

**Section/Local Nets**

Net	Net Manager	Total Points	Last Year's Total Points
<b>Alabama</b>			
Alabama Emergency Net U	WD4DAT	54	
Alabama Traffic Net M	KA4WYX	489	692
West Alabama Emergency Net	W4DAG	87	
<b>Arizona</b>			
Hualapai Amateur Radio	KA7JLV	85	
<b>California</b>			
Banning/Redmont ARES/ACES/AVIP	WA6HFE	23	47
Benicia ARES	KE6IA	90	106
Central Solano Co ARES	WD9BOX	198	

Meringo Basin ARC	N6DQU	164	
Southern California Net	WFBQ	107	124
Sun City Net	K6WX	157	83
Westland RACES/ARES	WB6OHB	433	
WCSZ	W6DTY	65	
<b>Colorado</b>			
CC 2-meter FM Emergency Net	KA200A	58	59
Colorado Wyoming Net	KB6Z	92	141
Columbia	WABRYL	62	96
High Noon Net	W6LAC	220	
Northern Colorado Traffic Net	N6FCP	487	241
Southern Colorado Traffic Net	WD8AIT	263	50
<b>Connecticut</b>			
Connecticut Net	KA1BHT	98	
FAA Emergency Net	K1NGL	86	
Western Conn Net	WB1GKZ	259	270
<b>Florida</b>			
Clay Co ARES Net	N4K0X	314	
Marion Co Emergency Net	WD4PON	199	160
Peace River Valley Amateur Net	K4VSN	48	
Pinellas Co ARES/ACES	W4GPL	2718	1632
Polk Co ARES	WT4F	53	195
Seminole Co ARES	WD4HBP	179	216
So Brevard Co Emergency Net	KA4ZPM	199	626
St Johns Co ARES	WA4WST	0	
<b>Georgia</b>			
Gwinnett ARES	WA4URT	155	
<b>Hawaii</b>			
Kaui ARES VHF Net	KH6S	107	0
<b>Idaho</b>			
ISRA-Magic Valley	WB7CYO	52	
<b>Illinois</b>			
DuPage Co ARES Net	KD9LA	148	
Madison Co ARES	NA9X	100	30
RADIO WAFAR-SKYWARN	WA8THM	43	44
W9KBV	WSKBU	109	
South Jacksonville Repeater Net	N9EHN	33	
Will Co ARES	N9DX	56	
W9VEY Memorial Net	WA8RUM	15	
<b>Indiana</b>			
Dekalb Co Amateur Net	KA9RNY	181	
IGN Grant Co VHF Net	KW9D	25	
Hancock ARC ARES/RACES Net	WD9IZA	119	
Hoosier Hills ARES	WB9IGY	77	66
KO9ED	00	00	
Huntington Co ARES Net	WA9DRI	132	106
Indiana Traffic Net (P)	KD9DU	1236	1245
KARES (Skywarn)	KA9RBY	177	
Lake Co Indiana ARES	N8DYC	315	193
Marion Co ARES	W8KGE	135	368
Pike Co ARC	WB9NCE	130	153
Radio Amateurs of Gibson Co	KB9NR	62	
South Central Area Net	W9SIO	123	109

<b>Iowa</b>			
Page Co ARES	WB0IGI	40	
West Central Iowa ARES Net	K0GNM	75	
<b>Kansas</b>			
Chippewa ARC	W0WVI	58	
Kansas Phone Net	W6FRC	240	
Kansas Sideband Net	W6FRC	393	374
Kansas Zone 12	K0EQH	107	116
<b>Kentucky</b>			
Kentucky Novice Traffic Net	KB4OZ	177	67
Kentucky Traffic CW Net	WB4ZDU	59	
Morning KY Phone Net	KA4SAA	445	
<b>Louisiana</b>			
Caddo/Bossier ARES Net	N5EYK	197	
Louisiana Traffic Net	N5ANH	56	76
<b>Maine</b>			
Aroostook Emergency Net	WA1VNZ	94	101
Pine Tree Net	K1MXB	89	
Saco Valley ARES	WB1FBE	140	
<b>Manitoba</b>			
Manitoba Net	VE4AFO	0	
<b>Maryland</b>			
Maryland Emergency Phone Net	WA2ERT	402	
Maryland Slow Net	KC3Y	106	
Washington Co 2-meter Net	KC3DW	159	75
<b>Massachusetts</b>			
Bellingham ARES	W1XA	70	58
Eastern Mass 2-meter Net	KA1AMR	168	176
Western Mass SET	W1NMQ	115	209
Eastern Mass/Rhode Is Phone Net	WA1FCD	84	
<b>Michigan</b>			
Hawatha ARC Emergency Net	KA2BTI	81	
Holland Emergency Net	W8HJB	72	196
Inia Co ARES	KA8PTB	120	71
Lark Net	K9BOJ	174	
Michigan Amateur Comm System	K80CP	106	246
Michigan Novice Net	KA8VOZ	77	
Michigan Thumb Net	WD8LIZ	98	
Michigan Traffic Net	WD8EJB	121	151
Monroe Co ARES	KA8NCR	100	121
St Clair Co APPSC	NM8Z	153	309
<b>Minnesota</b>			
Carver-Scott ARES	KB0CD	65	60
Marshall Area Emergency Net	WD0BZU	136	119
Northern St Louis Co ARES	WD0GUF	92	73
Rochester ARES	K0TS	29	136
<b>Missouri</b>			
Central Missouri Emergency Net	K0CPK	47	63

<b>Hickory Co Emergency ARES/RACES</b>	NF0X	86	
MO SSB Net	KTSY	188	109
Morgan Co ARES Net	N0AYI	36	14
PHD ARC	W8KUH	176	198
Zerobeaters ARES Net	N0DE	170	122
<b>Nebraska</b>			
Madison Co ARES	WB0YID	23	
Pine Ridge ARC	WD8AES	143	
Sar AM Net	W88GQM	67	
T8-State ARES Net			
<b>New Hampshire</b>			
Coos Co Emergency Net	K1OTQ	108	64
Granite State FM Net	K6UXO	138	160
NH CW Net	N1NH	80	55
Sea Coast Emergency Net	K1ACL	114	70
<b>New Jersey</b>			
Bergen Co Emergency Net	N2BMN	258	
Hudson Co Area Traffic and Emergency Net	WA2FPO	164	
Hunterdon Co Traffic and Emergency Net	NE2P	143	103
New Jersey Morning Net	W2RRX	50	
NJ Phone Net	W2CC	58	100
<b>New York</b>			
CNY/CREN Empire Slow Speed Net	W2WSS	56	
Oneida Co Traffic and Emergency Net	WB2HLY	230	290
St Lawrence Co ARES	WB2NAO	61	52
Western District Net	WB2OWO	382	310
<b>North Carolina</b>			
ARES of Ashe Co	N4JRE	58	
ARES of Forsyth Co	WA4TCR	276	61
Carolina Evening Net	K4NLK	21	
Davidson Co ARES Net	K4SWN	69	234
Franklin ARC	W4ZCZ	81	
NC Evening Net	WB4WII	109	
NC Morning Net	WB4HRR	318	248
<b>Ohio</b>			
Buckeye Net	RTTY	W8EK	517
Buckeye SSB Net	N8AKS	223	175
Burning River Traffic Net	N8AKS	131	148
CLARC-ARES	KH6JCT	89	144
DELARA Net	KC8MJ	27	
Don Smith Eastern Ohio Amateur Wireless	W8BDYW	518	
FARA ARES	K8IP	126	133
Guernsey/Noble ARES Net	WD8PHL	74	
Maser Net	WB8TRK	00	00
Mercer Co ARES Net	K8ERV	106	207
Ohio Single Sideband	W88QIA	91	
Ohio Slow Net	WB8MZZ	828	
Scioto Co Emergency Net	N8AEH	53	93
Seneca Co ARES Net	WA8NRC	82	
Switzerland of Ohio ARES	W88GXT	96	
Tuscarawas Co ARES	K8BZA	25	22
	K8HGL	89	154

Net	Reporter	Total Points	Last Year's Total Points	Net	Reporter	Total Points	Last Year's Total Points
Van Wert Area	K8LMN	69		Nashua	KA1GOZ	311	00
Emergency Net				Stratford Co	WA1PEL	210	161
W8SWS Service				<i>Western Massachusetts</i>			
Net	WD6HJO	104	94	Franklin Co	WB1FSV	00	00
W8WRR Net	N80VM	63		Worcester Co	K11SW	178	00
Warren Co				<i>Eastern New York</i>			
Disaster SVCS	WB8ZV	98	33	Albany Co	WA2JBO	361	00
Washington Co				<i>Northern New Jersey</i>			
ARES	WB8UHP	37		Bergen Co	N2BMM	349	63
Wayne Co Traffic				Bergen/Englewood	W2CC	67	90
Net	KABCGF	314	88	Borough of Somerville	KA20EE	89	93
Williams County				Chatham	W2UH	97	00
ARC	KDBIC	84	25	Hudson Co	W2KB	219	220
				Hunterdon Co	NE2P	160	318
				<i>Southern New Jersey</i>			
Oklahoma				Cumberland Co	WA2EUX	197	00
Oklahoma Co				<i>Western New York</i>			
AHES Net	N5ABM	172		Chautauque	KA20OA	176	141
Ontario				Chemung Co	WA20VT	170	00
Kingston ARES	VE3LXA	71		Clinton Co	KD2AJ	168	00
Northwestern Ontario ARES				Delaware Co	W2TF	30	58
Net	VE3JY	74		Lewis Co	W2REP	84	82
Ontario ARES Net	VE3FOI	113		Mercer Co	N2EH	282	424
QOV2	VE3KK	80	78	Niagara Co	WB2QZL	397	00
				Oneida	KB2DP	253	420
Oregon				Orondaga	WA2PUU	175	199
Clatsop Co				Oswego	KY2F	625	58
Emergency Services and ARES Net	W7YLV	42		St Lawrence	KA2CMQ	90	40
Pennsylvania				Yates Co	WA2UKX	49	9
District Two ARES Net	WB2OOB	121		<i>Eastern Pennsylvania</i>			
Huntingdon Co				District 1	KA2DVV	1700	00
AHES Net	WA3DBW	136		District 2	AA3C	211	00
North Western PA 2-meter Net	KC3NY	146		District 5	KB3FL	245	245
Western PA CW Net	WA3UNX	64	102	Montgomery Co	W5EAG	278	00
Western PA Phone and Traffic Net	KC3JQ	119	120	<i>Maryland/DC</i>			
South Carolina				Calvert Co	W3ZNV	116	101
South Carolina ARES	KB4MDG	129		<i>Western Pennsylvania</i>			
York Co 2-meter Emergency Net	KB4BZA	99		Allgheny Co	N3BPB	155	102
Tennessee				Armstrong Co	KX3V	135	184
East TN Hospital Net	WA4LLJ	50	57	Butler Co	WB3LKO	146	00
Knox Co ARES	WA4LLJ	109	97	Clark Co	WB3JDI	152	00
Lauderdale Co				Huntingdon Co	WA3DBW	189	00
AHES Net	WA4RMP	0		<i>Alabama</i>			
TN ARES Network	N4JPU	35		Morgan Co	W4MOI	297	111
Texas				Tuscaloosa Co	KF4VQ	194	115
Borden/Scurry Co ARES	KESZW	75		<i>Georgia</i>			
Grayson Co ARES N25K		130		Atlanta District 13	WA4DIW	132	90
Virginia				Central District 19	WB4BDP	103	00
Rap ARES	AA4GL	54		Cobb/Cherokee	W4GTS	56	00
Washington				Gwinnett	KCALJ	202	128
Cowlitz/Wahkiakum ARES	N7CFA	168		Harrison/Carroll	WB4UPC	72	00
Kitsap Emergency Net	W7IVW	118	205	West Georgia	W4FIZ	212	00
Spokane ARES	KA7CSP	74		<i>Kentucky</i>			
West Virginia				Carroll Co	KI4QB	75	00
Hampshire Co				Franklin Co	K4HOE	11	00
Emergency Net	WRFZP	22	20	<i>North Carolina</i>			
West Virginia ARES/RACES	K8QEW	42	43	Ash Co	N4JRE	113	00
Wisconsin				Davidson Co	K45WN	142	219
Badger Emergency Net	WB8ESM	311	311	Districts E & F	WB4HRH	410	430
Brown Co ARES Net	WB9NRK	49		Forsyth Co	WB4TOR	321	101
Calumet ARES	KN9P	28		Lee Co	WB4E	4	00
Green Fox ARES	K8BWC	92		Macon	K4JHF	133	00
Shawans Area ARES	N9FFJ	70		Mecklenburg	KF4WY	363	00
Wisconsin Slow Speed Net	N9BDL	30	39	<i>North Florida</i>			
				Citrus Co	KD4FG	199	98
				Clay Co	N4KDX	304	00
				Marion Co	WD4RJL	421	300
				Orange Co	WD4FAB	429	00
				Seminole Co	W4FI	200	242
				West Pasco Co	N4DWY	190	290
				<i>South Carolina</i>			
				Charterfield Co	KA4ABW	218	00
				Darlington Co	KB4HPD	70	00
				Martin Co	NG4S	77	00
				Sumter Co	W4COX	79	00
				York Co	K84BZA	138	00
				<i>South Florida</i>			
				Dade Co	W4YNT	439	428
				Hendry/Glades City	AA4BN	110	130
				Highlands Co	WB4WDK	162	83
				Hillsborough Co	K4R4	501	220
				Leon Co	KC4N	280	00
				Manatee Co	WA3TOX	433	277
				Palm Beach Co	W4GFL	687	131
				Pinellas Co	KB4VR	1176	1020
				Polk Co	WB3JUT	106	262
				South Brevard	KA4ZPM	186	655
				<i>Tennessee</i>			
				Hamilton Co	K4NAZ	119	00
				Lauderdale Co	WA4RMP	0	00
				Knox Co	WA4LLJ	243	227
				Mauzy Co	N4JPO	48	00
				West Sullivan Co	AA4DL	122	140
				<i>Virginia</i>			
				First Colony District	WB4SHK	395	00
				South Co	KM4X	79	135
				Virginia Beach	WA4TCJ	175	30
				Williamsburg/James City	AA4GL	77	00
				Charles City	K4JST	90	105
				<i>5</i>			
				Louisiana			
				Northwest Louisiana	WB5USS	258	00
				<i>Northern Texas</i>			
				Bell Co	N5FFY	164	00
Borden/Scurry Co	KESZW	177	10	Borden/Scurry Co	KESZW	177	10
Childress Co	N5GAN	50	18	Childress Co	N5GAN	50	18
Collin Co	K5MWC	160	00	Collin Co	K5MWC	160	00
Grayson Co	KNSK	193	00	Grayson Co	KNSK	193	00
Haskell Co	W4SYZ	00	00	Haskell Co	W4SYZ	00	00
Hill Co	K4QGV	00	00	Hill Co	K4QGV	00	00
Hunt Co	K2SCU	143	149	Hunt Co	K2SCU	143	149
McLennan Co	W5TAH	152	159	McLennan Co	W5TAH	152	159
Potter/Handall Co				Potter/Handall Co			
Ottawa	WA5ZKL	165	00	Ottawa	WA5ZKL	165	00
				<i>Oklahoma</i>			
Oklahoma City	N5PT	258	00	Oklahoma City	N5PT	258	00
Tulsa Co	K5ENA	142	90	Tulsa Co	K5ENA	142	90
				<i>South Texas</i>			
Bexar Co	WA5RNV	279	305	Bexar Co	WA5RNV	279	305
				<i>6</i>			
Ester Bay				Ester Bay			
Bencia/Rio Vista	KE6IA	177	171	Bencia/Rio Vista	KE6IA	177	171
				<i>Orange</i>			
Banning/Seamount/Cherry Vly	WA6HFE	66	00	Banning/Seamount/Cherry Vly	WA6HFE	66	00
Hospital Disaster Communities	WA6OPS	486	248	Hospital Disaster Communities	WA6OPS	486	248
Morongo Basin	K5BT	218	00	Morongo Basin	K5BT	218	00
Riverside	W6LKN	219	224	Riverside	W6LKN	219	224
Riverside District 9	K5WX	242	123	Riverside District 9	K5WX	242	123
Riverside Red Cross	WA6KCM	37	68	Riverside Red Cross	WA6KCM	37	68
San Bernardino	WA6SKH	861	228	San Bernardino	WA6SKH	861	228
San Bernardino District 1	WB6QHB	476	00	San Bernardino District 1	WB6QHB	476	00
San Bernardino District 7	W05BNG	141	102	San Bernardino District 7	W05BNG	141	102
				<i>Pacific</i>			
Island of Hawaii	AH6P	161	223	Island of Hawaii	AH6P	161	223
Kauai	KH6S	118	124	Kauai	KH6S	118	124
Mauai	KH6H	102	144	Mauai	KH6H	102	144
				<i>Sacramento Valley</i>			
Butte Co	KE6EP	348	165	Butte Co	KE6EP	348	165
Shasta Co	KX6G	74	111	Shasta Co	KX6G	74	111
				<i>San Francisco</i>			
Fairfield				Fairfield			
Vacaville/Dixon	W06BQX	292	00	Vacaville/Dixon	W06BQX	292	00
Western Sonoma	W6DTV	150	176	Western Sonoma	W6DTV	150	176
				<i>Santa Clara Valley</i>			
Campbell	W5BKEF	122	118	Campbell	W5BKEF	122	118
Cupertino	WA6VFD	81	00	Cupertino	WA6VFD	81	00
Merced	W06EKR	395	375	Merced	W06EKR	395	375
Palo Alto	WA6NIL	119	166	Palo Alto	WA6NIL	119	166
Redwood/				Redwood/			
San Carlos	K4RAN	85	00	San Carlos	K4RAN	85	00
San Mateo	K5ITL	277	204	San Mateo	K5ITL	277	204
Santa Clara	KA6TGE	239	182	Santa Clara	KA6TGE	239	182
Santa Cruz	N6YA	224	254	Santa Cruz	N6YA	224	254
Sunnyvale	WA6BAX	94	119	Sunnyvale	WA6BAX	94	119
				<i>7</i>			
				<i>Arizona</i>			
Kingman	KA7JLV	106	00	Kingman	KA7JLV	106	00
Pima Co	K7KYW	284	00	Pima Co	K7KYW	284	00
				<i>Idaho</i>			
Ada Co	K7CXG	116	124	Ada Co	K7CXG	116	124
Bonner Co	N7BHL	80	00	Bonner Co	N7BHL	80	00
Boundary Co	K07XD	75	00	Boundary Co	K07XD	75	00
Kootenai	N7SHV	270	00	Kootenai	N7SHV	270	00
Shoshone	N7BI	80	00	Shoshone	N7BI	80	00
Twin Falls Co	KA7BIF	76	00	Twin Falls Co	KA7BIF	76	00
				<i>Montana</i>			
Missoula Co	KC7HP	153	148	Missoula Co	KC7HP	153	148
				<i>Nevada</i>			
Western Nevada	K7HRW	204	00	Western Nevada	K7HRW	204	00
				<i>Oregon</i>			
Clatsop Co	W7YLV	102	00	Clatsop Co	W7YLV	102	00
Josephine Co	K7YGM	184	00	Josephine Co	K7YGM	184	00
Washington Co	WB7BGB	88	00	Washington Co	WB7BGB	88	00
				<i>Utah</i>			
Davis Co	WA7JLL	118	123	Davis Co	WA7JLL	118	123
Utah Co	KF8Q	152	236	Utah Co	KF8Q	152	236
				<i>Washington</i>			
Cowlitz/				Cowlitz/			
Wahkiakum	N7CFA	196	150	Wahkiakum	N7CFA	196	150
Island Co	W7GHI	196	127	Island Co	W7GHI	196	127
Kitsap	K07FA	155	284	Kitsap	K07FA	155	284
Jefferson	K7RBT	93	00	Jefferson	K7RBT	93	00
Pierce Co	KA7JNX	183	00	Pierce Co	KA7JNX	183	00
Skagit Co	N7CWU	148	187	Skagit Co	N7CWU	148	187
Spokane Co	KA7GSP	204	173	Spokane Co	KA7GSP	204	173
				<i>8</i>			
				<i>Michigan</i>			
Alger Co	W08PAF	48	00	Alger Co	W08PAF	48	00
Ionia Co	W8LCO	189	207	Ionia Co	W8LCO	189	207
Kalamazoo	KB0QB	75	99	Kalamazoo	KB0QB	75	99
Kent Co	KB0BQ	135	00	Kent Co	KB0BQ	135	00
Monroe Co	WB8BZF	193	258	Monroe Co	WB8BZF	193	258
Ontario Co	WA8BZF	181	00	Ontario Co	WA8BZF	181	00
Sanilac Co	WB8CJ	82	00	Sanilac Co	WB8CJ	82	00
St Clair Co							

# Results, 1985 ARRL 10-Meter Contest

By Michael B. Kaczynski, W1OD and Billy Lunt, KR1R  
Contest Manager, ARRL HQ

Billy Lunt, KR1R  
Assistant Contest Manager, ARRL HQ

It's hard to believe that just one solar cycle ago, the ARRL 10-Meter Contest was a mere fledgling. Over the past 12 years, this operating event has become an international favorite, as evidenced by 193 foreign entries from 55 different DXCC countries. Why? Because many operators are realizing that 28 MHz is an exciting band to operate!

Don't take my word for it. Ask KQ1V, who snagged ZM8OY and VR6JR Saturday evening ... or 4X61F, who reported superb conditions to Central and South Africa for 10 hours on Saturday. Saturday was unquestionably the best of the two days to operate. Nevertheless, several modes of propagation were still available on Sunday, with sporadic E, ground wave and meteor scatter (courtesy of the Geminid shower).

Propagation shouldn't be a problem next year, as conditions in general were significantly better than in '84. Solar flux passed through the 80 mark and is still on the increase. Could this be a sign of even better conditions in the 1986 event? Only time will tell!

Yes folks, conditions were better for the 1985 event, and the leader boxes show it. Scores in all single-operator boxes are up from last year. Nevertheless, several familiar faces are missing from this year's leader boxes.

Number 3 N2RM upped his 1984 score by 60 kilopoints to be the only repeat in the W/VE mixed-mode category this year, up one slot from last year. Just one rung up the ladder, in number 2, was NU4Y with 270 k. WC4E surpassed the 300 k mark and topped last year's number 1 effort by a whopping 25 k. A total of 174 W/VEs decided to enter mixed-mode, 1985's second most popular category.

The competitive mixed-mode DX leader box was led by a top-notch effort by ZM8OY, with 126,700 points. Oceania didn't take 'em all,

## Top Ten—W/VE

Mixed Mode		CW	
Call	Score	Call	Score
WC4E	308,800	KZ5M (KN5H)	198,268
NU4Y	270,450	N4BP	115,168
N2RM	235,500	N4VZ	112,896
N4ZC (WABMAZ)	185,400	K6HNZ	100,344
N5JJ	137,472	KN4B	100,064
NSUD	137,456	WD4AHZ	96,672
KM1H	135,450	K7QQ	95,760
K3ZJ	125,692	W5HUQ	58,600
K1VUT	119,536	KU2Q	52,400
W7EJ	96,287	W9VA	46,736

## Top Ten—W/VE

Phone		Multiop	
Call	Score	Call	Score
KE5FI	270,048	K5LZO	339,528
NR5M	263,488	W0AIH/9	209,020
KE5JA	162,180	K5RVK	208,980
K4JPD	148,896	W4WWW	162,754
W9OEH	144,744	N4EJW	151,995
K5FUV	123,970	N2EQC	132,864
AA4J	100,168	KB4HF	113,540
K1IU	94,080	KE7C	80,160
W0XK	93,240	K4SDLM	78,520
N2BJ	81,120	WD5ABC	76,038

## Top Five—DX

Mixed Mode		CW	
Call	Score	Call	Score
ZM8OY (ZL8OY)	126,700	ZS3Z	29,328
ZS6USA	83,376	LU1EWL	26,820
DL6FBL	58,950	TE4T	23,564
JR7EFI/JD1	28,850	V2ACW	20,320
HG9MAP	22,512	ZL2ACP	15,120

Phone		Multiop	
Call	Score	Call	Score
LU1E (LU3AJW)	316,304	LU1DCB	69,368
CE3BFZ	154,800	KP4BO	65,514
PP2ZDD	88,408	F6KBF	29,520
ZL1ANJ	63,512	UB4WZA	17,880
CX2AAL	47,492	JA2YKA	13,920

the controls) had twice the score of second-place CE3BFZ and defeated the 72 other phone-only entrants for top spot. PP2ZDD was third, just ahead of the only non-South American to make the phone-only box, ZL1ANJ. CX2AAL completes the DX phone-only top five.

Ninety-four Statesiders decided to pound the brass this time around. It took 100 k to make the top five in '85. KZ5M (skipped by KN5H) topped the field with just under 200 thousand points, wow! N4BP and N4VZ scrapped for number 2, with 'BP ending up with 115 k to 'VZ's 112 k. Less than 300 points separate numbers four and five—K6HNZ (100,344) and KN4B (100,064).

The multioperator category was entered by 49 stations this year, 31 from W/VE and 18 from DX participants. The closest race for first place was in the latter category, with LU1DCB and crew defeating the folks from KP4BO by less than 4,000 points. Stateside, most of the players were the same as last year, with a slight shuffle in the deck. Last year's number 2, K5LZO, tops the category, with W0AIH/9 (1984's number 3) K5RVK (6 in '84) and W4WWW (number 9 last time around) in positions 2 through 4. N4EJW didn't make the top ten last year, but ended up number 5 in the W/VE multioperator category in '85.

The 1985 ARRL 10-Meter Contest, if nothing else, has taught many a very important lesson: No matter what the sunspot numbers and WWV observations indicate, 10 meters is an amazing band. Anything can happen, (and it usually does), during contest season. Why not give the 1986 ARRL 10-Meter Contest a try—We'll be there, will you?

## SOAPBOX

It's amazing how much difference 1400 km can make to propagation! I was working consistent pileups into the states when ZS6USA couldn't

however, as African entrant ZS6USA rounded up a second-place finish with 83 kilopoints. DL6FBL put Europe on the boards with an outstanding entry. JR7EFI/JD1 and HG9MAP round out the mixed-mode top five.

On phone, five land had the clear-cut advantage. Both NR5M and KE5FI topped the 260 k mark. In the end, however, 'FI was the winner of top W/VE honors. That's not where the excitement ended, either. The race for third position saw another five-lander, KE5JA, outrun K4JPD and W9OEH (numbers 4 and 5, respectively). In all, 180 entrants from the States and Canada entered the phone-only competition.

South American entrants led the top DX phone-only category. LU1E (with LU3AJW at



V2ACW used this rig and a dipole to make 127 QSOs and 40 multipliers from Antigua.



KN5H is smiling because he was the top CW-only Stateside entrant in the 1985 ARRL 10-Meter Contest (station courtesy of KZ5M).

## Division Leaders

Division	Mixed Mode	Phone	CW	Multip
Atlantic	N2RM	K8XR	KR3G	W3KHO
Canada	VE3ST	VO3XN	VE3KP	VE7RON
Central	W9XT	W9OEH	W9VA	W6AIH9
Dakota	KN8Z	WB0MVJ	KN0V	---
Della	N4TG	K5FLV	---	KA5DLM
Great Lakes	WB8CCL	ND4Y	WA4EBN	WB8BUO
Hudson	K3EW	N2BJ	KU2Q	N2EOC
Midwest	KVB1	W9XK	N0LL	N0ALX
New England	KM1H	K1IU	KV1L	KB1I
Northwestern	W7EJ	K7IDX	K7QQ	KE7C
Pacific	NS6V	K6BIM	K6HNZ	K16T
Roanoke	N4ZC	K4BFJ	N3OS	KF4YH
Rocky Mountain	K8ZX	W5HI	NCSO	KC8AT
Southeastern	WC4E	K4JPD	N4BP	WA4WVV
Southwestern	WB7FDQ	WA7KLK	W7FGT	K6ELX
West Gulf	K5JJ	KE5FI	KZ5M	K5LZO

## DX Continental Leaders

Continent	Mixed Mode	Phone	CW	Multip
Africa	ZS6USA	EA8ZI	ZS3Z	---
Asia	JR7EF/JD1	JO1NZT	JL1OYJ	JA2YKA
Europe	DL6FBL	G4YLO	DL1HBT	F8KBF
North America	HP1XKR	HH2WL	TE4T	KP4BO
Oceania	ZM8OY (ZL8OY)	ZL1ANJ	ZL2ACP	---
South America	---	LU1E (LU3AJW)	LU1EWL	LU1DCB

even hear them (ZS6BCR, opr ZS3Z). Conditions were not good, but I enjoyed the CW QSOs (J13BFG). Even the "HFers" knew the sporadic E was there on Saturday night! (KN5H, opr KZ5M). N5JJ was worked via meteor scatter! (WP4L). More QSOs but less mults than last year. Nothing was heard from North America. Terrain makes working Europe difficult from this QTH. Surprise opening to T1 around 1430 UTC on Sunday. Wonder what we can expect in '86? (GW4BLE). It was sure nice to see 10 meters open so much during the contest (KA9AOK). Contests get some operators to copy signals 10 dB into the noise! (VE3FIU). The only propagation mode to the north was meteor scatter. It is a good choice to have the contest during the Geminids shower (OH2TI). Ten meters is still a surprise band! (OZ8T). I wish I had a better QTH (VK2BQQ). Conditions improved considerably from the 1984 contest. Let's hope we are entering the next sunspot cycle! (ZL1ANJ). I worked everyone I heard (W1VH). Where were all the Novice/Tech stations? (KA1MXZ). Wow! (KQ1V). Conditions were better than last year, and there was more activity (WA1PLK). Being on the thumb of the universe, the only direction was west to south. One-way skip didn't help (KAILJZ). Three years now and still no North Dakota (KMIH). I found that there was usually an opening to somewhere for the duration of my operating time (KAZVZW). How about special mention for the shortest log? (W2KTF). Have to figure out a way to get the XYL away for the weekend (K2OLG). Conditions were interesting with good scatter signals on Friday night. Aurora was present Sunday afternoon (N2RM). No wet noodle antennas and milliwatt output in this contest. It took amplifiers, preamps, beams and a hearing aid! (KR3G). What a fun contest. Where was Murphy? Seemed like a lot of those "59" reports needed several fills (WA4OIJ). Exciting! (N4MSU).

## Scores

DX scores are listed by continent and country according to the ARRL DXCC list. US and Canadian scores are listed by call area and ARRL section. Each line score lists call sign, score, QSOs, multipliers and entry class (A = Mixed Mode; B = Phone Only; C = CW Only; D = Multioperator).

DX	Score	QSOs	Mults	Entry Class
<b>Africa</b>				
FA8ZI	1,520	40	19-B	
EA8AMT	1,472	46	16-B	
ZS3Z (ZS6BCR, opr)	29,328	156	47-C	
ZS6USA	83,376	426	72-A	
<b>Asia</b>				
JR1CRA	10,296	195	19-A	
JA8YAI (JE6MOW, opr)	10,184	192	19-A	
JE7BZ	5,300	192	10-A	
JA1YLZ	4,950	112	16-A	
JH0LFE/1	3,492	141	9-A	
JA1BNV	2,880	89	10-A	
JQ1KW	2,816	90	11-A	
JA6P	2,688	70	14-A	
JS1UMQ	2,040	60	12-A	
JA9RYL	504	21	7-A	
JJ3BF	328	20	4-A	
JN1EN/3	150	14	3-A	
JO1NZT	12,512	275	23-B	
JH2KKW	3,680	115	16-B	
JA2BNN	3,192	114	14-B	
JY1SPG	814	17	11-B	
JH1UUT	726	33	11-B	
JA1AAT	540	58	12-B	
JA1RDJ	496	31	8-B	
JR8ODU	468	26	9-B	
JE1AER	360	20	9-B	
JH0UFI/1	288	36	4-B	
JA1BUJ	88	17	2-B	
JE1TTO	24	6	2-B	
JS1HVB	24	4	3-B	
JH8BT	10	5	1-B	
JL1OYU	6,120	100	15-C	
JA1YWG (JJ1VRO, opr)	1,920	60	8-C	
JH6NAC	1,056	33	8-C	
JA2YDC (J12HO, opr)	792	33	6-C	
JE7IVP	784	28	7-C	
JO1QZJ	464	29	4-C	
JA1YBK (J12LCE, opr)	408	23	4-C	
JA1PS	160	10	4-C	
IG1RYO	108	9	3-C	
JH6NBW/1	56	7	2-C	
JE7HFO	24	6	2-C	
JR4ISK	16	2	2-C	
JA2YKA (JJ1BTC, JF2S DGI, UT1, IG2% MTC, VT1, J12JRN, J12NJE, J3JOE, JA8SSY, oprs)	13,920	282	20-D	
JA7YF (JE7JWB, JF7% AAD, TDN, JH7XK, JR7% GYC, JLU, OEF, RLB, WPH, JN1RON, JH8ONT, oprs)	9,680	242	20-D	
JH1YDT (JH1OPU, JK1PRV, JL1NCC, JM1% MGP, WMU, JG2UHR, JH4UTP, JH5GRG, JH6UUN, oprs)	6,976	184	16-D	
JA1YXP (J151PXL, JR4HCV, JH3CAU, JR8ALC, oprs)	5,360	191	10-D	
<b>Europe</b>				
DL6FBL	58,950	465	45-A	
DL1SN	342	16	9-A	
DL8PC	1,596	42	19-B	
DL8XK	336	21	8-B	
DL1HBT	10,260	95	27-C	
DL7A1	3,192	53	16-C	
DL1ZJ	1,344	28	12-C	
DF5WN	608	19	8-C	
DL7TH	448	14	8-C	
DA2NO	240	10	6-C	
EA5VK	6,250	125	25-B	
EA3EGJ	3,600	90	20-B	
F4SRZS	2,464	44	28-B	
EA3ELM	2,124	39	18-B	
EA2BUF	600	25	12-B	
EA2ERT	264	44	6-B	
EA7FUP	216	12	9-B	
EA2BPJ	130	13	6-B	
EA2CAG	24	4	3-B	
F6GCP	2,844	53	18-A	
F6RACJ	5,768	103	28-B	
F8WE	1,920	48	20-B	
F6EQU	560	14	10-C	
FRKBF (F1s DDA, GVH, FB1IR, oprs)	29,520	292	45-D	
G4GIR	6,192	77	24-A	
G68IR	4,636	118	19-A	
G4YLO	17,028	258	33-B	
G4OTU	10,080	105	24-C	
G3ESF	2,254	41	14-C	
G4FDC	594	13	10-C	
GW4LE	9,454	163	29-B	
GW5NF	8,592	179	24-B	
GW3JI	1,152	24	12-C	
HG9MAP	22,512	255	42-A	
HA8ZC	6,670	85	23-A	
HA8KI	4,682	68	23-A	
HG4XX	3,990	74	21-A	
HA8XX	1,760	43	16-A	
HASMY	80	6	4-A	
HG5AAP	2,432	64	19-B	
HG5AAS	2,040	51	20-B	
HA7RI	4,636	61	18-C	
<b>North America</b>				
YU7CRO	856	20	11-A	
YU8NY	2,560	40	16-C	
YU5FE	2,108	31	17-C	
YU7MGU	80	5	3-C	
KA6ER	2,448	51	24-B	
HH2WL	6,102	113	27-B	
H8LC	3,960	70	22-A	
HP1XKR	18,360	139	36-A	
HR1FC	962	37	13-B	
KL7Y	726	23	11-A	
OQ1AKP2	5,790	80	36-B	
WP4L	12,740	91	35-C	
KP4BO (+WP4GBB)	65,514	461	61-D	
YRANL	5,632	88	32-B	
TE4T	23,564	137	43-C	
V2ACW	20,320	127	40-C	
XE1CEI	7,000	95	35-A	
<b>Oceania</b>				
WA7COE/DVZ	2,486	113	11-B	
KB1HMK/8	2,366	88	13-A	
KH8CP	720	22	10-A	
KH8CDO	374	17	11-B	
V4XA	9,752	212	23-C	
VR2BQ	1,696	53	8-C	
VR6H	1,148	41	7-C	
VK4TT	648	18	9-C	
ZL1ANJ	63,512	467	68-B	
ZL2ACP	15,120	105	26-C	
ZL2BDC	720	18	10-C	
ZM8OY (ZL8OY, opr)	126,700	768	70-A	
<b>South America</b>				
CE3BFZ	154,800	900	88-B	
CE4ETZ	41,344	323	64-B	
CE3AEZ	8	2	2-B	
OX2AAL	47,492	363	62-B	
LU1E (LU3AJW, opr)	316,304	1492	106-B	
LU1ABT	11,726	143	41-B	
LU1EWL	25,820	149	45-C	
LU1DCB (LU1ICL, LU5EIC, LU7DX, oprs)	69,368	408	58-D	
PP2ZDD	68,408	603	58-C	
PY3BC	10,440	85	30-C	
YV7OP	3,276	39	21-C	
ZP5ADW	1,700	25	17-C	
<b>Eastern Massachusetts</b>				
K1VUT	119,538	707	62-A	
KQ1V	92,748	699	59-A	
KA1DWX	54,400	384	50-A	
K52D/1	50,760	349	54-A	
NA1G	5,876	72	28-B	
W1HWU	1,050	24	15-A	
KA1AMR	7,192	124	24-B	
WA1PLK	550	25	11-B	
KV1L	32,528	258	38-C	
K1XM	23,380	167	35-C	
KQ1F	7,392	77	24-C	
AE1B (+AB1X, KX1G)	25,604	223	37-D	
<b>Maine</b>				
N1AFC	10,140	111	26-A	
R1CIV	7,616	98	32-A	
N1A1O	57,428	586	49-B	
KM6FC	14,874	201	37-B	
K1BZ	10,672	184	29-B	
KAILJZ	9,984	156	32-B	
W1MGP	2,322	86	27-B	
W1YXK	3,584	54	16-C	
<b>New Hampshire</b>				
KM1H	135,450	746	63-A	
AC1J	2,656	81	16-A	
W1UCI	672	25	12-A	
NA1E	53,242	504	53-B	
AF1T	36,848	376	49-B	
W1FJH	13,520	169	40-B	
W1END	4,080	51	20-C	
KA1X (+AK1L)	32,144	256	41-D	
<b>Rhode Island</b>				
K1HMO	20,774	218	47-A	
W1RFQ	12,588	133	29-A	
K2R	880	31	10-A	
K1IU	94,080	735	64-B	
KA1TS	57,134	638	53-B	
K1MVS	8,184	132	31-B	
KA1MPP	60	4	3-C	
K21A (+KA1LU)	936	22	13-D	
<b>Vermont</b>				
W3SOH	1,296	30	12-A	
WB1GQR	27,060	330	41-B	
WA1TBV	11,544	156	37-B	
K1YOU (+WB1S, EMB, EQS, FU, FX1)	10,336	138	38-D	
<b>Connecticut</b>				
N1CC	52,020	371	51-A	
KE1C	47,104	382	46-A	

<b>Western Massachusetts</b>			WA3GQU 1,884 47- 16-A	<b>Mississippi</b>			WA8DYU 4,524 78- 29-B	<b>Indiana</b>																																																																																																																																																																																																							
KRTR 15,466 161- 37-A	WA3K0I 2,352 42- 14-C	W3KHQ (+ KB3A) 48,450 353- 57-D	K5TYP 55,330 415- 55-A	WA7KXA 1,360 34- 20-B	KA7T 7,616 68- 28-C	Montana	W7KZK 648 18- 9-C	Nevada	W9COE 144,744 978- 74-B																																																																																																																																																																																																						
K2IM 8,112 87- 24-A	<b>Alabama</b>			W5DVK 18,662 165- 31-A	AA4LE 72,618 637- 57-B	KB4LE 8,888 101- 44-B	N4LVM 4,408 76- 29-B	WA4OQB 36,990 215- 42-C	KB4FAI 21,980 157- 35-C	KA4BLN 1,632 28- 12-C	Georgia	W4HR 92,400 601- 56-A	AA4MJ 42,330 303- 51-A	K4JPD 148,896 1034- 77-B	W5AN 29,088 303- 48-B	K4GKV 6,808 92- 37-B	K4FZ 5,600 80- 35-B	NA4V 112,896 441- 84-C	KN4B 100,084 424- 59-C	K4BAI 35,948 209- 43-C	Northern Texas	NSUD 137,456 795- 71-A	K5MR 13,760 123- 40-A	KASBS 8,792 106- 28-A	KASPV 3,360 53- 25-A	K5IS 1,428 33- 14-A	NSHJY 889 27- 14-A	NZSM 512 20- 8-A	N4GTU 6,992 92- 38-B	NJ5N 40,964 209- 49-C	W5ABC (+ K5F5AW) 76,038 434- 57-D	Oklahoma	WR5GMK 26,132 270- 47-A	KASUDL 288 18- 8-B	Southern Texas	N5JJ 137,472 698- 64-A	K5CP 86,194 605- 71-A	WA5F 6,400 84- 40-A	K5FI 270,948 1392- 97-B	N5RM 263,488 1432- 92-B	K5BJA 162,180 954- 85-B	WA5LY 37,076 299- 62-B	K5UCV 22,352 254- 44-B	W5PWG 11,562 141- 41-B	WB5YE 6,370 91- 35-B	K5HUT 4,576 88- 26-B	K5HM 1,500 30- 25-B	WB5VZL 574 41- 7-B	WB5HM (WB5VZL opr) 480 30- 8-B	K2SM (KN5M opr) 198,268 875- 73-C	N5AFV 8,848 78- 28-C	K5LZO (+ KE5IV, W5FRUS) 339,528 1531- 94-D	K5RYK (+ NS5AP) 208,980 1041- 81-D	<b>6</b>	East Bay	W6ES 10,432 123- 32-A	K6CSL 4,914 78- 21-A	K6SB 252 21- 6-B	W6FCR 13,200 110- 30-C	Los Angeles	N6HC 79,430 516- 65-A	K6EID 30,100 234- 50-A	K6W 2,664 58- 18-A	W6CN 24,990 255- 49-B	K6DM 3,942 73- 27-B	WB6ZM 1,482 39- 19-B	K6ELX (+ N6FR) 15,048 296- 38-D	Orange	W6HT 16,188 117- 38-A	Santa Barbara	WA6FGV 26,544 227- 42-A	NV8I 10,608 136- 39-B	K6VZ 9,792 136- 36-B	Santa Clara Valley	NS6V 20,794 158- 37-A	K6XO 20,520 195- 38-A	NSUW 12,528 117- 36-A	W6OKK 2,772 76- 21-A	N6NF 4,200 26- 7-A	K6HNZ 100,344 678- 74-C	W6NA 27,388 157- 41-C	San Diego	AA4M 77,866 448- 62-A	WA6VNR 12,992 165- 32-A	W6WZ 15,984 103- 36-C	K6HAI (K6PD, KAUCD, KW6V, W6MS EHR, JXA, ZBE, W6BLLD, oprs) 8,050 104- 35-D	San Joaquin Valley	KA6BM 37,560 313- 60-B	Sacramento Valley	K6SA 22,640 220- 51-B	W6BCQ 36 3- 3-C	K16T (+ N6MM, WA6OSX) 39,538 297- 53-D	<b>7</b>	Arizona	WB7FDD 87,000 478- 75-A	KY7M 5,904 88- 24-A	WA7KLK 44,280 346- 64-B	KX7J 9,672 124- 38-B	W7FGT 21,608 146- 37-C	KD7YO 6,888 76- 22-C	Idaho	N7HJM 1,972 36- 17-A	Washington	KS7L 25,382 207- 37-A	W7TSQ 3,724 75- 18-A	N7CFA 1,274 33- 13-A	K7IDX 75,504 572- 85-B	KR7L 9,600 160- 30-B	K7QQ 95,760 399- 60-C	W6KZV7 37,260 200- 45-C	NE7L 14,720 113- 32-C	W7QN 4,892 52- 24-A	W7IEU 4,104 54- 19-C	KE7C (+ WB7OV) 80,180 474- 60-D	W7BGH (+ K7s RLS, ZBV) 17,214 106- 57-D	Wyoming	N87Q 1,224 48- 12-A	NO7O 118 16- 11-A	K87M 708 22- 12-B	NC7O 680 18- 11-C	<b>8</b>	Michigan	K8DJR 32,830 284- 49-A	WB8MDG 10,296 133- 26-A	K8ED 6,798 100- 33-A	K8BAM 6,624 124- 24-A	N8CXX 38,532 338- 57-B	N8DPH 10,168 164- 31-B	K8DTM 9,742 128- 37-B	K8LHU 4,860 69- 31-B	K8MPF 10,744 78- 34-B	AC8P 2,752 42- 15-C	WB8BLU (+ N8FME, WA8ROF, W8PPEE) 75,480 560- 60-D	Ohio	WB8CCL 47,216 309- 52-A	KD8NS 31,722 232- 51-A	WB8XE 15,894 127- 26-A	WB8RON 6,128 127- 32-A	WB8TEI 3,480 53- 20-A	K8GYW 594 23- 9-A	WB8NPF 11,360 142- 40-B	KA8HBO 9,520 140- 34-B	WB8MF 9,040 113- 40-B	WB8PIY 6,580 110- 39-B	WB8CO 7,200 100- 36-B	K8RUZ 5,075 94- 27-B	K8RYR 2,806 61- 23-B	WB8ZYD 1,088 68- 16-B	K8BO 900 30- 15-B	W8OKT 12 3- 2-B	K8BSG 1,392 21- 12-C	KA8D 960 30- 12-C	West Virginia	N8II 13,550 214- 50-A	N8APA (+ N8ABW) 67,588 554- 61-D	<b>9</b>	Illinois	WB9JLI 19,220 218- 31-A	ND9Y 14,388 178- 33-A	WB9BZE 11,786 144- 37-A	AK9Y 11,282 107- 29-A	WD9EXD 2,250 134- 25-A	ND9X 6,510 96- 21-A	K9BQL 4,800 81- 23-A	W9HOT 1,890 36- 18-A	N9FFM 832 23- 13-A	WA9MRU 240 15- 8-A	KE9Y 52,440 460- 57-B	K9MQM 25,830 287- 45-E	KA9SUN 10,990 157- 35-B	W9ZGP 7,744 121- 32-B	N9FIV 6,554 113- 29-B	KR9G 6,048 84- 38-B	AD9K 4,464 93- 24-B	KA9AK 4,760 104- 20-B	W9REC 1,840 46- 20-B	N9EVW 618 26- 11-B	KA9QYA 276 23- 16-B	W9VA 48,736 253- 48-C	ND9V 4,692 51- 23-C	KG9Z (+ KC9DL) 35,820 398- 45-D	W9CA (+ N9AIR) 16,728 171- 34-D	Ontario	N8II 13,550 214- 50-A	N8APA (+ N8ABW) 67,588 554- 61-D	VE3ST 22,880 184- 44-A	VE3FU 11,328 128- 32-A	VE3XN 51,484 322- 61-B	VE3XO 49,128 456- 89-B	VE3FVO 44,100 350- 63-B	VE3MBN 28,778 257- 57-B	VE3BK 11,256 134- 42-B	VE3PK 30,120 184- 45-C	VE2AEJA 16,100 114- 35-C	VE3LUG 11,200 100- 28-C	VE3PCU 1,332 36- 9-C	VE3SAU (VE3s FHU, NPB, QAF, oprs) 14,720 166- 40-D	Saskatchewan	VE8DR 352 21- 8-A	Alberta	VE6COP 1,176 35- 12-A	British Columbia	VE7OTD 210 15- 7-B	VE7DV 2,616 35- 17-C	VE7RCN (VE7s EST, FTR, oprs) 47,040 420- 56-D	Checklogs	EASAP, FE306B, GM2MK, HA1UB, KA1BSZ, K1DW, AK2H, KR2Q, W2LRJ, W3ARK, N4HLU, N4JSP, KA7FE, PA38TH, SM8DVA, SP2UUU, VK4RZ, Y22EU, Z1LBWM, Z1ZARF

# Rules, 1986 ARRL UHF Contest

Grid squares are now exchanged in all ARRL-sponsored V/UHF contests. The ARRL UHF Contest is, therefore, an excellent opportunity to work toward the very popular VUCC award. If you have any questions about grid squares, consult Jan 1983 QST, p 49, for a complete introduction. The rules for this year's contest are the same as last year's. Be sure to mail your logs early and in a separate envelope from any other contest entries. Send an SASE to ARRL HQ and specify which contest summary sheet you need.

**Note:** ARRL is now accepting applications for VUCC on the microwave bands. These are single-band awards. To qualify, you must work at least 10 grid squares on 2.3 or five grid squares on 3.4, 5.7 or 10 GHz. An SASE to HQ will bring you application information and the name of the closest awards manager who will process applications. GL!

## Rules

1) **Object:** To work as many amateur stations in as many  $2^{\circ} \times 1^{\circ}$  grid squares as possible using authorized amateur frequencies above 220 MHz and all authorized modes of emission.

2) **Contest Period:** Begins 1800 UTC Saturday, Aug 2, and ends at 1800 UTC Sunday, Aug 3. Entrants may use as much of this time as they wish.

### 3) Categories:

(A) **Single operator:** One person performs all operating and logging functions, as well as equipment and antenna adjustments.

#### (1) Multiband.

(2) **Single band:** Single-band entries on 220, 432, 902 and 1296 MHz, and 2.3-GHz-and-up categories will be recognized both in QST score listings and by awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. See also Rule 8 (Awards).

(B) **Multioperator:** Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters.

4) **Exchange:** Grid-square locator (see Jan 1983 QST, p 49). Example: WIAW in Newington, CT, would send "FN31." Exchange of signal reports is optional.

### 5) Scoring:

(A) **QSO points:** Count three points for each complete 220- or 432-MHz QSO. Count six points for each complete 902- or 1296-MHz

QSO. Count 12 points for each 2.3-GHz-or-higher QSO.

(B) **Multiplier:** The total number of different grid squares worked *per band*. Each  $2^{\circ} \times 1^{\circ}$  grid square counts as one multiplier on each band it is worked.

(C) **Final score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: WIAW works W3CCX in FN20 on 220, 432 and 1296 MHz. This gives WIAW 12 QSO points (3 + 3 + 6) and also three grid-square multipliers. Final score is 12 QSO points  $\times$  3 multipliers, or 36.

### 6) Miscellaneous:

(A) Stations may be worked only once per band for credit, regardless of mode. Crossband QSOs do not count. This does not preclude working a station from more than one grid square with the same call sign.

(B) Partial QSOs do not count. Both calls, the full exchange, and acknowledgment must be sent and received.

(C) Fixed, portable or mobile operation under one call is permitted. Contacts with aeronautical stations do not count. A portable or mobile station may not be counted for more than one QSO per band, even if the station is moving. However, a station that changes locations may be contacted for additional grid square multipliers, but not for QSO points.

(D) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations where more than one call is assigned to one location by the FCC/DOC). The intent of this rule is to accommodate family members who share a rig, not to manufacture artificial contacts.

(E) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of non amateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

(F) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (ie, able to communicate over a distance of at least 1 km).

(G) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial

means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

(H) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(I) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

(J) The use of non-Amateur Radio means of communication (eg telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

7) **Reporting:** Entries must be postmarked no later than Sep 3, 1986. Official forms are available for an SASE from ARRL HQ, and all entrants are strongly urged to send early for a set.

### 8) Awards:


(A) Single operator

(1) Top single-operator score in each ARRL Division.

(2) Top single operator on each band (220, 432, 902, 1296, and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if W3HQT has the highest single-operator multiband score in the Atlantic Division and his 432-MHz score is higher than any other Atlantic Division single op's, he will earn both a certificate for being the single-operator Division leader *and* an endorsement sticker for 432 MHz.

(B) Top multioperator score in each ARRL Division where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

(C) Additional certificates may be awarded where significant effort or competition is evidenced.

9) **Disqualification:** See Jan 1986 QST, p 94. 


## Hamfests

(continued from page 75)

**Wyoming (Douglas)—Jul 11-13:** The 1986 Wyoming Hamfest will be held at the Wyoming State Fairgrounds in Douglas. Distributor displays, indoor flea market, white elephant auction, VEC testing and much more. Also a DX contest operating at 14.250 and a CW copy contest will be held. Ample RV parking w/wo hookups, plenty of motels. For information and advanced registration, SASE to 1986 Wyoming Hamfest, PO Box 3842, Gillette, WY 82716-0390.

**Wyoming (Jackson Hole)—Aug 2:** Come to the 5th Annual WIMU Hamfest located at the Virginian Motel. What other hamfest can offer the scenic beauty of Yellowstone and Teton National Parks, great fishing

on Jackson or Tenny Lakes, thrilling raft rides down the Snake River, stagecoach and horseback rides in the heart of the Rockies, Melndramas, a showdown in the streets at sundown or the fun of the famous "Million Dollar Cowboy Bar"? There will be great fun for all in this vacation paradise, including QCWA, family activities swapfest and dealers. Mobile, homebrew and transmitter-construction contests. For special room rates, call the Virginian Motel at 307-733-2792 and mention "Hamfest." For RV and campers who don't mind first come first serve, the A1 campground is next door to the motel. For more information, contact George Siegel, 130 E 17 St, Idaho Falls, ID 83401, tel 208-523-7433.

**Note:** Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. 

## Strays

I would like to get in touch with...

amateurs interested in playing chess on 80-m RTTY. Greg Miller, NY6C, 41911 Paseo Padre Pkwy, Fremont, CA 94539.

hams who are also EMTs, paramedics, coroners and others involved in emergency services, for the purpose of compiling a listing/directory available to all who contribute. Jeff Howell, WB9PFZ, RR 16, Box 423, Bedford, IN 47421.



# Contest Corral

Conducted By Billy Lunt, KR1R  
Assistant Contest Manager, ARRL

## JULY

**1**  
**Canada Day Contest**, Jun QST, p 85.

**2**  
**West Coast Qualifying Run**, 10-35 WPM, at 0400Z Jul 3 (9 PM PDT, Jul 2). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3.590/7.090 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

**9**  
**WIAW Qualifying Run**, 35-10 WPM at 0200Z Jul 10 (10 PM EDT, Jul 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Jul 2 listing for more details.

**12-13**  
**IARU HF Championship**, Apr QST, p 78.

**19-20**  
**CQ World-Wide VHF WPX Contest**, sponsored by CQ Magazine, from 0000Z Jul 19 until 2400Z Jul 20 (48 hours). Use all authorized bands from 50 MHz through 1296 MHz (6 meters through 23 cm). Use all modes, except no repeater or satellite contacts. Exchange call sign and grid square. A station in a call area different from that indicated by his call sign is required to sign portable. Multipliers are the prefixes worked per band. Count 1 point per QSO on 50, 70 or 144 MHz; 2 points per QSO on 220 and 432 MHz; 4 points per QSO on 902 and 1296 MHz. Work stations once per band, regardless of mode. Multiply total QSO points times the total number of prefixes worked (the sum of the prefixes worked per band). Classes are: single operator, single band; single operator, multiband; single operator, single band, low power; single operator, multiband, low power; single operator, portable (with temporary power source); multiplier, single band; multiplier, multiband; multiplier, portable (with temporary power source); FM only. Low power is defined as 30-W PEP output or less. Trophies and certificates. Send entries before Aug 31 to SCORE, PO Box 1161, Denville, NJ 07834, or to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

**QRP Summer Contest**, sponsored by the DL Activity Group CW, from 1500Z Jul 19 until 1500Z Jul 20. CW only, 160 through 10 meters. Classes are: A—less than 3.5-W input (2-W output), single operator; B—less than 10-W input (5-W output), single operator; C—less than 10-W input (5-W output), multiplier; D—QRO stations, more than 10-W input (5-W output), to contact QRP stations; E—SWL. Class C stations may operate full time; classes A, B, D and E must break for nine hours (may be taken in two parts). Exchange RST, QSO-number and input, adding x if crystal controlled. QRO stations add  $\times 1000$ . Operation is limited to one class per band, VFO or crystal controlled. No more than 3 crystals may be used on one band. Contact each station once per band. Count 1 point for QSO with own country, 2 points for QSO with own continent, 3 points for QSO with DX (outside own continent) per DXCC list. JA, PY, VE, W and ZS call areas count separately. Count 1 multiplier for each country and 1 for each DX QSO. Multiply points by multipliers on each band, then add band results. Crystal-controlled stations double total result. Submit a separate log for each band. Logs must be received within 6 weeks of the contest. Send logs (include 1 IRC for results) to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed Rep of Germany.

**Colombian Independence Contest**, sponsored by the Liga Colombiana de Radioaficionados, from 0000Z Jul 19 until 2400Z Jul 20. 160-10 meters, phone or CW. Categories: single operator, single band and mode, single operator, multiband, single mode; multiplier, single transmitter, multiband, single mode; multiplier, multitransmitter, multiband, single mode. Work stations once per band. No cross-band or cross-mode QSOs allowed. Exchange signal reports and 3-digit serial numbers. Count 10 points for QSOs with HK stations, 5 points for QSOs with other DX stations, 1 point for QSOs within your country. (HK stations count 10 points with non-HK stations and 5 points with other HK stations.) Multiply by the sum of countries worked on each band added to the sum of HK districts worked on each band. Logs and summary sheet should include all data. Participation certificates for minimum

of 50 QSOs (at least 10 of which are with HK stations for phone entries, or 5 for CW). Mail logs no later than Aug 30 to LCRA, c/o Direccion de Concursos y Diplomas, Apartado Aereo 584, Bogota, Colombia, South America.

**SEANET Contest**, CW, sponsored by the Philippine ARA. Work Southeast Asia stations, from 0000Z Jul 19 until 2359 Jul 20. (Phone portion will be held Aug 16-17.) 160-10 meters, single operator-single band, single operator-multiband and multiplier-multiband categories. Send signal report and serial number beginning with 001 on each band. SEANET country prefixes: A35 A51 AP BV BY C21 DU FK8 FR FWS HL HS H44 JA-etc. JDI KA KC6 KH2-through-0 KX6 P29 S2 S79 T2 T3s VK-all VQ9 V85 VS6 VU2 VU7 XU XV5 XW8 XX9 XZ2 YB YJ8 ZK ZL-all 3B6-through-9 3D2 4S7 SWI 8Q7 9M2 9M6 9M8 9N1 9V1 IZ9. Contacts with SEANET countries count 2 points on 20-15-10 meters; 5 points on 40 and 80 meters; and 10 points on 160 meters. Double the preceding point values for bonus prefixes: DU HS YB 9M2 9M6 9M8 9V1 V85. (SEANET to SEANET contacts count 1, 3 and 6 points, respectively). Contacts within one's own country do not count. Multipliers are the number of SEANET countries worked  $\times 3$  for others, ( $\times 2$  for SEANET to SEANET countries). Send 2 IRCS for results. Send your entry to SEANET Contest, CARL, PO Box 304, Cebu City, Philippines 6401.

**25**  
**WIAW Qualifying Run**, 10-35 WPM at 2300Z (7 PM EDT) Jul 25. See Jul 2 and 9 listings for more details.

**26-27**  
**County Hunters CW Contest**, sponsored by the CW County Hunters Net, from 0000Z Jul 26 until 0200 Jul 28. Work stations once per band. Work portables/mobiles again as they change county. Stations on county lines count as one QSO, but multiple multipliers. Exchange serial number, category (P for portables, M for mobiles), signal report, county and state (for US stations), province or country. Suggested frequencies: 3.575 7.055 14.065 21.065 28.065 MHz. Portables and mobiles call CQ below 7.055 and 14.065 MHz, others spread out above those frequencies. Count 1 point for QSOs with fixed stations, 3 points for portables or mobiles. Multiply QSO points by total US counties worked for final score. Mobiles and portables calculate their scores both on a state by state basis and overall for awards. Mail logs by Sep 1 (include a large SASE for results) to Jerry Burkhead, N6QA, 7525 Baltic St, San Diego, CA 92111.

**Armadillo Run**, Apr QST, p 73.

## AUGUST

**2-3**  
**ARRL UHF Contest**, p 86, this issue.

**YO DX Contest**, sponsored by the Romanian AR Federation, from 2000Z Aug 2 until 1600Z Aug 3. 80-10 meters, phone and CW. No cross-mode QSOs. Classes: Single operator, single band; single operator, multiband; multiplier, multiband. Exchange signal report and ITU zone. YO stations will send two letters indicating their country. Count 2 points per QSO with own continent, 4 points for different continent and 8 points for YO stations. Multiply by sum of YO countries and ITU zones worked per band. Mail entries by Sep 3 to RARE, PO Box 05-50, R-76100 Bucharest, Romania.

**5**  
**West Coast Qualifying Run**, 10-35 WPM, at 0400Z Aug 6 (9 PM PDT, Aug 5). See Jul 2 listing for more details.

**14**  
**WIAW Qualifying Run**, 10-35 WPM, at 0200Z Aug 15 (10 PM EDT, Aug 14). Refer to Jul 9 listings for more details.

**9-10**  
**European DX Contest**, CW, sponsored by the Deutscher ARC, from 0000Z Aug 9 until 2400Z Aug 10. (Phone contest, Sep 13-14; RTTY contest, Nov 8-9). Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry Classes: Single operator, all band and multiplier, single transmitter. Multi-single stations must remain on a band for at least 15 minutes, except


for a quick QSY to work new multipliers. Single operators may operate a maximum of 36 hours. The 12 hours of off-time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained below). Multiply by number of EU countries worked per band. European Country list: C31 CT1 CT2 DL EA EA6 EI F FC G GD GI GJ GM GM-Sheridan GU GW HA HB HB0 HV I IS IT JW-Bear JW-Spitsbergen IX LA LX LZ OE OH OH0 OJ0 OK ON OY OZ PA SM SP SV SV5-Rhodes SV9-Crete SV-Athos T77/M1 TA-European part TF UA-1346 UA2 UA-Franz Josefs Land UB UC UN/UKIN UO UP UQ UR Y22-99/DM YO YU ZA ZB2 1A0 3A 4U1-Geneva 4U1-Vienna 9H1. The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (eg, 1300/DJ1QQ/134). A QSO may be reported only once, and not back to the originating station. A maximum of 10 QTCs to the same station is permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupes sheets must be submitted for bands with more than 200 QSOs. Deadlines: CW—Sep 15; (Phone—Oct 15; RTTY—Dec 15). Mail to WAEDC-Committee, Postbox 1328, D-8950 Kaufbeuren, Fed Rep of Germany.

**16-17**  
**New Jersey QSO Party**, sponsored by the Englewood ARA, from 2000Z Aug 16 until 0700Z Aug 17 and from 1300Z Aug 17 until 0200Z Aug 18. Phone and CW are considered the same contest. Work stations once per band and mode. CW QSOs in the CW subbands only. NJ-to-NJ QSOs allowed. Exchange signal report, serial number and QTH (county for NJ station, ARRL Section or country for others). Suggested frequencies: CW—1.810 3.535 7.035 7.135 14.035 21.100 28.100 MHz; Phone—3.900 7.235 14.280 21.355 28.610 50.50 144-146 MHz. Suggested activity schedule: phone on the even hours; 15 meters on the odd hours, 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per W/V/E QSO and 3 points for DX (include KP4, KH6 and KL7). Multiply by the number of ARRL Sections worked (including NNJ and SNJ, max 74). Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max 21) worked. Awards. Include a SASE for results and mail logs to be received by Sep 14 to EARA, PO Box 528, Englewood, NJ 07631-0528.

**New Mexico QSO Party**, sponsored by the Albuquerque Assn, from 1600Z Aug 16 until 2100Z Aug 17. Phone and CW. Work stations once per band and mode. No repeater, cross-band, cross-mode or satellite QSOs. All QSOs must include one NM station. Mobile stations may be worked once per band and mode in each county. County-line QSO counts as one QSO and two counties. Stations outside NM do not call CQ on suggested frequencies. Station classes: A—inside NM, but outside home county; B—all other NM stations and stations outside NM. Exchange RST(I) and state/province/country (county for NM). Suggested frequencies: CW—1.810 3.555 7.055 14.055 21.055 28.055; phone—1.845 3.945 7.280 14.280 21.380 28.580. Score 3 points per CW QSO and 2 points per phone QSO. Multipliers are NM counties (max 33), VE provinces (max 12), DX countries (DXCC list, except US and Canada) and states (max 47). For scoring, multiply total QSO points by total multipliers. Class A stations multiply total score by 3. Class B stations multiply total score by 2. Awards. Include summary sheet, logs and dupe sheet if more than 200 QSOs. Send entries before Sep 30 to Bob Thanisch, KN5D, NM QSO Party, PO Box 997, Corralles, NM 87048. SEANET Contest, phone. See Jul 19-20 listing.

**23**  
**WIAW Qualifying Run**

**23-24**  
**All Asian DX Contest**, CW

**GARTG World-Wide RTTY Contest**, Part 3. 

# Special Events

Conducted By Billy Lunt, KR1R  
Assistant Contest Manager, ARRL

**Maryville, Tennessee:** The Smoky Mountain ARC will operate W4OUB Jul 4, 1400Z-2200Z, in conjunction with the Blount County Homecoming '86. Suggested frequencies are 3.860 and 7.280. For QSL, send a business-size SASE to Dan Toombs, N4KZT, Rte 11 Box 364, Maryville, TN 37801.

**Kansas City, Missouri:** The Heart of America RC will operate W0RR Jul 4, 1800Z-2400Z, from the Soldiers and Sailors Liberty Memorial to celebrate the Kansas City Spirit Festival. Phone only on 7.225. The Johnson County ARC will operate W0ERH Jul 5, 1800Z-2400Z from the same location. Phone only on 7.225. For commemorative QSL, send SASE and QSL to the *Callbook* address of W0RR or W0ERH.

**Woodstock, Connecticut:** The Eastern Connecticut ARA will operate K1MUJ Jul 4, 1200Z-2100Z, to celebrate the Woodstock, Connecticut Tercentenary. Suggested frequencies: CW—40 kHz from bottom edge of 10-80 meters; SSB—center of the 10-80 General phone bands; Packet—frequency and digipeater to be announced on the W1AW BBS. For a commemorative certificate, send SASE and QSL via Tom Francis, KB1SP, 73 Second Island Rd, Webster, MA 01570.

**Hattiesburg, Mississippi:** The Hattiesburg ARC will operate W5CJR Jul 4 from the Great American Birthday Party in Paul B. Johnson State Park in observance of Independence Day. Operation will be in the lower portions of the 10-80 General phone bands. For commemorative certificate, send QSL and SASE to HARC, PO Box 15025, Hattiesburg, MS 39404-5025.

**Thompson, Ohio:** KD8FJ will operate Jul 4, starting at 1400Z from Heritage Hill Camp to celebrate the 4th of July. Operation will be in the lower edge of the 40-meter General phone band. For a nice 8- x 10-in certificate, send QSL and SASE to George Bair, KD8FJ, 386 Cedarbrook Dr, Painesville, OH 44077.

**Bath, Maine:** The Merrymeeting ARC and the Bath Jr High School RC will operate WA1VZF Jul 4, 1200Z-1900Z, during the Bath Heritage Days Celebration. Operation will be in the middle of the 80, 40 and 20-meter phone bands. QSL to George Szadis, K1GDI, 60 Oak St, Bath, ME 04530.

**Laramie, Wyoming:** The High Plains ARC will operate K7YPT Jul 4, 0000Z-2400Z, from historic Fort Laramie. Suggested frequencies: phone—3.850 7.250 14.250 21.360 28.550; CW—30 kHz from band edges. For QSL, send business-size SASE to K7YPT, PO Box T, Torrington, WY 82240.

**Rawlins, Wyoming:** The Carbon County RC will operate KD7SU Jul 4-5 from the old historic Wyoming State Prison, located on the edge of the Red Desert, to commemorate Frontier Days in Rawlins. Suggested frequencies: phone—3.910 7.280 14.285 21.385 28.525; CW—3.580 7.080 14.060. For commemorative QSL, send no. 10 SASE and QSL to Ronald Bjork, KD7SU, 406 W Walnut St, Rawlins, WY 82301.

**Clinton, Iowa:** The Clinton ARC will operate W0C'S Jul 4-5 to commemorate the 25th anniversary of Clinton Riverboat Days. Suggested frequencies: CW—3.720 7.120 21.120; phone—3.875 7.275 14.275 21.375; 2 meters—(FM) 146.460, (SSB/CW) 144.210. For certificate, send no. 10 SASE via Darryl Petersen, KD0PY, Rte 1 Box 84, Bryant, IA 52727.

**Neligh, Nebraska:** The Buzzard Roost RC will operate WB0UPK 1500Z Jul 4 until 0100Z Jul 5 from the Neligh Mills in conjunction with the Mill Days Festival. Suggested frequencies: 3.950 7.250 14.295 21.425 28.600. For QSL, send SASE to WB0UPK, 804 E 1st St, Neligh, NE 68756.

**Jamestown, Tennessee:** In celebration of Independence Day, Tennessee Homecoming '86 and Sgt Alvin C. York, KJ4HT and KJ4JE will operate Jul 5, 1500Z-2300Z. Operation will be 3.870 7.235 14.235. For certificate, send QSL and SASE via KJ4HT or KJ4JE, Main Post Office, Jamestown, TN 38556.

**Bardstown, Kentucky:** The Kentucky ARS will operate WE4K Jul 5-6, 1500Z-2400Z, to celebrate Kentucky Homecoming and the 160th birthday of composer Stephen Foster at My Old Kentucky Home State Park. Operation will be in the lower 25 kHz of the 40 and 20 General phone bands, and RTTY on 40 and 20. For QSL, send SASE to WE4K, 128 Meadow La, Bardstown, KY 40004.

**Payson, Illinois:** The Hannibal ARC will operate W0KEM Jul 5-6, 1500Z-2100Z, from the Tom Sawyer Days celebration. Suggested frequencies: phone—7.245 14.290 21.400 28.770; CW—7.125 21.125. For certificate, send 9- x 12-in SASE and QSL to W0KEM, Rte 1, Box 55A, Payson, IL 62360.

**Ripon, Wisconsin:** The Green Fox ARC will operate a special-event station Jul 12, 1500Z-2400Z and Jul 13 2100Z-2400Z to commemorate the Riponfest

celebration. Operation will be in the lower 15 kHz of the 80 and 40 General phone bands, and packet. Commemorative QSL for SASE and QSL via Green Fox ARC, Box 314, Ripon, WI 54971.

**International Peace Garden, North Dakota:** The Minot ARA will operate N0EZF 1200Z Jul 12 until 1200Z Jul 13 in the First IARU HF Championship during the 23rd International Peace Garden Hamfest. Operation will be in the General bands. For certificate, send QSL and SASE to Dave Snyder, VE4XN, 25 Queens Crescent, Brandon, MB R7B 1G1, Canada.

**San Antonio, Texas:** Special-event station W5SC will operate 1200Z Jul 12 until 0400Z July 13 and 1200Z-1800Z Jul 13 to celebrate the San Antonio Sesquicentennial. Operation will be CW and phone in the 10, 15 and 20 General bands. Send QSL and no. 10 SASE to W5SC, 90 Brees Blvd, San Antonio, TX 78209.

**Springfield, Illinois:** The Sangamon Valley ARC will operate W9DUA Jul 12-13, 1300Z-1900Z, from the Panther Creek Bowhunters Archery Range during the 1986 Illinois State Field Archery Championship Tournament. Operation will be in the General phone bands and Novice bands. For certificate, send QSL and SASE via KY9D, 3110 S 13th, Springfield, IL 62703.

**Monroe County, Pennsylvania:** The Pocono ARC will operate special-event stations Jul 12-19, 1300Z-0200Z each day, in celebration of the Monroe County Sesquicentennial. Operation will be 3.885-3.910, lower 25 kHz of the 40-10 General bands and Novice bands. For certificate, send QSL and business-size or large SASE via PARK, c/o Asher W Resh, N3EWF, Rte 7 Box 143, E Stroudsburg, PA 18301.

**Winsted, Connecticut:** The Southern CT ARA will operate KA1CFA Jul 12-20, 1200Z-0200Z each day from Camp Sequassen during the BSA CT International Camporee. In attendance will be over 3000 Scouts from the US and many other countries. Suggested frequencies: SSB—3.940 7.290 14.290 21.360 28.990; CW—3.725 7.125. QSL with SASE to Seq Alumni Assn, c/o Al Schwartz, 18 Russo Dr, Hamden, CT 06518.

**Bath, Michigan:** Special-event stations WD80EV (SSB) and W8VPC (CW) will operate Jul 17-19 to celebrate the Bath Sesquicentennial. Suggested frequencies and times: SSB—7.240 Jul 17-18 2000Z-2200Z, Jul 19 1400Z-1600Z 1700Z-1900Z and 2000Z-2200Z; CW—14.050 Jul 17 1200Z-1400Z. For certificate, send QSL and SASE to 5220 Clark Rd, Bath, MI 48808.

**Hamburg, New York:** The South Towns ARS will operate WB2ELW Jul 19, 1500Z-2100Z, to commemorate the 101st year of the burger. Suggested frequencies: 3.925 7.230 14.255. For certificate, send large SASE to WB2ELW, c/o STARS, 5084 Chapman Pkwy, Hamburg, NY 14075.

**Shickshinny, Pennsylvania:** To commemorate the 125th anniversary of the borough of Shickshinny, KS3F will operate 1500Z-2300Z Jul 19. Operation will be in the 80-20 General phone bands. Certificate for QSL and SASE via KS3F, 507 Linden St, Leesport, PA 19533.

**Wapakoneta, Ohio:** The Reservoir ARA will operate K8QYI, Jul 19, 1400Z-2100Z, and Jul 20, 1630Z-2100Z, from the Neil Armstrong Air and Space Museum to commemorate the 17th anniversary of Armstrong's walk on the moon. Operation will be on 7.280 phone. For certificate, send QSL and large SASE to K8QYL, 1105 Linden Ave, Saint Marys, OH 45885.

**Jackson, Tennessee:** The Jackson RC will operate KA4UQS Jul 19, 1300Z-2200Z, to commemorate the Tennessee Homecoming '86. Operation will be in the Novice bands and the lower 25 kHz of the General phone bands. For certificate, send large SASE to Jackson RC, 35 Eagle Cove, Jackson, TN 38305.

**Port Huron, Michigan:** The Eastern Michigan ARC will operate K8EPV Jul 19-20, 1400Z-0200Z each day, during the annual Port Huron to Mackinac Island Yacht Race. Suggested frequencies: SSR—3.870 7.235 14.235; CW—3.710 7.110. Multicolor certificate for QSL and SASE via *Callbook* address or 654 Georgia, Marysville, MI 48040.

**Beardstown, Illinois:** The Illinois Valley ARC will operate KD9UI, 1300Z Jul 20 until 0100Z Jul 21 commemorating the 25th anniversary of manned spaceflight in conjunction with the Spaceweek Event. Suggested frequencies: phone—bottom 25 kHz General bands; CW—bottom 20 kHz Novice bands. For certificate and QSL, send SASE and QSL to Bruce Boston, KD9UI, 815 E 3rd St, Beardstown, IL 62618.

**Fishers Island Sound, New York:** The Tri-City ARC will operate KA1BB Jul 20, 1300Z-2000Z, from Flar Hammock Island. Operation will be in the lower 20 kHz of the 40-15 General phone and CW bands, and

40-meter Novice band. Send QSL and SASE to Tri-City ARC, PO Box 686, Groton, CT 06340.

**Arba, Indiana:** The Grant County ARC will operate W9EBN Jul 20, 0000Z-2000Z, from the highest point in Indiana to commemorate the 17th anniversary of the first manned communication from the moon. Operation will be 10 kHz from the lower edge of the 80 and 40 General phone bands and 20 CW band. For certificate, send QSL and SASE to Clyde Brookshire, WB9FDC, 1623 W 32nd St, Marton, IN 46952.

**Sioux City, Iowa:** The Sooland ARA will operate a special-event station Jul 23-27, 2200Z-0300Z each day, from the annual Port of Sioux City Rivercade. Frequency will be 14.285. For certificate, send contact no. and 9-in SASE to Loren Barbee, WB9YOW, 1015 16th St, Sioux City, IA 51105.

**London, Ohio:** The Madison County ARC will operate WB8JGW Jul 24-26, 1400Z-2200Z, from the Miami Valley Stearn Threshers Show. Suggested frequencies: phone—3.855 14.255 21.355. For certificate, send large SASE to Larry Krist, N8CWU, 725 Cordelia Dr, Galloway, OH 43119.

**Davenport, Iowa:** The Davenport RAC will operate W0BXR 1700Z-2200Z Jul 25, 1500Z-2300Z Jul 26, 1600Z-2200Z Jul 27 during the Bix Biederbeck Memorial Jazz Festival. Operation will be phone and CW, 10 kHz from lower edge of the 80-10 General bands. For certificate, send QSL and SASE via Davenport RAC, 2131 Myrtle St, Davenport, IA 52804.

**Gilroy, California:** The Gabilan ARC will operate NN6G Jul 25-27 in celebration of the 8th annual Gilroy Garlic Festival. Operation will be 2-80 meters SSB, CW, RTTY, ATV, packet and OSCAR 10. For a special garlic-scented swatch-and-sniff QSL, certificate and literature, send QSL and 9- x 12-in SASE (3 units postage, DX 3 IRC) to Gabilan ARC, PO Box 2178, Gilroy, CA 95021-2178.

**Booneville, Indiana:** The Pike County ARC will operate W9CZH 1700Z Jul 26 until 1700Z Jul 27 in celebration of the 23rd annual Reunion and Show of the Antique Steam and Gas Engine Club at Thresherman Park. Operation will be phone and CW in the low end of the 80, 40 and 15 General bands, 40-meter Novice band operation will be 2000Z-2330Z Jul 26. Send QSL and SASE for 8- x 10-in certificate via PCARC, Rte 1 Box 311, Winslow, IN 47598.

**Greenville, Ohio:** The Treaty City ARC will operate W8UMD Jul 26-27, 1400Z-2200Z, in celebration of Annie Oakley Days. Suggested frequencies: SSB—7.255 14.285; CW—14.060. In addition there will be an operation on 3.880 0000Z Jul 27 until 0200Z Jul 28. For certificate, send QSL and business-size SASE to W8UMD, PO Box 91, Greenville, OH 45331-0091.

**Germantown, Maryland:** The Germantown Campus ARC will operate KV3S Jul 27, 1300Z-2000Z, to celebrate the 40th anniversary of Montgomery College. Suggested frequencies: SSB—7.240 14.240. Special certificate for those born in 1946 and to those who make a 40-meter contact. For certificate, send QSL and large SASE to KV3S, Montgomery College, Germantown, MD 20874.

**East Aurora, New York:** The Pioneer Radio Operators Soc will operate W2QFC Jul 27, 1400Z-2100Z, from the 12th annual Racing Day celebration of the capital of breeding and champion race horses. Send QSL and business-size SASE to W2QFC, 308 Parkdale Ave, E Aurora, NY 14052.

**New Deadline:** The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Aug 1 to make the September issue. Please include the name of the sponsoring organization, the location, dates, times (Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

**QSLing Special-Events Stations:** To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- x 12-in envelope if you want an untold certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

# Section News

Administered by Steven Ewald, WA4CMS

## The ARRL Field Organization Forum

### CANADA

**ALBERTA:** SM, Bill Gillespie, VE6ABC—A/SM: VE6AAM. SEC: Roy Ellis, VE6XC. OO: VE6TY. ST/MN/DEC: VE6ABC. Old Timers Hockey successfully completed with radio assistance by Northern Alta Radio Club. Coming events are cycle races, marathons, and summer hamfests. Alberta ARES Net continues every Sunday AM at 1530Z on 3750 MHz under guidance of George, VE6AM, in Camrose. Calgary Amateur Radio Emergency Net (CAREN) provided communications for Boy Scouts Ice stampede and Calgary Sports Car Club Rallye. Ken, VE6AFO, named Calgary Ham of the Year at annual banquet. Traffic: APSN, QNI 1304, OTC 14. Informal 85. QNI 211, QTC 56. Personal totals: VE6CHK 134, VE6BLY 133, VE6CPE 25, VE6ABC 13, VE6CCP 6, VE6EO 5.

**BRITISH COLUMBIA:** SM, H. Ernie Savage, VE7FB—B. C. Public Service Net, 3729 kHz at 0130 Z daily NM Ford, VE7DE. Checkins: High 204 Low 127 for total 5220. BCEN 3553 kHz at 200 Z 7th Floor Ast—Tom VE7BN1, QNI 910, QTC 200. Congratulations from all the members of the BCEN. Net to our new Net Manager, Ferdi Wenger, VE7EU, of Hefley Creek. Lawrence, 7AKK, went for a hike into the mountains, took the wrong turn and the search and rescue party found him next morning, tired but OK. Sid, 7SM, and XYL sorry to say they totaled their car, but lucky to have cuts and bruises. Frank, 7FFF, sorry to report Betty his wife past away. VE7EXO is in full operation with every modes of communications. Much thanks must be given to the numbers of amateurs that worked so hard in seeing its completion. Now it is up to us to see it is manned 12 hours per day for five months. Contact VE7HV, VE7ED or VE7XQ and make a date during your holidays. Please Traffic: VE7BN1 356, VE7EU 70, VE7CDF 61, VE7EJW 49, VE7KA 48, VE7FNE 42, VE7CJG 40, VE7DZ 22, VE7FB 21, VE7FSP 16, VE7BZI 8, VE7EIR 8.

**MANITOBA:** SM, Jack Adams, VE4AJE—At the time of this report, it is my understanding that Jack Ravenscroft, VE3SR, will be appealing Judge S. J. Hollinger's decision that restricts Jack from operating his Amateur Radio from his home. Jack will need all the financial support he can get from amateurs and other broadcast stations. This could be a precedent setting judgement not only for Canada but other countries. Worked VE7EXO on 20 meters, hope to work that station on all bands. Section net reports: CRRL Evening phone net, 30 sessions, 1170 QNI, 18 QTC, MWV 30 sessions, 784 QNI, 33 QTC, MTN 30 sessions, 325 QNI, 67 QTC, WR5 2 meter informational net 6 sessions, 403 QNI, individual traffic: VE4IX 51, VE4AJE 50, VE4AR 50, VE4AT 49, VE4LB 31, VE4BI 29. See you at the Peace Garden's Hamfest.

**MARITIME-NEWFOUNDLAND:** ASM, Aaron Solomon, VE1OC—Congratulations to Moncton Area Seniors on new station VE1OC. Many thanks to pleasure operating VE1FO reports VE-1 Call Book ready at Halifax-Cornwall Flea Market, 30th-31st May. Cost of new Call Book \$7.00. Mail order \$8.00 from HARC, Box 663, Halifax, N.S. Expected to attend the Flea Market incl. VE3TT and VE3WV. On vacation South incl. VE1ABV, VE1BNK, VE1CJD, New UHF FM Repeater Hfx-Dart. Area VE1EPA out 444.0/449.0 in. VE1LZ and VE1SH would like to establish Maritime Chapter, Quarter Century Wireless Association. Hospitalization—VE1CDY. Silent Keys—VE1GA, VE1MK, VP9BN.

**ONTARIO:** SM, Larry Thivierge, VE3GT—BM: VE3LST. PGL: VE3AR. SEC: VE3GV. ST/M: VE3CYR. TC: VE3EGO. The Algoma ARC sponsored a successful emergency call out exercise within the Municipality of Sault Ste. Marie. The city was declared without any commercial power. Approximately 60 amateurs were contacted within 20 minutes. This was a first for the Club, and they are reviewing the results to correct any short comings. During his recent sojourn to California, VE3KK had the pleasure of operating for a morning, from the radio room of the S.S. Queen Mary. Marshall remarked that "I never thought, that when I was copying GBTT before the war, that one day I would sit at that desk and operate GBTT rig on board". The Chatham gang is upgrading the link systems which links 2 meter repeaters in Chatham, London and Kitchener/Waterloo with new filters for the receiver and a new UHF hub repeater for use in London. The Windsor ARC has donated a trophy to the ARRL named in honor of the Club's 40th anniversary for the ARRL's DX phone contest held in March. VE3WAT is a busy repeater. Waterloo input is 146.325 and output at 146.925 MHz. Congratulations to the Peterborough ARC on becoming a CRRL affiliated Club. By the way, their Club call is now VE3RB, it was VE3AEA previously. Now's the time for your Club to become affiliated—contact CRRL Headquarters in London for details. New ORS VE3EAM informed me that in 1920 before he knew that a license was necessary, he had a Ford spark-coil transmitter on the air using the call BM (his initials). Biggest thrill was working a friend in East Toronto—all of 7 miles away. VE3POJ is a new amateur. VE3GNW has been bitten by the packet bug. Ottawa ARC home brew night judges VE3HYS VE3JUG VE3JZT peaked VE3GNW and VE3JUB as the winners in this recent Club event. Thanks to VE3EH for standing in for OPN Net Manager VE3BUO while Don and his wife ran the UK. Traffic: VE3FAS 209, VE3GSQ 148, VE3GNW 121, VE3GT 109, VE3CYR 94, VE3ORN 86, VE3DPO 71, VE3KXB 67, VE3AJN 47, VE3WG 34, VE3GOL 30, VE3WV 24, VE3WM 20, VE3EAM 17, VE3EWD 14, VE3KZC 12, VE3BAJ 8, VE3POJ 5. (Mar.) VE3FPI 6.

**QUEBEC:** SM, Harold Moreau, VE2BP—ST/M: VE2EDO. BM: VE2ALE. TC: VE2ED. A/TC: VE2CP. NM: VE2EDO. Wishing everyone a nice summer vacation. No activities were reported for April, from Clubs. Prompt retablissement a Charles, VE2EC. Le petit train du matin, VE2CAA, fonctionne a pleine vapeur. A tous de bonnes vacances. Traffic: VE2EDO 178, VE2BP 50, VE2VT 48, VE2EKC 38, VE2JN 29.

**SASKATCHEWAN:** SM, W. C. Munday, VE5WM—SEC: VE5CJ. EC: VE5AO, VE5F, VE5HG, VE5VM, VE5ACI. ST/M: VE5HG. NM: VE5EE. VE5EX, VE5HG, VE5AEM, VE5BU, VE5CJ. VE5GF. A/TC: VE5XZ. BM: VE5WM. OBS: VE5CJ, VE5JA. Hats off to the Saskatoon ARES members who assisted with the 1986 April 23rd with special thanks to VE5HG and VE5MP hamfest trustees. Prince Albert hamfest around August 9 and the International Peace Gardens July 11-12-13, 1986. Net reports: Prairie Weather Net 30 sessions 862 QNI, Regina 2-meter 29 sessions 599 QNI. Traffic: VE5BAF 19, VE5AGM 12, VE5UX 11.

### ATLANTIC DIVISION

**DELAWARE:** SM, Harold K. Low, WA3WYI—ST/M: W3DKX.

SEC: K3PFW. EC: KC3JM, KC3TI, KA3LNK, PIO: W3BDPJ. SGL: AF3R. PSHR: K3JL, W3DKX. Nanticoke APC will have Board of Directors. Congrats to KA3OIF of DARC on upgrade. AWARE members with new calls KA3PBN to N3EVK, W3LCP to N3EVO. Jim Clary, WB9IHW, will be guest speaker at AWARE June 19. They will have no meetings during summer. SARA furnished communications for Crop-Work. Those active were W3QK W3KN K3PFW W3SHKW K3OZL W3FKT K3JL W3AVIT K3JLV W3PVO K3IXY W3FEG W3WYI. K3TI is heading communications for Hands Across America. DTN Stations 383 Traffic 36 in 22 sessions. DEP/N Stations 88 Traffic 14 in 4 sessions. SEN Stations 59 Traffic 1 in 5 sessions. Traffic: W3QO 91, W3DKX 40, W3WYI 29, W3BDUG 26, K3JL 21, W3FEG 14, KC3JM 11, N3AXH 10.

**EASTERN PENNSYLVANIA:** SM, James B. Post, KA3A—ASM: KC3LM, K3ZFD. ACC: KA3A. SEC: WA3PZO. ST/M: KB3UD. OOC: N3CWD. PIO: W3AMQ. TC: W3FAF. Please direct SM correspondence to KC3LM. Do you have a technical question about Amateur Radio? Your first resource is here in EPA: our Technical Coordinator, W3FAF, welcomes questions. He and his Assistant TC's can help you. In fact, all your Section leaders will be happy to make our selves useful as well as decorative. What we don't know, we'll find out. KA3BZX and N3DSA publicize Hamburg Flg's 5th exams on area repeater nets. If your group tests regularly, why not send the sked to KC3LM for EPA FEEDLINE, the quarterly sent to Section and Station appointees and Affiliated Clubs. I'd also like to build a list of Novice and upgrade classes for sectionwide reference. Tamaqua Area ARA's 1986 officers are W3VA, K3BWE, K3ZQ, and W3EEK. Mobile Sifers heard W3FTZ speak on weather satellites. Frankford RC elected K3WW, NF2L, KT3M and N3ARK officers for 1986. Listen for Pocono ARK's special event station July 9-12 during the Monroe County Sesquicentennial. Tamaqua Transmitting Society's 1986 officers are W3ACN, K3SRQ, W3CMA, W3TI, and K3NYX. Owing to re-organization, station calls may now sit down. Ohm's Law will be known as Ohm's Flat Mile idea, and alternating current won't have to it if it doesn't want to. W3BUR and W3CRK gave demos for Boy Scouts and an elementary school science class in Quakertown. Several photos by KA3NMX in ARRL's new ARES folder come from the 1985 National Disaster Medical System drill in our Section. Suburban APC president WA3IAO's in one, with DEC KA3OYV and ASM KC3LM in another. With much help from WA2HEB (SM/SNJ), EPA hosted April's Atlantic Division Cabinet meeting. Many thanks to the Assistant Directors from EPA who shared their long experience with us. Let's keep alert for proposed local ordinances affecting Amateur operations in any way, intentionally or not. We need early response. Remember, you can always call on your Section leadership for backup—and we have a chain of support going all the way to our Director and ARRL HQ. N2BSK is now an Official Relay Station. Net reports and station traffic figures should be in KB3UD's hands by the 8th of the month so he can get the BPL and PSHR info to QST on time. QNI/QTC for March Section Nets: EPA 527/126, EPAEPTN 550/203, PTTN 307/86. Local Nets: D2ARES 90/0; D3ARES 164/12; D5SEN 89/12; D4ARES 69/0; D6ARES 39/0; MARC ARES 97/7; MARCNT 181/42; PW ARES 133; NSCOV 145; N3CQ 145; KA3OLY 11; KA3IME 109; KU3R 102; KB3UD 83; W3ACN 62; W4UJO 55; W3KAG 50; KB3FW 46; KA3JOI 42; W3JKX 40; W3TWV 34; W3ADE 24; WA3CKA 22; K3TX 22; W3CL 19; WA3WQP 15; W3FAF 12; N3EFW 12; W3VA 9.

**MARYLAND—DC:** SM, John A. Barolet, KJ3E—KC3LM, ASM of the EPA section, sent their fine section newsletter, EPA FEEDLINE, to KJ3E. I'll mail a copy to anyone seriously interested in writing one for MDC. Printing and distribution can be arranged. Recently an active MDC public service radio amateur suggested we were being "exercised to death" with demands for our services. He had a point! Some ARES groups are being asked to provide more and more services, so the members are busy most weekends. That is too much! Suggestions: 1. As a group, sometimes provide only the most essential services requested, thus reducing the number of essential services required; 2. Divide the group into sub-groups, not all of which respond to each request for service, except in real emergencies; 3. As an individual, say NO once in awhile. Let's not wear ourselves out! And on that subject, KJ3E finds it beyond his capacity to respond to all the requests for his SM services, so he works at the job two to four hours each day and what gets done, gets done! SEC K3RXX reports four new ECs: WB3EFG Baltimore City County, KX3J Worcester County, K3TKJ Dorchester County, and KA3MRX Somerset County. That puts ECs in 23 of the 27 districts of Maryland and DC, a big improvement over recent years. More packet stations activating. ASM N3EGF, SEC K3RXX and 6-7 ECs now operating. And MDC operators are typing packet operations to the section traffic nets daily. W3FAF added a new synthesized two-meter all-mode rig to the shack. KC3NS upgraded to extra and a new call of NA3Q. KC3TS also upgraded to extra and awaits his new call. Congrats to both. The Maryland Emergency Phone Net (MEPN) annual picnic will be at Cedarville State Park, Brandywine, Maryland, about 20 miles southeast of Washington, DC, all day on July 13. In addition to the membership and their guests, all radio amateurs interested in emergency operation and/or traffic handling, using any mode, are invited. Info from KA3CDD, W3FA or KJ3E. Val come, hear BARRC has created an emergency callup tree for Baltimore metro members and MAVEP has been reactivated. MDD BRASS: W3FA129, W3OQ100, N3EGF/67, KC3Y/65. NETS: Net/Mgr QND/QTC/NI: MDD/W3FA 61/205/488, MEPN/WA2ERT 31/180/806, MSN/KC3Y 30/58/493, PONS/WB3BFF 22/16/242, FRED-CARES/K3RXX 41/2/63, MDCPON/W3OYV 4/3/52, W2M/MK3SDW 5/2/94, PSHR: W3FA 118, N3EGF 109, WA2ERT 103, K3RXX 93, KJ3E 80, KC3Y 78, W3GYW 74. Traffic: W3FA 149, N3EGF 124, KJ3E 109, KC3Y 104, KC3DW 49, K3NNI 83, N3DE 71, WA2ERT 82, KC3AV 55, K3RXX 41, W3ZD 32, JA3C 31, N3RC 25, KT3T 25, WB3BK 23, W3WD 20, W3VQG 14, W3DQJ 12, W3FZV 12, N3EGE 8, KC3FK 6, WA2VDT 5, WA3VPL 2, KB3QV 1.

**SOUTHERN NEW JERSEY:** SM, Richard Baier, WA2HEB—SEC: K2QJL, ST/M: WB2JVB, ACC: K2XIE, TC: VACANT, PIO: VACANT, SGL: KA2KMU, BM: WB2UBV, OOC: WA2HEB, A/TCs: N2BOT, K2JF and KA2RJA. Recently, I made a request to the League for mailing labels in conjunction with a section newsletter that you should have received by now. Before doing anything else, I entered the names, addresses, cities, states, zip codes and types of membership for each ARRL member

in our section into my PC. This took, all told, about 3 days and 100 finger cramps. My hope is to be able to let clubs have access to this information. For instance, say your club has a membership drive going and would like to have a listing of League members in a certain area. Or, your club is getting together a novice training class and would like to know how many Associate Members (non-hams) are in an area. These are but a couple of areas the information I've compiled can be used. If your club is interested, please have your club president get in touch with me. In order to prevent this information from being used for profit or some other non-ham use, I will only release information from the section data base to club presidents, or designated club officers. I hope you'll use the data base to the fullest extent possible. 73. Traffic: NG2T 51, N2FIZ 49, W2JML 45.

**WESTERN NEW YORK:** SM, William M. Thompson, W2MTA—April was a sparkler of a month, what with Spring and Summer both present. THANKS to KC3LM and WA2HEB who made all preparations for the Atlantic Division Cabinet Meeting 2 at Plymouth Meeting PA. Many subjects in the future of the Field Organization were addressed, including liability and that old and popular subject "ability". HAMFEST CALENDAR: Batavia (at Alexander) July 13, Traffic Handlers at Verona August 9, Finger Lakes at Trumansburg August 23, National at San Diego Sept. 6, HAM-O-RAMA at Niagara Falls Sept. 6, Elmira at Horsheads Sept. 27, Syracuse at State Fair Grounds Oct. 18.

NYSEMO	3933	087-004-04	NYSR	3530	029-004-04
NYSIM*	3877	356-176-30	NYSIF*	3671	406-378-30
WDNWM*	0464	350-089-30	JCARC	10730	350-012-28
Mike	Farfad	274-039-30	LCARES	A/15	039-000-04
NYPON*	3913	669-274-30	OARCN	28788	052-002-25
NYSPTEN	3925	574-046-30	NYTN	3720	121-022-09
ESS	3590	389-054-30	BRVSN	1655	336-004-30
Q Net	3191	356-005-30	CNNTN*	90320	239-066-30
OCTENE*	184	731-118-30	OCTENI*	188	215-005-09
STARH	13773	189-045-30	Mohawk	VTN	013-045-09
BlueLine	135	168-032-25	VHF THIN	164	037-000-04
WDNE*	5717	549-167-30	WONL*	04624	515-115-30
			NYSL*	3677	300-189-30

\*NTS Net Public Service Honor Roll: W2DAFI KG2D KA2DQA N2EVG/T WA2FJJ VE2FMQ NN2H WB2DJS W2MTA WB2NLU/T WB2QWO ND2S K2YAI W2ZJO. REPORTS: (OBS) WB2DSR, WA2ZPE, K2KWK with bulletins Tues. 1930 on 145.31 and Sun. 2045 on 146.79/88. COMMS: Auburn March of Dimes Walk-W2CDS. Orleans County Ronald MacDonald House Service-WA2AIV. NOVICES: BARRC hatched a brood of 11 from class of 21. There are more out there, does your Club have a project to conduct Novice entry classes? Why not? STARC Hamfest VE Team had a big turnout and passed 56 per cent. NICE Going! APPTS: (EC) KA2CBQC-Herkimer, KA2OTS-Jefferson. Thanks to W2GLH for past services as EC in Jefferson. CLUB OFFICERS: Allegany Highlands NG2O WA2RPO K2UOB WB2SQX; Auburn N2DTG

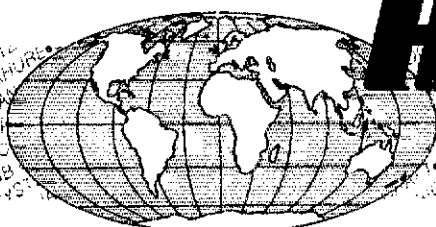
# QST

## advertisers

Advertising is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products are accepted for advertising by the technical staff of the ARRL.

**Amateurs and Electronic Engineers: Practically everything you need can be supplied by the advertisers in QST. And you will know the product has the approval of the League's technical staff.**

**NOW! FASTER SERVICE FOR OUR EASTERN CUSTOMERS.**



# HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

## 7 STORE BUYING POWER

### KENWOOD TS-940S

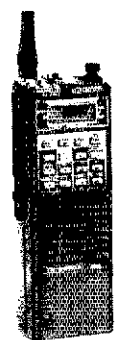


TOP-OF-THE LINE HF TRANSCEIVER  
**GREAT PRICES. CALL**

### KENWOOD HAND-HELDS

#### TH-21AT/41AT

Compact. Only 2.4"W, 4.74"H, 11"D. Outstanding performers in an ideal package size.



**TR-2600A**  
Deserves its well-earned reputation as the leading HT

**CALL FOR PRICE**



### ELH-230D

2 METER  
3 IN/30 OUT



**WE SHIP DIRECT TO YOU FROM ANY ONE OF OUR NATIONWIDE OUTLETS.**



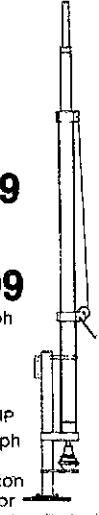
**MA-40**  
40' TUBULAR TOWER  
\$745 **SALE! \$549**

**MA-550**  
55' TUBULAR TOWER  
\$1245 **SALE! \$899**

- Handles 10 sq. ft. at 50 mph
- Pleases neighbors with tubular streamlined look.

#### TX-455

- 55' FREESTANDING CRANK-UP
- Handles 18 sq. ft. at 50 mph
- No guying required
- Extra-strength Construction
- Can add raising and motor drive accessories



**IN STOCK FOR QUICK DELIVERY OTHER MODELS AT GREAT PRICES**

### ICOM IC-2KL



**LINEAR AMPLIFIER**  
• Auto Band Switching  
• Broadbanded  
• HF 500 Watt Linear

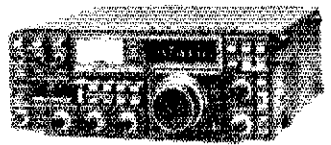
**AT GREAT LOW, LOW PRICES**



### YAESU HANDHELD FT 209RH

5 WATT 2M/HT  
**CALL FOR PRICE**

### ICOM IC-751A



TOP-OF-THE LINE HF TRANSCEIVER  
**SPECIAL NEW PRICE!**



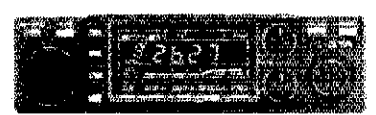
### W-51 TOWER SALE

51' CRANK-UP 9 SQ. FT. WINDLOADING

**\$899**

Limited Quantities Available

### ICOM IC-37A



- IC-27A** (25W,2M,FM)
- IC-27H** (45W,2M,FM)
- IC-37A** (25W,220MHz,FM)
- IC-47A** (25W,70cm,FM)

**GREAT PRICES. CALL**



**All Major Brands in Stock Now!**

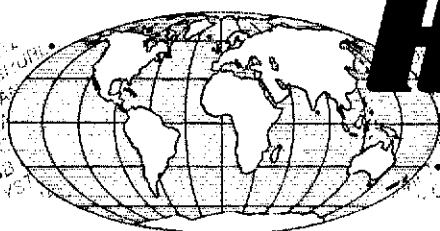
**CALL TOLL FREE (800) 854-6046**



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



NEW ATLANTA STORE!  
EASY SERVICE FOR  
OUR EASTERN CUSTOMERS



# HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

## 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



**LATEST EDITION**

**ICOM**

**IC-1271A**



1.2 GHz Transceiver:  
The First Full-featured  
1240-1300 MHz Transceiver  
**AT GREAT LOW, LOW PRICES**

**ICOM**

**IC-28A/28H**

**NEW**



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

**SPECIAL NEW PRICE!**

**NOW! RAPID DELIVERIES FROM OUR OUTLETS**

**COAST TO COAST**

To Our Customers

**ICOM**

**HAND-HELDS**

**VHF/UHF**



IC-02AT  
IC-04AT

IC-2AT  
IC-3AT  
IC-4AT

**WE SHIP DIRECT TO YOU FROM ANY ONE OF OUR NATIONWIDE OUTLETS.**

**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**



**Bob Ferrero W6RJ**  
President  
**Jim Raftery 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 SF9

**OAKLAND, CA 94606**  
2210 Livingston St.  
(415) 534-5757  
Joe, Mgr. K5OS  
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  
Glenn, Mgr. K6NA  
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**



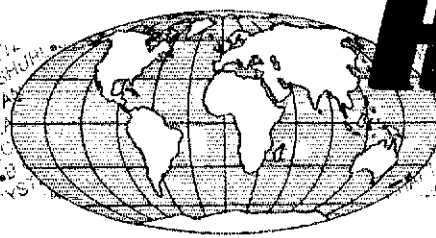
# CALL TOLL FREE (800) 854-6046

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



WORLDWIDE DISTRIBUTION

**NEW ATLANTA STORE!**  
EASY SERVICE FOR  
OUR EASTERN CUSTOMERS

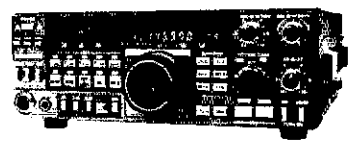


# HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

## 7 STORE BUYING POWER

**KENWOOD  
TS-711A TS-811A**



Ideal VHF/UHF base stations for 2M/70CM transceiver operation.

**GREAT PRICES. CALL**

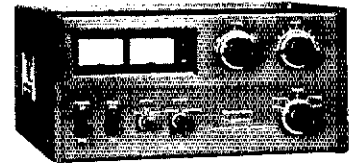
**KENWOOD  
TS-940S**



TOP-OF-THE LINE HF TRANSCEIVER

**CALL FOR LOW, LOW PRICE**

**KENWOOD  
TL 922A**



2 KW PEP LINEAR AMPLIFIER  
Pair of EMAC 3-500Z Tubes

**KENWOOD  
TS-440S** **NEW**



HF TRANSCEIVER  
• 160-m to 10-m Amateur Band  
• 100-kHz to 30-MHz General

**SPECIAL NEW PRICE!**

**NOW! RAPID DELIVERIES  
FROM OUR OUTLETS**



**To Our Customers**

**KENWOOD  
TM-2570**



FIRST COMPACT 70W/2M FM MOBILE TRANSCEIVER

**IN STOCK FOR IMMEDIATE DELIVERY**

**KENWOOD  
TR-751A** **NEW**



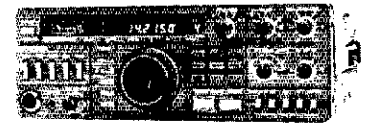
COMPACT 2-METER ALL MODE TRANSCEIVER  
**SPECIAL NEW PRICE!**

**KENWOOD  
TM-3530A** **NEW**



The First Comprehensive 220 MHz FM Transceiver.  
**SPECIAL NEW PRICE!**

**KENWOOD  
TS-430S**



HF Transceiver  
**CALL FOR LOW, LOW PRICE**



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

## All Major Brands in Stock Now!

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

**ATLANTA, GA 30340** **NEW**  
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 SFU

**OAKLAND, CA 94606**  
2210 Livingston St.  
(415) 534-5757  
Joe, Mgr. K6OS  
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) 580-4300  
Glenn, Mgr. K6NA  
Hwy. 163 & Claremont Mesa Blvd.

**VAN NUYS, CA 91401**  
5265 Sepulveda Blvd.  
(818) 988-2212  
Al, Mgr. K6YRA  
San Diego Fwy.  
at Victory Blvd

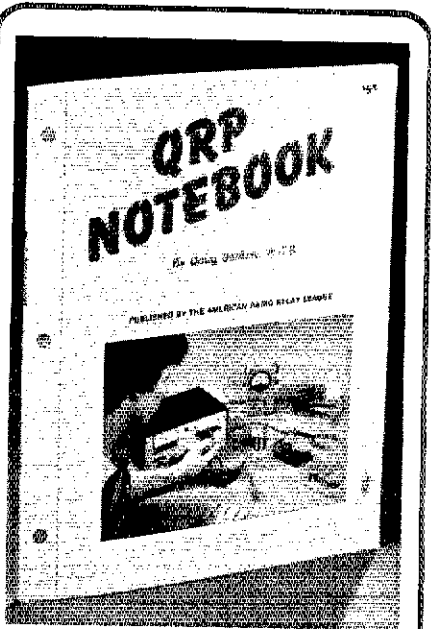
**STORE HOURS**  
10 AM-5:30 PM  
**CLOSED SUNDAYS**



# CALL TOLL FREE (800) 854-6046

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





## Doug DeMaw's QRP Notebook!

Doug DeMaw, W1FB, has been writing articles about QRP operating and equipment construction for many years. In this ARRL publication, Doug presents construction projects for the QRP operator, from a simple one-watt crystal-controlled transmitter to more complex transceiver designs. Rather than simply presenting a collection of completed units, Doug guides you through the project "building-block" style. This way, you gain an understanding of how the circuits operate and learn how the building blocks might be put together in other configurations.

Experimentation and low-power operating go hand in hand. Construction of a complete modern transceiver is a major undertaking, but some of the circuits in this book can be put together in an evening or a weekend from a few dollars' worth of parts. Once built, the equipment can be tested and improved as your understanding and skill grow. Many of the simpler circuits can be used later as parts of the more complex projects.

The QRP Notebook contains 112 pages. #0348, copyright 1986, \$5.00, plus \$2.50 postage and handling (\$3.50 for UPS).

THE AMERICAN RADIO RELAY LEAGUE  
225 MAIN ST.  
NEWINGTON, CT 06111

# CUT YOUR LOSSES

Portable radios can be a trade-off. In return for mobility you get loss of performance.

Well now you can cut your losses significantly. All you need is the new Larsen UHF KūLDUCKIE® KD14-HW half-wave antenna.\* It's a mouthful but it'll do your ears a lot of good.

Because it's half-wave, the KD14-HW is fully resonant despite the poor ground plane portables are faced with. Under ideal ground plane conditions, it delivers performance equal to a full quarter-wave. And that's a powerful improvement over most portable antennas!

And because it is inherently resonant, the KD14-HW can also be easily remoted with a length of coax.

The KD14's flexible, easy-to-get-along-with radiating element measures a scant 12 inches. At the base is a 3/4 inch impedance transformer that gives added strength.

The KD14 half-wave series is also available in a collapsible 2-meter version.

Cut your losses and improve your gain when you operate with the new Larsen UHF KūLDUCKIE® KD14-HW, with no-nonsense warranty. You can see it at your favorite amateur dealer.

\*For units with BNC output.



## Larsen Antennas

The Amateur's Professional™

See your favorite amateur dealer or write for a free amateur catalog.

IN USA: Larsen Electronics, Inc. / 11611 N.E. 50th Ave. / P.O. Box 1799 / Vancouver, WA 98668 / 206-573-2722  
IN CANADA: Canadian Larsen Electronics Ltd. / 149 West 6th Ave. / Vancouver, B.C. V5Y 1K3 / 604-872-8517

LARSEN® KūLROD® AND KūLDUCKIE® ARE REGISTERED TRADEMARKS OF LARSEN ELECTRONICS, INC.

# *Kantronics Introduces* **2400 BAUD PACKET**

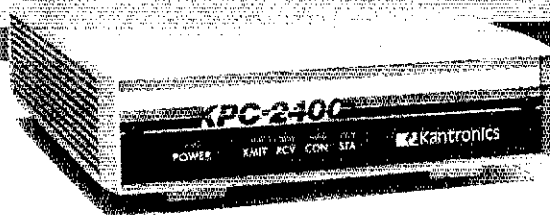
***Not Just For All Computers  
But For All TNC's Too!***

## **WHY 2400 BAUD?**

Packet channels are congested, and faster is better. So Kantronics has designed a 2400 baud PSK (phase shift keying) modem and included it in an all new KPC-2400. In addition, we are making this modem available in PC-board form to add to your TNC-1 or TNC-2, cables included! If you have a KPC-1 or KPC-2, we'll take it in trade for a new KPC-2400.

Since October 28, 1982, the rules have allowed for baud rates up to 19.6K. Of course, we've

all been operating at 1200 baud with Bell 202 (1200 baud) standard tones. However, the bandwidth of our radios is fully capable of running up to 2400 baud, giving us congestion relief. Our phase shift modem (PSK) takes advantage of the bandwidth available and the reasonable linearity of the audio channels, and it is designed with the V.26TER CCITT specification in mind. To add to your TNC or trade for a new KPC-2400, see facing page.



## **KPC-2400**

***All the Features of KPC-2  
Plus 2400 Baud***

### **KPC-2400 Features**

- AX.25 version 2 software
- Supports multiple connects
- All EPROM software is Kantronics written and U.S. copyrighted
- Advanced software HDLC, eliminating expensive chips
- In-house programmers/engineers
- In-house service representatives
- Periodic updates  
— we keep you on the air

When we set out to design the KPC-2400™, we wanted it to be compatible with existing units, and it is. The KPC-2400 features 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. All modes are software selectable with HBAUD command!

In addition, we've retained the RS-232/TTL jumper for easy direct interface to PC compatibles or the VIC/C-64 series. Hence, with the KPC-2400 you get HF, VHF, and 2400 baud packet with all computers that have a serial port, all in one!

The KPC-2400 of course, retains the version 2 software with multiple connects, and we've included an on-board memory diagnostic routine too.

*Suggested Retail \$329.00*





# ARRL BOOKSHELF

Prices are subject to change without notice. Shipping and handling: add \$2.50 for book rate or \$3.50 for UPS. Payment must be in US funds.

ARRL, 225 MAIN STREET, NEWINGTON, CT 06111

## THE ARRL HANDBOOK

1186 pages and 40 chapters make this the most comprehensive edition since the *Handbook* was first published in 1926. It is updated yearly to present the cutting edge of rf communication techniques while presenting hundreds of projects the average Amateur Radio operator can build.

Paper #0631 \$18 US, \$19 elsewhere. Cloth #1638 \$27 US, \$29 elsewhere

The 63rd edition is packed with information on digital communication modes as well as new power supplies, amplifiers, and a digital PEP Wattmeter. Ready-to-use etching patterns are provided for many projects. This *Handbook* belongs in every ham shack.

## ANTENNA BOOKS

**THE ARRL ANTENNA BOOK** represents the best and most highly regarded information on antenna fundamentals, transmission lines, and propagation. There are practical construction details of antennas for 160-meters through microwaves, and those for mobile or restricted space use. Covers use of Smith charts and equipment for antenna and transmission line measurements. 328 pages copy-right 1982.

Paper #4149 \$8 US, \$8.50 elsewhere  
Cloth #0038 \$12.50 US, \$13.50 elsewhere

**ANTENNA COMPENDIUM** Packed with new material on quads, yagis and other interesting topics.

©1985 178 pages #0194 \$10 US, \$11 elsewhere

**HF ANTENNAS FOR ALL LOCATIONS**

G6XN's look at antennas with practical construction data.

©1982 264 pages #R576 \$12

**YAGI ANTENNA DESIGN** a new book published by ARRL coming soon! Watch **QST** for details.

## OPERATING

**The ARRL Operating Manual** 192 pages packed with information on how to make the best use of your station including: interfacing home computers, OSCAR, VHF-UHF, contesting, DX traffic/emergency matters and shortwave listening.

\*1985 2nd ed. #1086 \$7 US, \$7.50 elsewhere

**The RSGB Operating Manual** The third edition published in 1985 is packed with practical operating tips, techniques and tables.

#R69X \$10

**The ARRL Repeater Directory** . . . . . #0267 \$3

**The ARRL Net Directory**-free shipping . . . #0275 \$1

**Radio Amateur Callbook** pub. 12/1/85

North American Ed. . . . . #C086 \$21

International (outside N. American) . . . #C186 \$20

## PACKET RADIO/COMPUTERS

**Computer Networking Conferences 1-4** from 1981-1985. Pioneer Papers on Packet Radio #0224 \$18.

**RSGB Amateur Radio Software** Contains 86 BASIC programs, 6 in assembly language covering CW, RTTY, Amtor, Packet, Antenna Design, Satellite Predictions, Distances, Bearings and Locators.

©1985 328 pages, hardbound #R711 \$15

**5th Computer Networking Conference Papers**

©1985 . . . . . #033X \$10

**AX.25 Link Layer Protocol** . . . . . #0119 \$8

## DX

**The Complete DX'er** by W9KNI covers all aspects of the DX'er's life both in and out of the pile-ups: listening, the chase, capture and quest for elusive QSL cards. #0283 \$10 US, \$11 elsewhere

**DX Power** by K5RSG . . . . . #T740 \$10

**DXCC Countries List** - free shipping . . . #0291 \$1

## QRP

**QRP Notebook** by Doug DeMaw, W1FB. An exciting book for the low power enthusiast and experimenter. There are many useful construction projects described. Copyright 1986, 112 pages . . . #0348 \$5

## OTHER ARRL PUBLICATIONS

**Fifty Years of ARRL** . . . . . #0135 \$4

**GIL: Collection of cartoons from QST** . . #0364 \$5

**Instructor Guide-Novice** . . . . . #0305 \$4

**Instructor Guide-Tech./General** . . . #0313 \$6

**Oscarlocator** . . . . #3037 \$8.50 US, \$9.50 elsewhere

**ARRL RFI Book** . . . #4254 \$3 US, \$3.50 elsewhere

**200 Meters and Down** . . . . . #0011 \$4

**The Satellite Experimenter's Handbook** by Martin Davidoff, K2UBC. Packed with information on amateur satellites and how to communicate through them. 208 pages, copyright 1985

#0046 \$10 US, \$11 elsewhere

**FM and Repeaters** . . . . #4548 \$5 US, \$5.50 elsewhere

**Understanding Amateur Radio**

. . . . . #6036 \$5 US, \$5.50 elsewhere

**Field Res. Directory** . . . . . #0321 \$10

## OTHER RSGB PUBLICATIONS

**RSGB VHF/UHF Manual** . . . . . #R630 \$17.50

**RSGB Radio Communications Hdbk.** . . #R584 \$22

**RSGB Teleprinter Handbook** . . . . . #R592 \$21

**RSGB Test Equipment** . . . . . #41X \$11

**RSGB Data Book** . . . . . #R673 \$15

**RSGB Microwave Newsletter Col.** . . . #R000 \$10

## PASSING POWER! - THESE PUBLICATIONS WILL HELP YOU THROUGH THE EXAMS

Beginning with **Tune in the World with Ham Radio** for the Novice and progressing through the critically acclaimed **ARRL License Manual Series** for the Technician through Extra Class; you will find passing each exam element a snap! There are accurate text explanations of the material covered along with FCC question pools and answer keys. The latest edition of **The FCC Rule Book** is invaluable as a study guide for the regulatory material found on the exams and as a handy reference. Every amateur needs an up-to-date copy. **The ARRL Code Kit** has a booklet and two C-60 cassettes to take you from 5 to 13 WPM quickly. **Morse Code the Essential Language** has tips on learning the code, high speed operation and history. If you have a Commodore 64™ or C 128 computer, **Morse University\*** provides hours of fun and competition in improving your code proficiency. **First Steps in Radio** from **QST** presents electronic principles for the beginner.

\*MORSE UNIVERSITY is a trademark of AEA, Inc.

## ADVENTURE

Tommy Rockford, K6ATX is back on the trail of high adventure! In **Death Valley QTH**, what starts as a typical field day operation becomes a matter of life and death for K6ATX and the Santa Bonita Amateur Radio Club. **SOS at Midnight** finds Tommy up against the Purple Shirt Mob and ham radio saves the day! The beachcomer seemed like a harmless character, but what did he have to hide in **CQ Ghost Ship?** Underwater adventure and ham radio join together to form the exciting conclusion to **DX Brings Danger**. Coming soon is a fifth ham radio adventure, **Grand Canyon QSO**.

**Tune in the World with Ham Radio 1986 edition**  
Kit with book and cassette . . . . #0232 \$10  
Book only . . . . . #0240 \$ 7

### License Manual Series

Technician/General Class . . . . #0143 \$ 5

Advanced Class . . . . . #016X \$ 5

Extra Class . . . . . #0178 \$ 5

FCC Rule Book . . . . . #0216 \$ 4

### Code Proficiency

Code Kit . . . . . #5501 \$ 8

Morse University . . . . . #0259 \$40

### C-60 Code Practice Cassettes

30 min. each at 5 and 7½ WPM\* . . . #1030 \$ 5

30 min. each at 10 and 13 WPM\* . . . #1040 \$ 5

30 min. each at 15 and 20 WPM . . . #2050 \$ 5

\*Same tapes included in *Code Kit*

**Morse Code: The Essential Language** covers

sending, receiving, high speed operation and

history ©1986 . . . . . #0356 \$ 5

**First Steps in Radio** . . . . . #2286 \$ 5

The author of this series is Walker Tompkins who is K6ATX in real life. He is noted screenwriter, newspaper columnist, historian and biographer. His knowledge of the areas where these stories take place makes them even more true-to-life. You'll want to read all of these classics in Amateur Radio fiction.

**SOS at Midnight** . . . . . #5005 \$ 5

**CQ Ghost Ship** . . . . . #5013 \$ 5

**DX Brings Danger** . . . . . #5021 \$ 5

**Death Valley QTH** . . . . . #503X \$ 5

**Grand Canyon QSO** Available soon.

# MEMBERSHIP SUPPLIES

- Bumper Sticker**  
"Amateur Radio—A National Resource" ..... #1010 \$ 2.00
- The ARRL Flag**  
3 x 5 Cloth Flag ..... #1060 \$21.00  
Pin ..... #1070 \$ 2.50  
License Plate ..... #1080 \$ 5.00  
Cloth Patch ..... #1090 \$ 5.00
- Amateur Radio Emergency Service**  
Black and Gold Sticker 2/pkg. .... #1100 \$ 0.50  
Red White and Blue Sticker  
per package of 2 ..... #1105 \$ 0.50  
Black and Gold Decal 5/pkg. .... #1110 \$ 1.00  
Red White and Blue Decal  
per package of 5 ..... #1115 \$ 1.00  
Black and Gold Patch ..... #1120 \$ 2.50  
Red White and Blue Patch ..... #1125 \$ 2.50
- Member 5" Diamond Decal**  
per package of 2 ..... #1130 \$ 0.50  
Life Member Decal 2/pkg. .... #1135 \$ 0.50
- Cloth Patches**  
3" ARRL Diamond ..... #1140 \$ 1.00  
5" ARRL Diamond ..... #1150 \$ 2.00  
Life Membership goes with 3" ARRL Diamond ..... #1160 \$ 1.00  
Life Membership goes with 5" ARRL Diamond ..... #1170 \$ 1.25
- Membership Pins**  
Membership ..... #1180 \$ 2.50  
Replacement Pin for Life Membership ..... #1190 \$ 2.50  
League Appointee (state title) ..... #1200 \$ 2.50
- Charms**  
Membership ..... #1210 \$ 2.50  
League Appointees (state title) ..... #1220 \$ 2.50
- Banner 14" x 16" gold with ARRL Diamond** ..... #1230 \$ 7.50
- Life Membership Plaque** ..... #1240 \$25.00
- Member Stationery**  
50 pieces of stationery and envs. .... #1460 \$ 8.00  
50 pieces of stationery ..... #1465 \$ 4.00  
50 envelopes ..... #1470 \$ 5.00
- Log Books**  
8½ x 11 Spiral ..... #1250 \$ 2.50 U.S.  
\$ 3.50 Elsewhere  
Mini-Log, 4" x 6" ..... #1260 \$ 1.00 U.S.  
\$ 1.50 Elsewhere
- 3-hole Loose Leaf, 96 8½ x 11 sheets ..... #1265 \$ 3.00
- Maps and Atlases**  
U.S. Call Area ..... #1270 \$ 3.00  
World Map—full color great circle map centered on the United States ..... #1280 \$ 8.00  
Grid Locator (US and Canadian Grid Squares) ..... #1290 \$ 1.00  
ARRL World Grid Locator Atlas ..... #1475 \$ 4.00  
Polar Map (for OSCAR) ..... #1300 \$ 1.00
- For Traffic Handlers:**  
Message Delivery Cards per package of 10 ..... #1310 \$ 0.50  
Message Pad with 70 sheets ..... #1320 \$ 1.00  
Message Pad with 70 sheets per package of 3 ..... #1330 \$ 2.50
- Antenna and Transmission Line Design Aids**  
Standard Smith Charts per package of 5 sheets ..... #1340 \$ 1.00  
Expanded Smith Charts per package of 5 sheets ..... #1350 \$ 1.00  
Antenna Pattern Worksheets 100 8½ x 11 sheets ..... #1360 \$ 3.00
- QST Binders**  
8½ x 9½ for QST 1975 and prior ... #1370 \$ 9.00  
8½ x 11 for QST 1976 and after ... #1380 \$10.00
- Apparel**  
Blue tie with ARRL diamond imprint ..... #1390 \$12.00  
Maroon tie with ARRL diamond imprint ..... #1400 \$12.00  
Scarf ..... #1410 \$ 6.00
- Video Tapes**  
SAREX WOORE/Challenger VHS ... #1420 \$25.00  
SAREX WOORE/Challenger U-Matic ..... #1430 \$35.00  
Amateur Radio's Newest Frontier VHS ..... #1440 \$25.00  
Amateur Radio's Newest Frontier U-Matic ..... #1450 \$35.00

# INVITATION TO MEMBERSHIP



**JOIN TODAY!** Take advantage of these membership benefits: **QST** The interesting, lively way to keep on top of everything that is happening in Amateur Radio: Coverage of regulatory developments; Washington news; operating — DX, VHF-UHF, and repeaters, OSCAR, SSTV, RTTY; new youth column; lists of hamfests where you can meet local hams, hear interesting talks, and possibly find a bargain at a fleamarket; and you will find technical articles aimed specifically at the beginner's level. **W1AW** is the voice of ARRL. This station transmits daily code practice sessions and regular bulletins. **LOW COST INSURANCE** for your ham gear. **OTHER SERVICES:** Outgoing QSL Bureau, Operating Awards, Amateur Radio Emergency Service, Field Organization and much, much more! The League is a **democratic organization**, of, by and for its members. The members determine policies of the League through the Board of Directors which is elected directly by the membership. The League is **YOU!**

## DUES ARE YOU AGE 17 OR YOUNGER? ARE YOU THE OLDEST LICENSED AMATEUR IN YOUR HOUSEHOLD?

	U.S.	Elsewhere
1 Year	\$25	\$33
2 Years	47	63
3 Years	65	89
Amateurs who are age 65 or over with proof of age:		
1 Year	\$20	\$28
2 Years	37	53
3 Years	50	74

If you answered "YES" to both questions then these special rates apply: Age 13-17 \$12.50. Age 12 and younger \$6.25. Evidence of your date of birth is required. Attach a copy of your birth certificate or have your parent or guardian certify your date of birth. A list of all other amateurs in your household is required. Family memberships, club commissions and rebates and multiple year rates do not apply.

**Family Membership** An immediate relative of a full dues paying member may become a family member without **QST** for \$2 per year.

----- USE THIS FORM OR PHOTOCOPIY -----

**ORDER BLANK** Shipping and handling charges do not apply to membership, the *DXCC List* or *Net Directory*, or membership supply items. Please allow 1 week for us to receive your order, 1 week for processing and 1 to 3 weeks shipping time after your order leaves ARRL.

<input type="checkbox"/> YES! Sign me up for membership at the rate shown above:			
Product #	Quantity	Title	
Shipping/Handling <input type="checkbox"/> Parcel Post or Book Rate \$2.50 <input type="checkbox"/> UPS \$3.50			
Payment must be in U.S. Funds drawn on a U.S. bank			TOTAL

6/86

Charge to  VISA  Mastercard  AMEX

Name \_\_\_\_\_

Call \_\_\_\_\_ Card Number \_\_\_\_\_

Street \_\_\_\_\_ Card good from \_\_\_\_\_

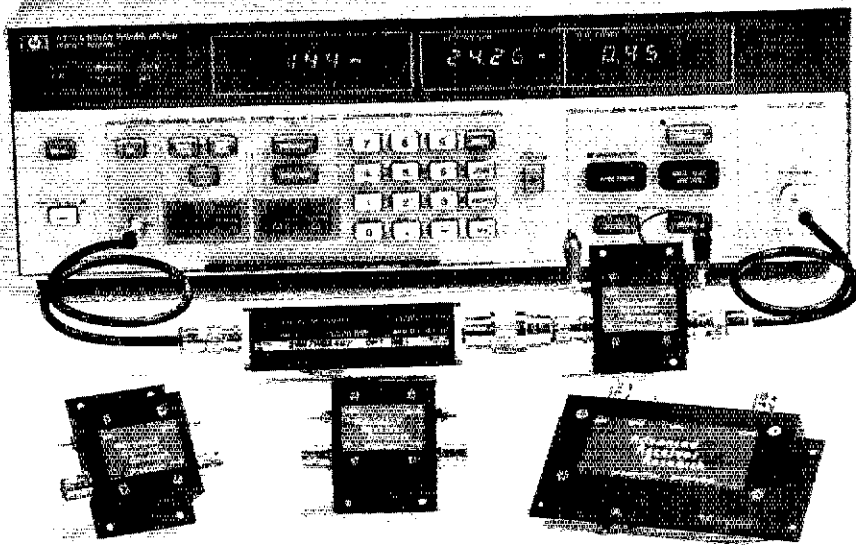
City \_\_\_\_\_ Card good to \_\_\_\_\_ Expiration Date \_\_\_\_\_

State/Province, Zip/PC Country \_\_\_\_\_ Signature \_\_\_\_\_

**ARRL 225 MAIN STREET NEWINGTON, CT 06111 U.S.A.**

High Performance

# vhf/uhf preamps



Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
P28VD	28-30	< 1.1	15	0	DGFET	\$29.95
P50VD	50-54	< 1.3	15	0	DGFET	\$29.95
P50VDG	50-54	< 0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	< 1.5	15	0	DGFET	\$29.95
P144VDA	144-148	< 1.0	15	0	DGFET	\$37.95
P144VDG	144-148	< 0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	< 1.8	15	0	DGFET	\$29.95
P220VDA	220-225	< 1.2	15	0	DGFET	\$37.95
P220VDG	220-225	< 0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	< 1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	< 1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	< 0.5	16	+12	GaAsFET	\$79.95

Inline (rf switched)	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
SP28VD	28-30	< 1.2	15	0	DGFET	\$59.95
SP50VD	50-54	< 1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	< 0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	< 1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	< 1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	< 0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	< 1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	< 1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	< 0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	< 1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	< 1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	< 0.55	16	+12	GaAsFET	\$109.95

Every preamplifier is precision aligned on ARR's Hewlett Packard HP8970A/HP346A state-of-the-art noise figure meter. RX only preamplifiers are for receive applications only. Inline preamplifiers are rf switched (for use with transceivers) and handle 25 watts transmitter power. Mount inline preamplifiers between transceiver and power amplifier for high power applications. Other amateur, commercial and special preamplifiers available in the 1-1000 MHz range. Please include \$2 shipping in U.S. and Canada. Connecticut residents add 7-1/2% sales tax. C.O.D. orders add \$2. Air mail to foreign countries add 10%. Order your ARR Rx only or inline preamplifier today and start hearing like never before!

## Advanced Receiver Research

Box 1242 • Burlington, CT 06013 • 203 582-9409



WB2LHP N2FOJ K2ZOD N2FTF KA2USO KW2C; Chenango Valley WB2ACV KI2Y N2EHD W2RME. ATTENTION ALL AFFILIATED CLUBS: When your Club has its election of officers, be sure to send results to Newington! If the mailing list gets out of date, your Club will miss a lot... and a computer at Newington gets out of date too! Where are the Annual Reports for N. Franklin, Jefferson Co. HAWNY, Genesee Repeater, Rochester, D. RIT, U of R, Kodak, Kodak Park, Lockport, Tioga, N. Chautauqua, Chautauqua FM, Rockies, Cornell - the League needs you all! Traffic: WB2IDS 395, WB2OWO 339, W2MTA 204, WA2FJJ 191, N2ABA 157, VE2FMO 132, WB2QIX 119, ND2S 101, NN2H 100, KG2D 94, W2ZCJ 93, WA2JPB 80, K2YAI 76, KA2DQA 75, W2FR 72, WB2NLU 69, WB2RBA 67, WB2LJH 60, N2EVS 54, WD2AFI 50, KU2N 48, W2UYE 37, AF2K 28, WA2GV 18, W2PPS 12, K2QR 12, K2VH 11, K2IUT 10, KA2BDD 8, WB3CUF 2.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB-ASM & STM: WN3VAW. SEC: WA3UFN. CO Coord: KJ3Q. PIO: WB3IJJ. SGL: K3HVL. TC: K3LR. BM: KR3P. ACC: AK3J.

Net	QNI	QTC	Sess	kHz	TD	Man.
WPACW	286	143	30	3955	7:00P	WA3UNX
WPAPT	507	115	30	3983	6:00P	WA3HLN
KFN	202	57	25	3958	1:00P	N3EMD
WPA2MTN	406	68	30	146.28/68	8:00P	KA3BGC
NWPA2MTN	576	52	30	145.13/53	1499Z	KC3NY
PFN	234	216	30	3958	6:00P	WA3IHT

I regret to announce two Silent Keys: KA3JGP and WB3GZL son of WB3HBE. He was also editor of the Butler County Teleson of WB3HBE. I have appointed KC3FO as as Asst. Section Manager. He will be in charge of special events in the section and will assist other section-level appointees where needed. Congratulations to W3VF Keith Suseker who will receive the March cover Plaque for his article on HF WEFAX. The ATA of Western Penna is 60 years old this spring. We congratulate the members and note that it is an excellent group. Recently an article in the Pgh Press reminded me of the dangers when erecting antennas and towers when you are in the clear. The article reported three men killed erecting a CB tower. Are there any amateurs in Fulton County? If so, please get in touch with me. WA3UFN has asked me to remind the ECs to please report monthly this is necessary to hold the appointment. We need tic operators both CW and SSB. All we need is a couple of hours of your time each week. Think about doing it. Some of the tic handlers are excellent and do a fine job. Traffic: W3EKG 265, KG3T 221, N3EMD 195, W3NGO 105, W3ADW 80, WA3UNX 74, W3OKN 72, K3SMB 52, N3AES 43, W3VI 40, WB3CIS 40, WA3DBW 39, W3KKB 32, W3RUL 37, K3NPW 36, WA3QNT 34, N3CZV 31, W3KUN 31, KA3COX 22, N3EJL 15, W3TTL 14, KC3JQ 14, W3TZW 13, W3SN 8, K3LTV 6, K3BNV 5, KA3EGE 3.

### CENTRAL DIVISION

ILLINOIS: SM, David E. Laitan, WD9EBO-SEC: W9OBH. STM: KB9X. OOC: W9TT. BM: K9EUI. SGL: W9KPT. PIO: K9IDQ. ACC: W9B9FT. TC: N9RF. ASM: K9OHF.

NET	FREQ	TIMES (Z WIN)	QNI	QTC	SES
ILN	3690	0030/0400 DY	688	185	61
ITN	3705	0100 DY	178	29	29
ILPN	3915	1400 SN	102	3	4
NCPN	3915	1300 DY(X SN)	509	82	26
NCPN	7270	1815 DY(X SN)	225	46	22
EN	3440	1500 SN	88	4	4
IARES	3915	2230 1+3 SN	61		2
ISN	3905	0000 DY	646	150	31
CTN	147.89/09	0300 CY	513	111	30

Illinois was represented 98% to 9RN and 85% to D9RN. D9RN was represented 100% to CAND. Those who like myself have never been able to break 100 for a month's traffic are amazed by folks like Terry, KA9FEZ, who commuted "slow month" on his traffic report for April. (See totals below.) W9DBO is back active on the nets and has a new piece of electronic gear in his shack. KA9EJ whenever else he goes. Hope you don't get any F9J. Elmer Morgan Co EC W9QES reported that the Francis Across America logistics planning meeting held in Springfield was like a hamfest. Various state agencies were represented and Amateurs present included DD W9PRN, SEC W9OBH, SGL W9KPT, PIO K9IDQ, IL HAA com coord K9BOO and several county ECs. Thanks to all who attended for their reports. Illinois has started a Volunteer Exam opportunity newsletter through the efforts of PIA KA6A. The idea is to provide one source for information on all volunteer exam opportunities in Illinois regardless of VEC affiliation. The letter will be mailed to clubs periodically with a list of upcoming exam locations and contact persons. If you wish to list a future exam session or be put on the mailing list to receive the newsletter contact Jim Coleman, KA6A, 25-14 Jordan Dr., Champaign IL 61821. Be sure to give Jim maximum lead time on upcoming exams. W9CJW and the Shawnee Amateur Radio Assn remind us that now is the time to make plans to attend the annual SARA Hamfest which will be held Sunday September 14th at the John A. Logan Jr. College in Carterville. W9DKO invites amateurs to use the Ham radio to 32529-1588 and the parameters are 30D1200 baud 8.1NO. Traffic: KA9FEZ 289, K9WJ 263, W9LXL 231, W9EHS 182, N9GT 155, WB9RFB 153, W9HOT 119, W9NKG 91, K9JL 82, W9HBI 58, K9BK 47, W9KR 39, W9LNQ 24, WD9AHQ 20, K9QEW 17, KA9EWN 17, WB9YD 16, K9WPM 12, W9VEY/JM 7, W9IL 6, WD9QW 4, KA9USQ 2.

INDIANA: SM, Ron Koczor, K9TUS-ASM: W9UMH. SEC: WB9ZQE. STM: W9LJJ. ACC: K9TUS. TC: K9PS. SGL: WA9VDO. OOC: KC9TA. PIO: K9DIY. OOC: KJ9G. SRC: NSWB. Net Managers: ITN K9DUD, QIN K9J, ICN K9WD, VHF W9PMT, IWN K9SERC.

Net	Freq	Time	Daily	UTC	QNI	QTC	QTR	Ses
ITN	3910	1330/2130/2300			3315	458	2357	83
QIN	3656	1430/0000/0300			648	293	1507	90
IWN	3910		1310		1574	0	337	30
IWN	VHF	Bloomington			1016	0	300	30
IWN	VHF	Kokomo			1216	0	218	30
Hoesier	VHF	Nets			5023	149	4224	137

D-9RN: IN 100% fix to K9GCS, W9LJJ. 9RN-4: IN 100% fix to K9WJ, WB9CSJ, W9FC, WA9QCF, K9J, W9LJJ, N9FK, WB9YUJ. Silent Key: WA9OLW, Elizabethtown. Appointments: KA9TNL, EC Henry County; KA9ONS, EC Porter County. This is my first column as SM. Thanks to Bruce, W9UMH, for his dedicated service to ARRL and Indiana amateurs as SEC/SM for the last 8 years. I have made Bruce my first ASM and expect to lean heavily on him! This column is for ALL ARRL members in Indiana. Its nature will depend upon the variety of inputs I receive from you. Send me interesting news and this column will be interesting. I hope to include news about Indiana's Special Service Clubs, SSCs (take note! Welcome to Kankakee Valley ARC (W9CMB Pres.), state's newest affiliated club! Over 600 copies of the Indiana Section Letter go out each time. If you receive it, share it with your local club. If you'd like to become an appointee (ORS, OBS, etc.) let me know. Every ARRL member in the state should be an OBS to spread the word on what's happening. There are a few counties where an EC is needed; contact WB9ZQE or me if you're interested. I plan no major changes in the state. Bruce set up a first-rate Section organization and most of his staff have agreed to remain with us. Have a hap-

Large Stock

## BUY — SELL — TRADE ALL BRANDS NEW & USED



DRAKE KENWOOD COLLINS ICOM YAESU HEATHKIT  
SEND \$2.00 FOR CATALOG & WHOLESALE LIST



ASSOCIATED RADIO  
8012 Conser - Box 4327  
Overland Park, KS 66204 • (913) 381-5900



SAVE

SAVE

# COLORADO COMM CENTER

## KENWOOD



**TR-2600**

25W/300MW (w/alt)  
-dual band / Meter  
hand held  
transceiver  
• LCD Readout  
• 10 Memories w/  
Lithium Bank-up  
• Band and  
Memory Scan



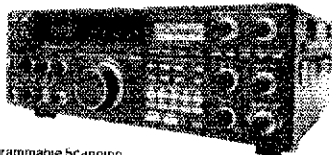
**TH-21AT**

• Compact Pocket  
Size  
• 1 Watt  
• Opt. 500 M.A.  
Battery

**TM-2570**



• First 70 Watt FM Mobile • First with Memory &  
Autodater • 23 Channel Memory • Front  
Panel Programmable CTCSS



**TS-940S**  
"DX-celence"

• Programmable Scanning  
• High Stability Dual Digital VFO's  
• 40 Channel Memory  
• General Coverage Receiver

**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

**COD'S WELCOME**

## YAESU



**FT-209RH**

• 5 Watts  
• 10 Memories  
• LCD  
• Compact

**FT-2700R**

• Duo-Band Full Duplex  
• 25 Watt



**FRG-9600**

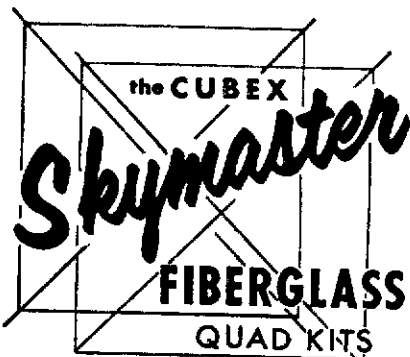
• 100 Memories  
• 60 MHz - 905 MHz Continuous



525 East 70th Avenue, West, Denver, CO • 80229 • 443-3355



"CHOICE OF THE DX KINGS"



2 ELEMENT—  
3 BAND  
KIT SPECIAL

ONLY  
**\$229<sup>95</sup>**

FOB Calif.

### CONTENTS

- 8 Fiberglass Arms, 1 pc. White 13 ft.
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler, 2" to 2"
- 16 Wraplock Spreader Arm Clamps
- 1 CUBEX QUAD Instruction Manual (Boom and wire not included)

**MK III 2 EL COMPLETE "PRE-TUNED"  
QUAD ONLY \$279.95**

2-3-4 or more element Quads available. Send 50¢ (cash or stamps) for complete set of catalog sheets, specs & prices

**CUBEX COMPANY**

P.O. Box 732, Altadena, California 91001

Phone: (818) 798-8108 or 449-5925

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"



16th ANNUAL  
**INDIANAPOLIS HAMFEST™**  
And INDIANA STATE ARRL CONVENTION



July 12-13, 1986

Marion County Fairgrounds — Gates open 6:00 AM both days

### 2 Full Days of:

Commercial Exhibitors  
Large Flea Market  
Hourly Awards  
Forums

### FREE:

Parking  
Kids Awards  
Camping  
Womens Awards

Indiana's Largest Electronic Flea Market  
and Amateur Radio Display

INDIANAPOLIS HAMFEST, P. O. Box 11776, Indianapolis, IN 46201  
OR CALL: (317) 745-6389

### TO-220 VOLTAGE REGULATORS

250-500 MA.	750-1500	REG. 1 AMP.	POS. ADJUSTABLE
78M02	7800	7803	3177 1 AMP. 80
78M05	7805	7805	3307 5 AMP. 150
78M15	7812	7808	
78M18	7815	7812	
78M22	7820	7815	3374T 500 MA. 70
78M24	7824	7924	3377 1 AMP. 50

1.25- 8/1.00

.25- 4/1.00

ALL UNITS PRIME  
LIMITED QUANTITIES

S.S. TRANSISTORS

MPF301 1.25

MPF311 1.50

2N3055 1.50

2N3055 1.50

2N3055 1.50

TERMS: VISA & MC ACCEPTED SORRY NO  
C.O.D.'S OR CHECKS. ALL ORDERS MUST  
BE PRE-PAID. ADD \$2.00 FOR SHIP-HAN.

PRECISION ELECTRONICS CORP. P.O. BOX 894 UNION, N.J. 07083  
201-486-4644 9 A.M. - 5 P.M.

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.

WB6VAS

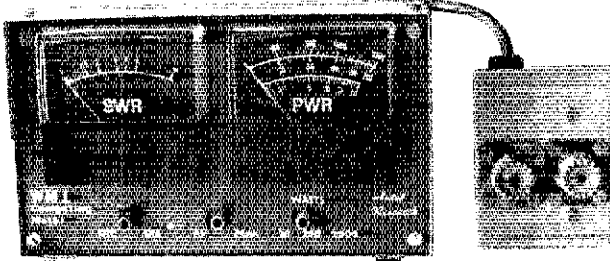
PH: 517-484-9794

WRIGHTAPES

WB6ON

235 E. Jackson S-1 • Lansing, MI 48906

# COMPUTING SWR & WATTMETER



**NEW!**  
**Model WM1**  
**\$89.00**  
(Includes AC Supply)

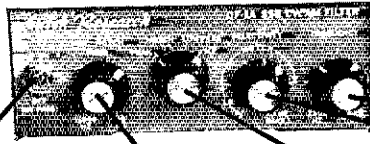
- **AUTOMATICALLY COMPUTES SWR.** No adjustments needed!
- **READS SWR DIRECTLY.** Even when you're talking on SSB!
- **GREATLY SIMPLIFIES TUNER ADJUSTMENT.** SWR reading not affected by forward power. No confusing readings.
- **REMOTE RF HEAD.** A must! Up to four feet from meter. Coax can't pull meter off table.

- **AVERAGE & PEP READING.** Allows compliance with latest FCC rules.
- **THREE RANGE SCALES.** 2000, 200, 20 watts. Usable to less than 1 watt.
- **TWO TOP-QUALITY METERS.** Large 2 3/4" meters.

1.5-30 MHz 5% F.S. Accuracy. Uses 8-18 VDC or 115 VAC. 5 1/4" x 3 1/2" x 2 3/4". Attractive light/dark grey styling.  
**WHY PUT UP WITH AN INFERIOR METER OURS DOES IT ALL — AUTOMATICALLY!**

# THE AUTEK "QRM ELIMINATOR"

Also reduces errors in computer CW/RTTY copy!



**Model QF-1A**  
**For SSB & CW**  
**\$73.00** (Includes AC supply)

115 VAC supply built-in. Filter by-passed when off.

Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz)

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will do to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

Built-in 115 VAC supply. 6 1/2" x 5 1/2" x 2 1/2". Two-tone grey styling. Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig. Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr. or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works! If it can't pull him out, nothing can.

**NO LONG DELAYS. WE SHIP 95% OF ORDERS FROM STOCK**

We sell only factory direct. No dealer markup in our price. Order with check, M.O., VISA, MC. We pay shipping in 48 states. Add 5% tax in Fla. Add \$3 to Canada, Hi., Ak. Add \$18 each elsewhere. (Shipped air.)

**Auttek Research**

BOX 302 DEPT J

ODESSA, FLORIDA 33556 • (813) 920-4349

**Crystal Filters**

For most Ham Rigs from:  
**KENWOOD • YAESU • HEATHKIT**  
Also DRAKE H-4C7 Line, COLLINS 7553-B/C, and ICOM FL44A, FL52A and FL53A clones.

**Finest 8-pole Construction**  
**ALL POPULAR TYPES IN STOCK**  
**CW • SSB • AM**

Phone for information or to Order.  
VISA/MC or COD accepted.

**FOX-TANGO Corp.**

Box 15944, W. Palm Bch, FL 33416  
Telephone: (305) 683-9587

# UR TRIPOLE ANTENNA



The TRIPOLE covers the 160-6 m bands, including new bands, without retuning. No taps, no traps, no coils, built-in balun. A best choice for an all-around amateur antenna. Guaranteed. Kit T80-K \$74.95; Assembled T80-A \$84.95. Prices postpaid cash. TX residents add 5% sales tax.

**UNIVERSAL RADIO CO.**

Dept. Q1 P.O. Box 28041 El Paso, Texas 79926 (915) 592-1910

**Radio World**

**YOUR NORTHEAST'S FAVORITE HAM STORE**

FEATURING: Kenwood, ICOM, Yaesu and all other major lines of amateur equipment and accessories. Write or call for quotes

WARRANTY/NON-WARRANTY REPAIRS  
WE'RE JUST A FEW MINUTES  
OFF N.Y.S. THRUWAY, I-90, EXIT 32

ONEIDA COUNTY AIRPORT TERMINAL BUILDING  
ORISKANY, NEW YORK 13424

Call (315) 736-0184

oy and sale 4th. See you at the Indiana ARRL Convention on Saturday, July 12, in Indy. A full day is planned. Don't forget to send your Field Day reports to both Hqtrs and IRRCC (K9BRF). Station reports: STN (QTC): W9JUI 713, W9JZV 235, K9J 182, W9FC 163, KA9FFO 124, WD9JAA 104, WA9YIF 92, K9BRF 74, KB9HH 48, WD9DVK 48, KA9RMY 44, K9KTB 33, WB9IHR 21, KA9EIV 19, K9TKE 15, W9PMT 13, N9DTG 12.

**WISCONSIN:** SM, Richard R. Regent, K9GDF—SEC: W9OAK, STM, K9UTO, ACC: KA9FOZ, BM: W9JWSW, OOC: NC9G, PIO: K9ZZ, SGL: AG9V, TC: K9RDE, Wisconsin Valley Radio Amateurs received 50-year ARRL Affiliated Club Award. W99TFJ is on Packet Radio, Silent Key, W9YCO, STM K10G. W99TFJ is a newly qualified Boy Scout Scoutmaster and is searching for traffic training Assistants (amateurs with NCS or NM experience) for the Fond du Lac, Green Bay, La Crosse, and Oshkosh areas. Fox Cities ARC has 17 Extras among its 71 members. Ozaukee RC has awarded W9RQR as its Ham of the Year. ATC N9EYU helps fix RFI problems for others and upgraded to Extra. July 1st is the start of my third year as Section Manager, thanks for your help. Happy Fourth of July to all. July 11 to 13 is Riponfest with KD9GD Chairman for Amateur Radio activities. July 12, South Milwaukee ARC Swapfest at American Legion Post 434 in Oak Creek. License exams, talk-in 146.94 MHz. Also July 12, Eau Claire ARC Hamfest at 451 Building on Fairfax Street in Eau Claire. License exams, talk-in 146.52 MHz. July 13, Milwaukee Circus Parade needs more communicators, contact EC WB9SMM. N9EYU and WA9USD passed Extra. As a reminder, your Field Day entry must be postmarked by July 30th.

BWN	3984	6 AM	WD9ID	1146-1232-26
BEN	3984	Noon	KA9RII	739-126-30
WSBN	3985	5:30 PM	WA9ZTY	
WNN	3723	6 PM	N9DGL	185-18-28
WCWTN	3191	6 PM	N99J	639-40-30
WSSN	3645	6:30 PM	N9BDL	204-57-30
NWNT	3494	6:30 PM	K9BVR	423-55-30
WILE	7	7 PM	W99ICH	278-128-30
WINL	3662	10 PM	K9C9J	137-45-30

Traffic: WB9YYP 1338, KC9CJ 786, KA9RII 221, K9GDF 210, W9CBE 179, W9DND 149, KA9BHL 139, W9YCV 107, WA9WYS 104, N9DHT 88, N9BDL 85, W9CXY 84, W9AUG 73, WB9JG 73, WB9RGO 71, N9BGE 70, K9AKG 57, W9JL 54, W9IHW 52, K9UTO 52, AG9G 48, W9ODY 44, KA9KCZ 44, K9JPS 37, N99H 35, K9HF 34, K9GB 27, KA9JY 17, W9IEM 16, WA9USD 16, WB9NRK 11, W9UW 10, KA9KEQ 8, KA9BHK 7, (Mar.) KC9CJ 600, WA9ZTY 30, WB9NRK 19.

## DAKOTA DIVISION

**MINNESOTA:** SM, George Frederickson, Jr., KC0T—SEC: KADAP, STM, KD0CJ. The week of April 20-28 was proclaimed Minnesota Volunteer Recognition Week by Gov Rudy Perpich. As a result, 25 radio amateurs in the state were recognized for their efforts as volunteers, having given much of their time during the past year to help others. Each of them received certificates signed by the Gov. Congrats to each of you and keep up the fine work! Duane Jabas, N8BEU/PIO Minn has a number of 16 MM films and video tapes in 1/2 and 3/4 inch formats. You may request these tapes from him on MSP/VE or by writing or calling him at his QTH in White Bear Lake. These tapes can be used for presentations at club meetings or other gatherings. NE: Due to the usual down-trend in activity during the summer, both M5N/RTTY and M5NAM/WNT will not operate in June, July and Aug. There is activity however. For those of you who don't turn your rigs on until 6 PM, there are 3 code nets to keep you busy. M5SN has been doing quite well, thank you! Activity has grown steadily with April being the best month. KA0SBY had 17 QNL in one evening. A training program has been started on M5SN, so get in on the action! Our "Ham of the Month" for April was selected by KC0T...honest folks! My XYL, Mary Broshotske, KA0AJF was named for that honor. Tnx Mary for helping your OM and keep up the great work! Tnx to the Anoka County ARC for letting me know about "Hamming". Included in the newsletter was an article concerning the recent passing of Lydia Johnson, W4KJZ, a former Minn SCM back in the 60's. Our regrets to her family and friends, and also to those who knew Robert Packer, W9VHE, who became a silent key in April. Our best wishes to K9CVD, KA9EY and KC0NL who have had health problems recently. K9CVD's was particularly harsh as he suffered severe injuries from a fall off a roof. Election results from St Paul Radio Club: Pres Joe Koppi, NG0F, Vice Pres Bill Beaman, KA0Y5, Sec Walt Johnson, WA0CQB, and Tress Mary Ketzler, KA0OMX. Congrats to WA0CEL and K9BWW who have done their part by working with process notices and helped them obtain their licenses by closing. I'd like to commend WD9LUF, one of our very dedicated traffic handlers as well as EC for northern St Louis County. He has shown dedication that will rival that of a postman by delivering traffic anywhere in spite of the odds, even by accident in this case. Where land line and rptr failed, he wound up delivering two pieces of traffic in person to KADARP when the two met in the basement mens room of the courthouse in Duluth quite by coincidence! 73 de KD0CJ

NET	FREQ	TIME	QNI/QTC/SESS	MGR
M5N/RTTY	3620	6:30P	67/10/13	KA6LUT
MSN/1	3685	6:30P	379/88/30	KA9EY
MSN/2	3685	10:00P	217/22/30	NCBE
M5SN	3710	6:00P	310/47/30	KA0DDQ
M5N/1	3929	12:00P	522/123/30	WB0WJN
M5PN/3	3929	5:00P	877/136/30	WD9BGS
M5NAM/WXNT	3929	6:15P	440/269/26	KA0IZA
PICONET	3925	9:00A	No Report	WD9BAC

EMERGENCY FREQUENCY: 3929, BULLETINS: 3685, 3929  
M5M/SO: 3620 T & TH 5-7 PM, Sat & Sun 9-12 Noon. Traffic: WB0WJN 500, K791 353, KD0CJ 232, WA0YFC 218, KA9EY 150, KD0CJ 88, KA0DDQ 88, KA0ZTA 69, WD9HD 69, K9C9J 66, N8CL 50, WD9GUF 43, W9UM 39, KA0T 19, WD9BGS 31, KA0PBM 25, N8X 22, KA0AJF 19, KA0T 19, KA0BFP 18, KC0NL 16, KA0JUX 13, W9YFC 13, KA0CJC 11, N9JLP 10, KD0NH 10, N8FOO 9, K9BCD 7, K90WV 7, N80T 6, N8EWA 5.

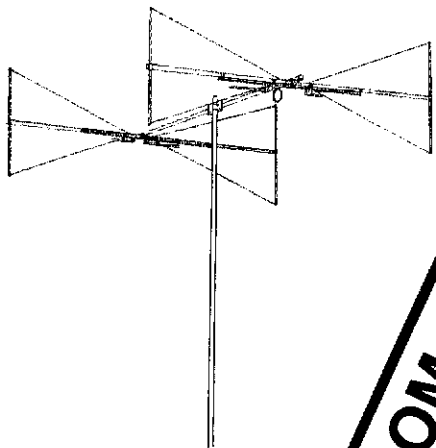
**NORTH DAKOTA:** SM, Michael Mankey, WB0TEE—Once again it is time for the Fargo Gardens Hamfest. July 11-12, 13, 1988. I am sure that with the experience of Dave, K9RUL, and his crew it will be one of the best yet. The projected shipping date for the Superlink repeater is July 11, 1988. There will be a N.D. forum at the Dakota Division Convention this year in Fargo. We will be discussing many topics that may set the direction of our hobby in N.D. for the years to come. It is very important that we have your input into such issues as Superlink operation, frequency coordination, packet radio, DATA Net operation, and other issues that are of prime importance to all Hams in our state. It will be held Sept. 19, 20, 21, 1988. 73's, Mike. Net Summary for 88:

Net	Freq	Time	Se	QNI	QTC
GOOSE RIVER	1990	WB0CO	4	102	182
ND WX NET	3883	WA9RWM	4	(Summer break)	
DATA	3883	KA9FSM	27	538	21
NORTH FORTY	6464	KE0EI	4	33	0

Traffic: KA9FSM 58.

**SOUTH DAKOTA:** SM, R. L. Cory, W0YMB—STM: Ole Johnson, N8ABE, SEC: Warner Muns, KA0KPY. Congratulations

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.

HF ANTENNAS FROM 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

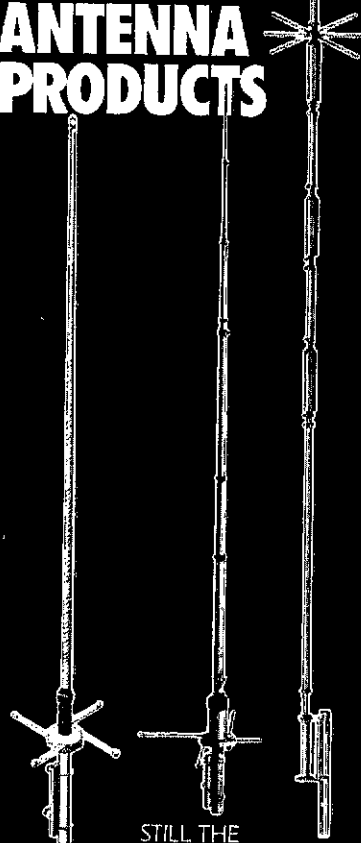


**BUTTERNUT ELECTRONICS CO.**

405 East Market Lockhart, Texas 78644

**ASK ANY  
HAM...  
THEN  
ASK FOR  
HUSTLER.**

**AMATEUR  
ANTENNA  
PRODUCTS**



STILL THE  
STANDARD OF PERFORMANCE



**One New-Tronics Place  
Mineral Wells, TX 76067  
(817) 325-1386**

**WANTED**

FOR IMMEDIATE PURCHASE  
CALL COLLECT: (201) 440-8787

- |                 |                    |
|-----------------|--------------------|
| RT-1159/A       | IP-480/WLR         |
| RT-712/ARC-105  | TTU205C/E          |
| RT-859A/APX-72  | QA3952/AQA-5       |
| RT-1022/ARN-84  | AN/AWM-21,30 or 62 |
| RT-1057/ARN-103 | AN/ARC-114,115,116 |
| RT-823/ARC-131  | AN/ARN-89          |
| RT-868A/APX-76  | AN/TPX-46          |
| RT-988/APX-76   | AN/APQ-120         |
| RT-547/ASQ-19   | MK-994/AR          |
| RT-857/ARC-134  | MK-1004/ARC        |
| RT-1004/APQ-122 | DT-37/ASQ-8        |
| RT-624/VRC      | DT-239/ASQ-10      |
| RT-865D/PRC-66  | RO-32/ASQ          |

WE BUY MILITARY PARTS  
AND NEW TUBES.

**SPACE ELECTRONICS**

35 Ruta Ct. So. Hackensack, N.J. 07606 (201) 440-8787

"OUR 24th YEAR"



THIS MONTH'S GOODIE FROM  
THE CANDY STORE

**YAESU FT-767  
UNDER \$1700.00**

YAESU FT-7200RVH 2M. 25 WATT \$249.90 L.T.O.  
OVER 750 HAM RELATED ITEMS IN STOCK, ALL  
PRICES FOB PRESTON. Send SASE for NEW HF  
PRICE LIST. More specials in classifieds.

**ROSS DISTRIBUTING COMPANY**  
78 South State Street, Preston, Idaho 83263  
Telephone (208) 852-0830 Closed MON. & SAT at 2:00

**AMATEUR RADIO MAIL LISTS**  
Self-stick 1x3 labels

- \*\*\* NEWLY LICENSED HAMS \*\*\*
- \*\*\* ALL NEW UPGRADES \*\*\*
- \*\*\* UPDATED EACH WEEK \*\*\*

Total List = 462,728 (ZIP sorted)  
Price is 2.5 cents each (4-up Cheshire)

**BUCKMASTER PUBLISHING**  
Mineral, Virginia 23117  
703-894-5777





# ege, inc. Towers & Antennas

WITH  
**REBATES**  
FROM  
**Hy-Gain**

**\$100 Rebate**  
On Hy-Gain Towers  
HG-37SS  
or HG-57SS

**\$200 Rebate**  
on Hy-Gain Towers  
HG-54HD  
or HG-70HD

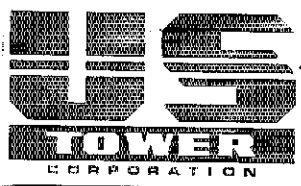
**\$50 Rebate**  
if you buy both a  
Hy-Gain HF antenna  
and Rotator

Choose your rotator from HDR-300, CD-45,  
Tail Twister, or Ham IV.  
Manufacturer's Rebate on Hy-Gain products  
in effect July 1-September 30, 1986.

**Mike Special**  
Telex Hy-Gain Procom 400 Desk Mike  
prewired for Icom, Kenwood, or  
Yaesu. Ask about our super special.

**Headset Specials**  
Telex Hy-Gain headsets/phones on  
special. Models super light weight to  
padded. Call for quotes.

**ege, inc.**  
**Orders & Quotes Toll**  
**Free: 800-336-4799**  
In Virginia: 800-572-4201  
In New England: 800-237-0047  
In New Hamp.: 603-898-3750  
More phone numbers & addresses—please  
see our two-page ad in this issue.



8975 W. GOSHEN AVE., VISALIA, CA 93291

**Fastest Shipments  
in the Industry.**

**MA SERIES CRANK-UP TUBULAR TOWERS**

Will handle 10 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
	MAX.	MIN.			Top	Bot.	
MA-40	40'	21'6"	2	242	3"sq	4 1/2"	\$ 735.00
MA-550	55'	22'1"	3	435	3"sq.	6"	\$1245.00
MA-550MDP*	55'	22'1"	3	620	3"sq.	6"	\$2640.00
MA-770	71'	22'10"	4	645	3"sq.	8"	\$2385.00
MA-770MDP*	71'	22'10"	4	830	3"sq.	8"	\$3780.00
MA-850MDP*	85'	23'6"	5	1128	3"sq.	10"	\$5090.00

\*MDP models complete with heavy-duty motor drive with positive pull down.

Shown w/ optional MARB 550C rotor base and motor drive



**FREE STANDING CRANK-UP TOWERS**

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
	MAX.	MIN.			Top	Bot.	
TX-438	38'	21'6"	2	355	1 1/2"	15"	\$ 925.00
TX-455	55'	22'	3	670	1 1/2"	18"	\$1395.00
TX-472	72'	22'8"	4	1040	1 1/2"	21 1/2"	\$2295.00
TX-472MDP*	72'	22'8"	4	1210	1 1/2"	21 1/2"	\$4195.00
TX-489	89'	23'4"	5	1590	1 1/2"	25 1/2"	\$3995.00
TX-489MDPL*	89'	23'4"	5	1800	1 1/2"	25 1/2"	\$5995.00

\*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MD comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drives models include limit switch brackets)

**FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.**

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
	MAX.	MIN.			Top	Bot.	
HDX-538	38'	21'6"	2	600	1 1/2"	18"	\$1195.00
HDX-555	55'	22'	3	870	1 1/2"	21 1/2"	\$2095.00
HDX-572	72'	22'8"	4	1420	1 1/2"	25 1/2"	\$3595.00
HDX-572MDPL*	72'	22'8"	4	1600	1 1/2"	25 1/2"	\$5495.00
HDX-589MDPL*	89'	23'8"	5	2440	1 1/2"	30 1/2"	\$7195.00

\*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

**FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.**

Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
	MAX.	MIN.			Top	Bot.	
TMM-433SS*	33' w/o mast	11'4"	4	315	10"	18"	\$ 985.00
TMM-433HD*	33' w/o mast	11'4"	4	400	12 1/2"	20 1/2"	\$1195.00
TMM-541SS*	41' w/o mast	12'	5	430	10"	20 1/2"	\$1295.00

\*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.



Standard bases included with all towers (except MA-770, 770-MDP and 850-MDP).

- ALSO AVAILABLE: • Motor drives for most towers  
• 5' to 24' antenna masts • Coax arms • Service platforms  
• Mast raising fixtures • Special bases • Limit Switch Packages

FOR ADDITIONAL INFORMATION Contact:  
Amateur Electronic Supply (All Locations) • Texas Towers  
Ham Radio Outlet (All Locations) • U.S. Tower (209) 733-2438  
Prices are FOB factory: Visalia, CA. Prices and specifications are subject to change without notice.



Life Membership is available for \$625 in the US. You may also make one payment of \$79 and 7 more of \$78 over a two year period. Family life membership is available for \$50. Outside the US, the rate is \$825, also payable in 8 installments. Write to Dept. LM for our formal application!

THE AMERICAN RADIO RELAY LEAGUE  
225 MAIN ST  
NEWINGTON, CT 06111

**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 WOBBLY, 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 TRANSCEIVERS! Use - RG8U feedline. any length! 2000 Watt PEP, input power. Shipped - PREPAID IN USA. Assemblies in 10 min. using only screwdriver. WEATHERPROOF!

No.-AVT80-10	5 Band	25'8"	\$199.95
No.-AVT40-10	4 Band	18'9"	\$139.95
No.-AVT20-10	3 Band	11'4"	\$109.95
No.-AVT80-10-3	8 Band	24'8"	\$229.95
No.-AVT40-10-3	5 Band	17'9"	\$159.95

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 1-800-236-5333 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. AQ Kearney Ne. 68947

# RF TRANSISTORS

P/N	Rating	Each	Match Pr.
MRF412,IA	80W	18.00	45.00
MRF421	Q 100W	22.50	51.00
MRF422*	150W	38.00	82.00
MRF426,IA*	25W	18.00	42.00
MRF433	12.5W	12.00	30.00
MRF449,IA	Q 30W	12.50	30.00
MRF450,IA	Q 50W	14.00	31.00
MRF453,IA	Q 60W	15.00	35.00
MRF454,IA	Q 80W	15.00	34.00
MRF455,IA	Q 60W	12.00	28.00
MRF458	80W	20.00	46.00
MRF475	12W	3.00	9.00
MRF476	3W	2.75	3.00
MRF477	40W	11.00	25.00
MRF479	15W	10.00	23.00
MRF485*	15W	6.00	15.00
MRF492	Q 90W	16.75	37.50
SRF2072	Q 65W	13.00	30.00
SRF3662	Q 110W	25.00	54.00
SRF3775	Q 75W	14.00	32.00
SRF3795	Q 90W	16.50	37.00
SD2545	Q 50W	23.00	52.00
SD1487	Q 100W	36.00	76.00
2SC2290	Q 80W	15.00	36.00
2SC2879	Q 100W	25.00	56.00

Q = Selected High Gain Matched Quads Available

### VHF/UHF TRANSISTORS

Rating	MHz	Net Ea.	Match Pr.
MRF212	10W 136-174	\$16.00	—
MRF221	15W 136-174	10.00	—
MRF222	25W 136-174	14.00	—
MRF224	40W 136-174	13.50	32.00
MRF237	4W 136-174	3.00	—
MRF238	30W 136-174	13.00	30.00
MRF239	30W 136-174	15.00	35.00
MRF240	40W 136-174	18.00	41.00
MRF245	80W 136-174	28.00	65.00
MRF247	75W 136-174	27.00	63.00
MRF260	5W 136-174	7.00	—
MRF261	10W 136-174	9.00	—
MRF262	15W 136-174	9.00	—
MRF264	30W 136-174	13.00	—
MRF607	1.75W 136-174	3.00	—
MRF641	15W 407-512	22.00	49.00
MRF644	25W 407-512	24.00	54.00
MRF646	40W 407-512	26.50	59.00
MRF648	60W 407-512	33.00	69.00
SD1441	150W 136-174	74.50	170.00
SD1477	100W 136-174	32.50	78.00
2N3866*	1W 30-200	1.25	—
2N4427	1W 136-174	1.25	—
2N5591	25W 136-174	13.50	34.00
2N6080	4W 136-174	7.75	—
2N6081	15W 136-174	9.00	—
2N6082	25W 136-174	10.50	24.00
2N6083	30W 136-174	11.50	24.00
2N6084	40W 136-174	13.00	—

### MISC. TRANSISTORS & MODULES

MRF134	\$16.00	SAV6	\$32.50
MRF136	21.00	SAV7	30.00
MRF137	24.00	S10-12	13.50
MRF138	35.00	2SC1075	25.00
MRF140	89.50	2SC1307	5.00
MRF150	89.50	2SC1946A	12.00
MRF172	62.00	2SC1969	3.00
MRF174	80.00	2SC2221	10.00
2N1522	7.95	2SC2269	22.00
2N4048	7.20	2SC2289	20.00
NE41137	3.50	2SC2312C	4.00
2N5590	11.00	2N5945	10.00
2N5642	14.00	2N5946	13.00

Selected, matched finals for Icom, Atlas, Yaesu, Kenwood, Cubic, TWC, etc. Technical assistance and cross-reference on CD, PT, SD, SRF and 2SC P/Ns.  
Quantity prices users — call for quote  
**WE SHIP SAME DAY • C.O.D./VISA/MC**  
Minimum Order— Twenty Dollars  
**(619) 744-0728**



## RF PARTS

1320-16 Grand Avenue  
San Marcos, CA 92069

10, WA4HKU 10, KB4UQ 9, W4PSN 6, KA4BSG 5, K4WOP 5 and N4KQX 4. Thanks for your reports.

## GREAT LAKES DIVISION

**MICHIGAN:** SM, James R. Sealey, WB8MTD—It is my unpleasant task to announce the resignation of Aileen Gagnon, WA8DHB, from the post of Asst. SM for personal reasons. She has been my "right arm" in the U.P. for as long as I've been SCM/SM. She'll be missed. She will continue as NM for U.P. SEC WB8BYG reports that the new state RACES plan is now reality and that the long-suffering revision of the state ARCS plan is actually nearing completion. He also announces the appointment of three Deputy RACES Directors made by Director Alan NBF7Y for SE MI. He reports further that for the first time in MI history, ARES is officially recognized by the state Emergency Management Division as a viable communications organization. That is real progress. New Edison RAA (Detroit area) officers, all re-elected: Pres. N8ESN; VP KA8AYK; Sec/Treas WB8CN; Act Mgr WA8TJA; Trustee WB8VRE. I see a lot of club newsletters. They are an important source of info for me and I greatly appreciate getting them. In way of constructive criticism, there is one flaw that stands out in many of them (more than half): the club's officers are hiding it takes a bit of space, granted, but listing the complete address and phone number of each of the club's officers, not just name and call sign, is a very important use of bulletin space. It makes the leaders much more accessible to members, particularly newcomers, and especially in large clubs wherein not everyone knows everybody. The continuing success story of the U.P.N.: now 30 straight months of record-breaking attendance. Net Summary (ONI TFC SESSIONS): QMN 1004 215 88; MITN 599 195 30; MACS 492 113 30; UPN 1164 76 34; MNN 257 51 57; GLETN 545 27 23; WSSSN 1386 26 30. Traffic: KACBCPS 325, WA8QHB 157, KA8VOZ 133, W8DQUO 106, W8DKQC 97, WA8DHB 88, WB8SIW 86, KB8XJ 82, NJ8JR 73, N8AHA 66, W8YIC 46, N8EXS 46, W8EJO 46, W8EJO 46, W8RNO 43, W8SCW 39, W8DPAF 22, KB8CP 20, W8WBU 27, K8JAP 26, N8CNY 24, W8MSP 22, KB8CO 20, W8WBU 27, W8TBP 15, K8ZJU 14, K8JQ 13, W8URM 10, W8BMVH 9, K8M 8, W8BSYA 5, W8BHSN 4. (Mar) K8JQ 32.

**OHIO:** SM, Jeffrey A. Maass, K8ND—ASM: N8AUH, SEC: W8DMFV, STIM: K8FSJ, BM: W8ZGM, ACC: K8J3O. TC: K8BMMU. OOC: ADL, PIO & SGL: N8CVK

NET	ONI	QTC	Sess	Time (Local)	Freq.	MGR
BNI(E)	205	75	30	1845	3.577	W8JMD
BNI(L)	210	88	30	2200	3.577	W8BBO
BNR	247	88	30	1800	3.605	W8EKK
BSSN	482	230	60	0945, 1830	3.873	K8OZ
NNN	196	47	30	1825	3.708	W8BKEW
OSN	326	93	30	1810	3.577	N8AHE
OSSBN				1030 1615, 1845	3.975	W8BZZ
OSSN	179	116	30	0645 M-F, 0800 5-9n	3.577	K8GJV
O6MN	99	10	13	2100	50.16	W8DXTX
Ohio Section ARES Net				1800 Sun.	3.875	W8BMPV

Ohio Section ARES Net  
Hosts: Wood City (Bowling Green) July 13; Lancaster July 13 (7); Wheeling WVA July 20; NCARFEST July 25. Amateur examinations in July: Columbus 12th; Toledo 12th; Marion 19th; Elyria 20th; Akron 26th; and Mentor on August 2. If you need additional info, contact me at the address/telephone on page 8 of the QST. Attendance at the Dayton Hamvention set a new record of 24,500, up 1300 over 1985. Nice weather played a big part. On April 15, Amateurs in Northeastern Ohio participated in a test of the emergency response plan of the Perry Nuclear facility in Lake County. There were a number of "rough edges" including the failure to use standard message form for important message traffic. It all comes down to training and practice! In the past several months ASM N8AUH, SEC W8DMFV, and I have held discussions with officials of the Ohio Disaster Services Agency to determine how we can best serve the needs of DSA units in each of the Counties. I received the following radiogram as a part of Iorradio Awareness Week: "Thank all Amateur Radio Operators in Ohio for me for their strong support of NWS SKYWARN programs. Marvin J. Miller, Ohio Area Manager, National Weather Service. Every Amateur in Ohio should support their local weather spotting net! Victor Kean, K1LT, (Central Ohio ARES repeater, quru), was selected by the Board of Directors of the Columbus Chapter of American Red Cross as their "Volunteer of the Quarter" for the first part of 1986: congratulations Vic! Wayne Buxton, W8OQL, is retiring as Emergency Coordinator of Hardin County. Wayne has served as EC since December 1978, and now finds that his health will no longer permit him to continue. The Ohio Section thanks Wayne for his eight years of service in a tough job! April was a big month for new APRIL Field Organization appointments: The following received Official Relay Station (ORS) appointments: KA8RIK, KF8RE, W8DOSP, W8BALH, NR8C, KB8FW, K8ZKX, K8RWI, and N8GJO. Three stations received ORS and Official Emergency Station (OES) appointments: W8FPA, N8GJO, N8GSM. Two individuals were issued Public Information Assistant (PIA) and Official Bulletin Station (OBS) appointments: NO8Q and W8YYS. KA8BUPR was issued an OES appointment. Chapple, W8BJGW, has been elected and appointed to serve as Net Manager of the Ohio Single Sideband Net (OSSBN). Congratulations to all! If you would like to know more, contact me! A reminder to all appointees: monthly reporting is necessary if I am to keep track of (and publicize) all of your good work! BEGINNING WITH APRIL 1986, the 1986 IS "TRAFFIC HANDLING MONTH" in OHIO! Clubs and nets are asked to promote training in traffic handling procedures: more in the Ohio Section Journal! Traffic: W8BO 255, KV8Q 233, W8BKEN 175, K8JDI 169, KA8KHS 166, KB8ZL 162, W8BJGW 154, K8ND 152, K8TVG 152, W8BDMF 141, W8DRAO 124, W8QZK 110, K8BKU 107, KA8GJV 105, N8EFB 102, KF8J 97, W8EKK 89, W8JMD 86, N8FFH 84, W8DYE 80, W8BKSW 75, W8FPA 74, N8AKS 65, W8BMEK 64, W8BRIB 60, W8BNHV 59, WA8SSI 55, KA8CGP 53, K8C8MR 53, W8D8MI 53, N8FVA 48, N8AEH 46, N8HBI 46, W8WHD 43, N8MI 43, W8SPK 43, K8DFV 42, W8BHI 42, W8BKWC 40, K8CJZ 40, N8GJO 39, N8B 39, W8ADY 38, K8BXL 36, N8FB 35, N8BUL 35, N8CJD 35, N8KB 34, KA8RIK 34, WA8JGH 32, K8BLV 25, K8DHD 28, W8ZOL 26, K8D8C 24, KABST 24, N8BX 24, W8CXM 23, N8AUH 22, K8RC 21, W8WEG 20, K8CB 19, W8W9M 19, K8LQW 18, KA8OFP 17, N8FBE 16, W8D8SP 15, K8DX 15, W8DALH 14, N8GJO 14, KA8ICB 14, W8MVE 14, K8CW 14, K8CKY 10, W8BCTX 10, KE8EY 10, W8B9RM 9, N8AJU 8, NR8C 8, W8BKW 8, KARSON 7, KA8UYW 7, W8BOYK 6, N8CW 5, K8EF 5, N8BK 5, K8DWI 5, W8BCKK 4, W8BEK 4, N8GJO 4, W8RG 4, W8FPU 3, N8GIY 3, N8GST 3, N8BHF 3, N8CIY 3, W8BZ 3, W8BAWM 2, N8CJS 2, KA8VET 2, W8BATN 1, KA8MFG 1, KA8MGH 1, W8BNE 1, KA8R1D 1, KA8UPR 1, W8WVU 1, W8BYP 1, W8DYF 0. (Mar) W8WEG 36, K8EF 22, KA8ICB 13.

**NET LISTINGS (ONI/QTC):** AESN 6610 ATEEN 14/4 CDN 476/52 ESS 388/54 HVN 183/326 NYPON 669/274 NYSE 408/189 NYSM 356/176 NYSL 340/190 SDN 308/85 Ulster RACES 29/10. CLUB NEWS: Albany AFA heard Tektronix engineer talk about High Technology and test equipment at May meeting. CCNR learned about certificate hunting and DX from KB2ON. They are installing a new 450 MHz repeater. Rip van Winkle ARES is celebrating its 35th anniversary on 19 May. SAFA (Schenectady) learned about Emergency coordination and traffic in April and welcomes new members WA2QIN N02H KA2HXZ. Saratoga RACES held homebrew night in May. Ulster RACES and OMARC provided Comm for 10K Race. WARA heard talk by NE2Q on security systems. WEGA held its annual elections. Hope to hear you all on Field Day. Don't forget all those public-service activities during the summer. All have a sale and enjoyable summer. Apr. PSHR: KA2MYJ WB2VUK W2PKY K2ZVI KC2TF WB2MCO Mar. TFC: N2FT 10. Traffic: WB2VUK 158, W2PKY 146, KC2TF 123, WB2MCO 88, KA2MYJ 87, K2ZVI 62, W2ZVI 43, WA2JBO 42, N2AVI 28, K2HNW 17, KA2TOW 16.

**NEW YORK CITY—LONG ISLAND:** SM, John H. Smale, K2IZ—ASM/ACC: WB2AP, ASM/VE: W2N2 and SGL: KA2RGI, OOC: N827, TCC/FR1: W2JUP, STIM: W2ARF, PIO: W2IYA. The following are traffic net: 1900/2200 W82EUF mgr NLI 964kHz 1930 m-f K2MT mgr KCVHF 6.745rpt 1930 m-f K2YQK mgr BAVHF 6.67rpt 2000 m-f W2GSD mgr SCVHF 5.37rpt 2030 m-f W2WSS mgr ESS 3590 kHz 1800 W2EAG mgr NYS/M 3877 kHz 1000 WB2EAG mgr NYS 3677 kHz 1900/2200 WB2EAG mgr

\*Denotes section net, all times are local, please try and help out by checking in whenever possible. LIMARC will continue to sponsor examination sessions on the second Saturday of the month at N.Y. Inst. of Technology, Rt. 294, Old Westbury, in Sallen Hall, Rm. 2, appearing on the schedule to please bring 2 forms of I.D., original and copy of your FCC license, check for \$4.00, made payable to ARRL/VEC, 2 pens/pencils and a calculator for the math questions, for further info contact Woody Gerstner, WB2IAP, 42 Mohawk Ave., East Atlantic Beach NY 11651. For those of you who ask, "why always LIMARC?", because they have the most regular schedule and I don't have to worry about changes in the schedule during the 2 month lead time I have for the column. The Tu-Baro Radio Club has been asked for the third year in a row to provide emergency communications for the Queens Mini run. Our vice Director, Steve Mendelsohn, WA2DMP, has been visiting many clubs in our section. Steve is considered very knowledgeable on the various Sabellia Dish and Antenna laws, why not give these a call if you have any questions. The following LIMARC members handled communications for the 5 mile Merrick Kiwanis race for charity: K2LJH, W2QZ, WB2RVA, WB2IAP, WB2IAP and his XYL, spent 2 weeks in Fla. K2GCE spent 2 weeks in Calif. with his son and family. KE2N has received his 2mtr VUCC 102, unless someone has gotten one before him he believes it to be the first in NLI. The Radio Central News has product reviews by W2KEK, talk about calls from the past and the early days of 2mtr repeaters. Traffic: K2YQK 226, K2GCE 71, W2GKZ 66. (Mar) K2GCE 84.

**NORTHERN NEW JERSEY:** SM, Robert R. Anderson, KA2HNO—OOJ/ACC: N2WMM, ACC: KY2S, PIO: WB2NGV. SGL: W2KB, TC: K2BLA, BM: N2CXH. April appointments are: DECS: N2BMM (Bergen) and WA2JZ (Somerset), ECs: KA2CHK, N2DZ, N2EXX, K2YOZ, N3CBM, N2DZ, N2ZJY, KA2CHK, N2DZ, N2EXX, W2BKS, OES: KA2PFU, KA2ZY, KB2ZB, KC2ZIE, K2ZD, N2AJU, N2CZF, N2DZZ, N2EXX, N2FDM, N3CBM, N2NT, WA2JVP, WA2SEJ, WA2YUW, WB2AQW, WB2GAL, and WB2IXS. OBS: W2CC, and KX2O. Welcome aboard to all. Please note that thanks to the effort of Ed Soloy, K2SE (DEC Passaic) and President of the Flamm Valley Emergency Net (FAVEN) many of the new EC's and OES's listed above were recruited to ARES from FAVEN. Our Passaic county ARES district is now the largest in our section. Our PIO has taken on a new function: maintaining a list of amateur radio classes, including within the section. All affiliated clubs, including classes are requested to register their efforts with our PIO as soon as possible; R02 Box 249 Annandale, NJ 08801, 735-7366. The Ocean-Monmouth SSC has appointed Dan Tonner, K0ZV as both HF and VHF Awards Manager. The NNJ chapter of the QCWA is accepting nominations for their "Elmer Award". Contact W2SGI at 34 Franklin St, Little Ferry, NJ 07643. Congratulations to the following who were newly licensed or upgraded during April sessions conducted by Cherriville Rpt Assn, Old Bridge RA, Faritan Bay RA, and NNJ VE Board, Novica: P Campbell, L Keane, J Harrington, N Casey, W Richter and J Roselli. Technician: R Admonio, T Walker, KA2ZVI, KA2ZVI, KA2YGH, KA2ZMR, KA2ZOB, KA2ZVX, KA2ZVZ, KA2ZJ, KB2ACH, KA2MM, KA2L, Lapore, General: KA2ZTS, WA2CON, and N2CZB, WB2NZD, KA2YGY, KA2ZAL, KA2ZUW, KA2YOZ, KA2PZD, N2DFY, N2FXZ, KA2ZDA, and C Krauss. Advanced: WB2GGN, KA2RLW and KA2UUV, KA2RJJ, KA2FTI, WA2RAM, N2FRK, KA2MZN and KA2ZUJ. Extra: WB2EKL, K2BKE, WB2ULI, W2GHB, N5HAW, KD2PZ, WA2ZYWA, W2ZYM and KA2UOL. Sorry to have to report B.A.R.A. member Glen Atlas, K2JLL as Illigent Key. April Data:

NET	Mgr	Freq	Time	Sess	ONS	QSP
NJM	W2RRX	3695	1000	Dy	38	188 88
NJPN	W2RC	3690	1800	Dy	04	306 80
NJNE	A2GR	3695	1900	Dy	30	211 138
NJNE	A2GR	3695	2200	Dy	03	83 23
CBTTN	W2QMP	144.12	2700	Dy	36	323 148
TCETN	W2QFP	147.85	1830	Dy	30	80 12
NJVN	W2BANK	146.48	2230	Dy	50	180 84
NUPIN	(PBBS)	145.01	WA2SNA-1	and	WB2GWO-0	

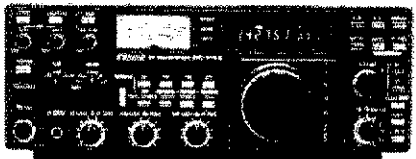
NNJ Amateur Radio Public Info Line: 201-735-8550. Note: This number is "UPLINK" and the NNJ PIO Traffic: N2XJ 237, W2RXX 156, KA2SPH 96, N2DQF 89, K2VX 73, WB2MCP 46, W2XZ 37, W2NKD 32, W2XP 11, PSHR: N2XJ 104, KA2SPH 103, K2VX 97, W2RXX 74, W2QMP 67.

## MIDWEST DIVISION

**IOWA:** SM, Rollin Sievers, WB8AVW—SEC: KD8BG, BM: KR8R, ACC: WB8QAM, PIO: NG0W, OOC: KD8RT. TC: KD8AS, SGL: AK9Q. Congratulations to Bob, K0CY, he was selected Midwest ham of the year. With regrets I have to announce the resignation of KD8RT. The Midwest Convention held at So. Sioux City Neb. was a great success. Was a pleasure to meet some of the league officials that were



HF Equipment	Regular SALE
IC-735 HF transceiver/SW rcvr/mic	889.00 769 <sup>95</sup>
PS-55 External power supply	169.00 149 <sup>95</sup>
AT-150 Automatic antenna tuner	399.00 359 <sup>95</sup>
FL-32 500 Hz CW filter	59.50
EX-243 Electronic keyer unit	50.00
UT-30 Tone encoder	TBA
IC-745 9-band xcvr w/ 1-30 MHz rcvr	999.00 799 <sup>95</sup>
PS-35 Internal power supply	169.00 149 <sup>95</sup>
EX-241 Marker unit	20.00
EX-242 FM unit	39.00
EX-243 Electronic keyer unit	50.00
FL-45 500 Hz CW filter (1st IF)	59.50
FL-54 270 Hz CW filter (1st IF)	47.50
FL-52A 500 Hz CW filter (2nd IF)	96.50 89 <sup>95</sup>
FL-53A 250 Hz CW filter (2nd IF)	96.50 89 <sup>95</sup>
FL-44A SSB filter (2nd IF)	159.00 144 <sup>95</sup>
SM-6 Desk microphone	40.00
HM-12 Extra hand microphone	39.50
MB-12 Mobile mount	21.99



IC-751 9-band xcvr/1-30 MHz rcvr	1399.00 999 <sup>00</sup>
PS-35 Internal power supply	160.00 149 <sup>95</sup>
FL-32 500 Hz CW filter (1st IF)	59.50
FL-63 250 Hz CW filter (1st IF)	48.50
FL-52A 500 Hz CW filter (2nd IF)	96.50 89 <sup>95</sup>
FL-53A 250 Hz CW filter (2nd IF)	96.50 89 <sup>95</sup>
FL-33 AM filter	31.50
FL-70 2.8 kHz wide SSB filter	46.50
HM-12 Extra hand microphone	39.50
SM-6 Desk microphone	40.00
RC-10 External frequency controller	35.00
MB-18 Mobile mount	21.99

IC-720A 9-band xcvr • (CLOSEOUT) •	1349.00 689 <sup>95</sup>
PS-15 20A external power supply	149.00 134 <sup>95</sup>
FL-32 500 Hz CW filter	59.50
FL-34 5.2 kHz AM filter	49.50
BC-10A Memory back-up	8.50
SM-5 8-pin electret desk mic	40.00
MB-5 Mobile mount	21.99

Other Accessories:	Regular SALE
PS-15 20A external power supply	149.00 134 <sup>95</sup>
CF-1 Cooling fan for PS-15	45.00
EX-144 Adaptor for CF-1/PS-15	6.50
PS-30 Systems p/s w/cord, 6-pin plug	259.95 234 <sup>95</sup>
OPC Opt. cord, specify 2, 4 or 6-pin	10.00
SP-3 External speaker	54.50
SP-7 Small external speaker	49.00
CR-64 High stab. ref. xtal (745/751)	56.00
PP-1 Speaker/patch (specify radio)	139.00 129 <sup>95</sup>
SM-8 Desk mic - two cables, Scan	69.95
SM-10 Compressor/graph EQ, 8 pin mic	119.00 109 <sup>95</sup>
AT-100 100W 8-band auto. antenna tuner	399.00 359 <sup>95</sup>
AT-500 500W 9-band auto. antenna tuner	499.00 449 <sup>95</sup>



## Check the Prices at AES!

<i>Other Accessories cont.</i>	
AH-2 8-band tuner w/mount & whip	Regular SALE 549.00 489 <sup>95</sup>
AH-2A Antenna tuner system, only	429.00 389 <sup>95</sup>
GC-4 World clock • (CLOSEOUT) •	99.95 69 <sup>95</sup>
GC-5 World clock	79.95
<i>HF linear amplifier</i>	
IC-2KL 160-15m solid state amp w/ps	Regular SALE 1795.00 1389

<i>6-meter VHF Portable</i>	
IC-505 3/10W 6m SSB/CW portable	Regular SALE 469.00 419 <sup>95</sup>
BP-10 Internal Nicad battery pack	79.50
BP-15 AC charger	12.50
EX-248 FM unit	49.50
LC-10 Leather case	34.95

<i>VHF/UHF base multi-modes</i>	
IC-551D 80W 6-meter SSB/CW	Regular SALE 735.00 649 <sup>95</sup>
EX-106 FM option	125.00 112 <sup>95</sup>
BC-10A Memory back-up	8.50
IC-271A 25W 2m FM/SSB/CW	735.00 649 <sup>95</sup>
AG-20 Internal preamplifier	56.95
IC-271H 100W 2m FM/SSB/CW	944.00 789 <sup>95</sup>
AG-25 Mast mounted preamplifier	84.95
IC-471A 25W 430-450 SSB/CW/FM xcvr	839.00 729 <sup>95</sup>
AG-1 Mast mounted preamplifier	89.00
IC-471H 75W 430-450 SSB/CW/FM	1149.00 989 <sup>95</sup>
AG-35 Mast mounted preamplifier	84.95

<i>Accessories common to 271A/H and 471A/H</i>	
PS-25 Internal power supply for (A)	99.00 89 <sup>95</sup>
PS-35 Internal power supply for (H)	169.00 149 <sup>95</sup>
PS-15 External power supply	149.00 134 <sup>95</sup>
SM-6 Desk microphone	40.00
EX-310 Voice synthesizer	41.25
TS-32 CommSpec encode/decoder	59.95
UT-15 Encoder/decoder interface	12.50
UT-15S UT-15S w/TS-32 installed	79.95

<i>VHF/UHF mobile multi-modes</i>	
IC-290H 25W 2m SSB/FM, TTP mic	Regular SALE 549.00 479 <sup>95</sup>
IC-490A 10W 430-440 SSB/FM/CW	649.00 569 <sup>95</sup>

<i>VHF/UHF 1.2 GHz FM</i>	
IC-27A Compact 25W 2m FM w/TTP mic	899.00 349 <sup>95</sup>
IC-27H Compact 45W 2m FM w/TTP mic	429.00 379 <sup>95</sup>
IC-37A Compact 25W 220 FM, TTP mic	449.00 349 <sup>95</sup>
IC-47A Compact 25W 440 FM, TTP mic	489.00 429 <sup>95</sup>
PS-45 Compact 8A power supply	112.95 99 <sup>95</sup>
UT-16/EX-388 Voice synthesizer, 47A	31.00
SP-10 Slim-line external speaker	31.95
IC-3200A 25W 2m/440 FM w/TTP	569.00 469 <sup>95</sup>
UT-23 Voice synthesizer	31.00
AH-32 2m/440 Dual Band antenna	32.95
Larsen PO-K Roof mount	20.00
Larsen PO-TLM Trunk-lip mount	20.18
Larsen PO-MM Magnetic mount	19.63

IC-1271A 10W 1.2 GHz SSB/CW Base	1049.00 929 <sup>95</sup>
PS-25 Internal power supply	99.00 89 <sup>95</sup>
EX-310 Voice synthesizer	41.25
TV-1200 ATV interface unit	115.00 106 <sup>95</sup>
UT-15S CTCSS encoder/decoder	79.95
IC-120 1W 1.2 GHz FM Mobile	499.00 449 <sup>95</sup>
ML-12 1.2 GHz 10W amplifier	339.00 299 <sup>95</sup>

<i>Repeaters</i>	
RP-3010 440 MHz, 10W FM, xtal cont	Regular SALE 1049.00 949 <sup>95</sup>
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1259.00 1129
Cabinet for RP-1210 or 3010	269.00



### Hand-held Transceivers

Deluxe models	Regular SALE
IC-02AT for 2m	369.00 299 <sup>95</sup>
IC-04AT for 440 MHz	399.00 339 <sup>95</sup>

Standard models	Regular SALE
IC-2A for 2m	239.00 189 <sup>95</sup>
IC-2AT with TTP	269.50 209 <sup>95</sup>
IC-3AT 220 MHz, TTP	299.95 249 <sup>95</sup>
IC-4AT 440 MHz, TTP	299.95 249 <sup>95</sup>

<i>Accessories for Deluxe models</i>	
BP-7 425mah/1.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger for all batteries	74.95
BC-60 6-position gang charger, all bafts	SALE 349.95
BC-16U Wall charger for BP7/BP8	19.95
LC-11 Vinyl case	18.49
LC-14 Vinyl case for Dlx using BP-7/8	18.49
LC-02AT Leather case for Dlx models w/BP-7/8	39.95

<i>Accessories for both models</i>	
BP-2 425mah/7.2V Nicad Pak - use BC35	42.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	31.25
BP-4 Alkaline battery case	13.75
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	10.75
CP-10 Battery separation cable w/clip	19.99
DC-1 DC operation pak for standard models	18.75
EX-390 Bottom slide cap	4.95
MB-16D Mobile mtg. bkt for all HTs	21.99
LC-2AT Leather case for standard models	39.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	39.00
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier	SALE 89.95
SS-32M Commspec 32-tone encoder	29.95

<i>Receivers</i>	
R-71A 100 kHz-30 MHz, 117V AC	Regular SALE \$849.00 689 <sup>95</sup>
RC-11 Infrared remote controller	59.95 49 <sup>95</sup>
FL-32 500 Hz CW filter	59.50
FL-63 250 Hz CW filter (1st IF)	48.50
FL-44A SSB filter (2nd IF)	159.00 144 <sup>95</sup>
EX-257 FM unit	38.00
EX-310 Voice synthesizer	41.25
CR-64 High stability oscillator xtal	56.00
SP-3 External speaker	54.50
CK-70 (EX-299) 12V DC option	10.95
MB-12 Mobile mount	21.99
R-7000 25 MHz-2 GHz scanning rcvr	969.00 849 <sup>95</sup>
RC-12 Infrared remote controller	TBA
Voice synthesizer	TBA
AH-7000 Radiating antenna	89.95 (6)

**HOURS • Mon. thru Fri. 9-5:30; Sat. 9-3**  
 Milwaukee WATS line: 1-800-558-0411 answered evenings until 8:00 pm Monday thru Thursday.  
**Please use WATS lines for Ordering**  
 use Regular lines for other Info and Service dept.

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

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

# AMATEUR ELECTRONIC SUPPLY® Inc.

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

## AES® BRANCH STORES

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

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

**CLEARWATER, Fla. 33575**  
 1898 Drew Street  
 Phone (813) 461-4267  
 No In-State WATS  
 No Nationwide WATS

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

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



## STILL LOOKING FOR QUALITY AT THE RIGHT PRICE? WIRE & CABLE

- RG-213 MIL. SPEC. 97% SHIELD ..... 29.5¢/ft
  - RG-214 MIL. SPEC. DBL. SILVER SHIELD ..... 51¢/ft
  - RG-174 MIL. SPEC. 97% SHIELD ..... 10¢/ft
  - RG-8X (MINI 8) FOAM, 95% SHIELD ..... 12.5¢/ft
  - RG-8U FOAM 95% SHIELD ..... 24.5¢/ft
  - RG-58A/U MIL. SPEC. 97% SHIELD ..... 12¢/ft
  - RG-11A/U MIL. SPEC. 97% SHIELD ..... 28¢/ft
  - RG-58U MIL. SPEC. 97% SHIELD ..... 12¢/ft
  - 300 OHM KW TWIN LEAD ..... 16¢/ft
  - 450 OHM HD LADDER LINE, POLY INS. .... 10¢/ft
  - 450 OHM HD LADDER LINE, BARE, 250 FT ROLL \$30.00
  - 4 CONDUCTOR ROTOR CABLE ..... 9¢/ft
  - 6 CONDUCTOR ROTOR CABLE ..... 14¢/ft
  - 8 CONDUCTOR ROTOR CABLE (2#18/6#22) ..... 16.5¢/ft
  - 8 CONDUCTOR ROTOR CABLE HD (2#16/6#18) ..... 34¢/ft
  - 14 GA STRANDED COPPERWELD, 70 FT ROLL ..... 56.50
  - 14 GA STRANDED COPPERWEL D, 140 FT ROLL \$12.00
  - 14 GA HD STRANDED COPPER ..... 80¢/ft
  - 12 GA HD SOLID COPPERWELD ..... 10¢/ft
  - 14 GA HD SOLID COPPERWELD ..... 9¢/ft
- \*SOLD IN CONTINUOUS LENGTHS TO 5000 FT IN 50 FT MULTIPLES ONLY

### MINIMUM WIRE ORDER-100 FEET PHILLYSTRAN GUY CABLE



- HPTG 2100 (2100RATING) ..... 24¢/ft
- HPTG 4000 (4000RATING) ..... 40¢/ft
- 9901 CABLE END ..... 7.50
- SOCKETFAST POTTING COMPOUND ..... 14.50

### AVANTI ANTENNAS (ANTENNA SPECIALISTS)



- AP-151.3G 2M ON GLASS ANTENNA ..... 30.95
- AP-450.3G 440 ON GLASS ANTENNA ..... 30.95
- APR450.5G 440 ON GLASS ANTENNA ..... 34.00

### ASTRON CORPORATION

#### ASTRON POWER SUPPLIES

- RS7A/RS12A ..... 44.99/62.50
- RS20A/RS20M ..... 79.75/96.00
- RS35A/RS35M ..... 123.50/138.50
- RS50A/RS50M ..... 179.50/202.99
- VS20M/VS35M ..... 113.99/158.50
- VS50M ..... 222.99

CALL TOLL FREE - ORDERS ONLY PLEASE!

**800-637-3300**  
**MINIMUM ORDER 20.00**  
**PA and CUSTOMER SERVICE**  
**814-536-5500**

### SHIPPING CHARGES ADDITIONAL LA CUE inc.

132 Village Street  
Johnstown, PA 15902

Mon.-Fri. 8:30-5:00

### 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. Q, P.O. Box 20491  
Indianapolis, IN 46220-0491

BUSINESS SIZE BASE GETS DETAILS

present. We still are looking for two PIAs mostly in the central and southern part of the state. Contact NQ0W or WB0AVW if interested. There were several people in attendance at Humboldt to honor K0GPF. Ivan for his contribution for public service and helping several hams in the area in getting new license or upgrading. C. Rapids Hamfest Aug. 2-3. I sure appreciate all the news letters from the various clubs around the state, you did also like to receive newsletters from those who are not doing so now. They help keep me informed of activities and for info for the QST

NET	QNI	QTC	SESS	TIME	DAY	MGR
75 Mir. noon	1282	106	27	1830	Dy	WB0JFF
75 Mir. eve	801	73	26	2330	Dy	N0AEF
ITEN	92	11	4	1830	Dy	K0DBG
ICN	60	14	12	8:00 PM	M-W-F	N00J
TLCN	279	102	80	0930-0400	Dy	W0YLS

Traffic: W0SS 158, KA0ADP 120, K0GPF 93, K0CXL 78, W0YLS 71, K0BRE 57, W4JL 50, KA0GSA 36, WB0AVW 35, WB0JFF 29, K0JJI 20, N0AEF 16, W0G 12, W0BW 14, N0QW 4. (Mar.) K0TFT 52, KA0SNL 13, K0BRT 9.

**KANSAS:** SM, Robert M. Summers, K0BFX—SEC: N0BLD, DIST: W0OYH. Net Manager K5B0JUF. W0PFC—Net Mgr QK5. W0BZEN. Ks FTY Mgr. KA0CJF. District Emergency Coordinators are W0CAF, W0CFZ, and W0EB. STATE Govt Liaison is N0GLD. Tech. Coord is W0B0N0M. Bulletin Mgr, K0JDD. ACC, K0BFX and Manager of QCS-SS is W0M0Y. Packet Radio is coordinated for KS by W0DBRZ and the WX NET by W0B0XZ. Net activity for March is as follows: K8BN QNI 1413 QTC 219. KFN QNI 443 QTC 33. KWN QNI 896 and QTC 696. KMWV QNI 691 QTC 656. CSTN QNI 2166 QTC 56. Net Mgr is W0DE, even though from Missouri, a KANSAN at heart! QK5 QNI 200 QTC 47 and QK5-SS QNI 40 QTC 13. K5 RTTY QNI 65 QTC 6. W0PB reports that Zone 1 ARS net continues to have 20 or more QNI each Monday night with 3 states represented thru the Hiwatha Repeater. TABLE TO COPY W1AW for the bulletin by N0G0C schedule: 3805 KHz Mon. thru Fri. 1330 UTC and 7093 KHz Mon. thru Fri. 1730 UTC RTTY 100 WPM. He also sends special bulletins and to local 2-meter machines. The stormy season is approaching. I trust each of you are prepared to be of assistance to your local community if the need arises. Traffic (Mar.): W0PFC 373, N0G0C 365, W0QBK 294, W0PFR 235, W0OYH 90, K5MJ 88, W0B1 87, W0A0CZ 81, K0BFX 81, W0C0DJ 70, N0BZ 49, W0BZEN 32, W0M0Y 19, W0R0B 11, W0C0J 10, W0PB 6, N0APJ 4.

**MISSOURI:** SM, Benton C. Smith, K0PCK—The Jefferson Barracks ARC officers for 1986 are, Pres. W0SILK, VP. W0DEMS, Sec. K0JEM and Tres. N0G0K. The St Peters ARC will hold their second annual September Swapfest Sunday Sept. 28. For more information, contact Joe Rordan, K0G0, 2760 HWY 40, O'Fallon, MO 63366. When I received W0G0L's monthly QRS report, Lon informed me he has been on the air for 58 years. I wonder if Lon knows how many log books he has filled up in all those years. On April 23, operation "Shakedown" was held. It was a test of communications in the state readying for a possible earthquake. The amateurs in Missouri turned out in large numbers to help with this drill. W0B0TOK, SEC, and K9OCU directed the amateur operation. Field appointment for the month, N0BKE, QBS, K0UAA received the Heart of America ARC "Ham of the Year" award for the second straight year.

Net Reports:

Net	Sessions	QNI	QTC	MGR
MON	60	298	148	KBSI
M0SSB	30	736	108	KTSY
M0EOW	30	518	54	K0DSQ
HBN	22	336	94	K0DSQ
MTTN	16	58	8	N0BKE
LO BRK CLUB	26	511	0	W0RTJ
RRARSBN	28	358	9	KADLLN
CMEN	6	93	0	K0PCK
ARES	5	75	2	N0PQW
Tri-Co	4	64	0	K0AIO
LOFM	4	81	0	W0RTJ
LOCW	4	15	0	W0RTJ
JC ARES	5	49	0	W0B0DX
SARN	2	49	0	W0ENW
MOFO	4	31	3	A0O
Leb. ARES	4	41	0	W0BRHC
MCARES	4	55	0	W0BELJ
ZAEN	10	99	7	NEOQ

Traffic: K0SI 158, A0O 147, W0BMA 88, KTSY 74, K0PCK 62, W0OUD 57, N0QW 54, K0DSQ 39, K0ORB 35, W0B0CJB 35, W0WJX 31, K0WJY 31, N0DN 30, N0R 28, N0BKE 25, N0GE 18, K9OCU 16, N0SS 16, W0G0L 2.

**NEBRASKA:** SM, Vern Wirka, W0G0QM—STM: Jerry Kohn, W0DEGK. The Midway Amateur Radio Club of Kearney reports 393 persons registered for the Nebraska ARRL state convention this past April. 252 persons registered for the banquet. The Midway Amateur Radio Club also reports there is now a net every Sunday at 9:00 PM local time on 43.9 MHz. Club repeater with W0B0WVZ as net control. The AK-SAR-BEN Radio Club of Omaha operated a special event station for Armed Forces Day at Offutt Air Force Base. The battery powered station was operated from a C-133 airplane. The AK-SAR-BEN Radio Club monthly publication "Ham Hum" is now available on cassette for the visually impaired. The free "Ham Hum" cassettes can be obtained by contacting K0QVL in Omaha. The Victoria Springs Hamfest is July 25-26-27. All of your club newsletters, monthly stations reports and all other pieces of information are appreciated. Please change your records to show the new address for your section manager: 5106 Victoria, Omaha, Nebraska 68105. The phone number is 402-343-4574. Traffic: K0DKM 152, W0K0K 82, W0B0K 16, K0QCB 9, W0B0GM 9, N0OQ 6.

### NEW ENGLAND DIVISION

**CONNECTICUT:** SM, Robert J. Koczur, K1W0G—STM: K1EIC. SEC: K1ECL. BM: K3ZJJ. ACC: KGT1M. CO/RR: NA1I. TC: W1HAD. PIO: KX1B. SGL: K1AH.

NET	FREQ	LOCAL TIME	QTC	QNI	NET
CN	3840	1900/2000	194	313	K1EIR
CPN	3965	1800 M-S	84	256	K1AHT
NVTN	22/68	2130	26	200	N1B0W
WCN	7818	0330	188	583	W1GXZ
RTN	13/73	2100	32	277	K1AJN

We have been supplied with lots of info for the column this month, so here goes. From Tri-City A.R.C.—On July 20 they will have their 3rd annual expedition on Flat Hammock Island on L.I. Sound. QSL w/assive via Tri-City ARC, PO Box 686. Groton, CT. 06340. From your SEC K1ECL—Congrats to new appointments, N1DCS, Caesar, West Haven; N1DMV Mike, New Milford; W1A1NWJ, Bob, Lakeside. From NA1I—With deregulation of the amateur bands comes more responsibility for every ham operator. Volunteers are needed urgently for the O.O. program. If you have a tech license or higher and have been an active ham for about 4 years, consider an appointment for an O.O. For additional info contact: NA1I, 122 Columbus Ave., Meriden, Ct. 06450. From K3ZJJ—West Haven ARC ran an emergency preparedness drill on May 17 in cooperation with the Veterans Hospital. The drill simulated the receipt of an unexpected number of overseas casualties

for treatment under emergency conditions. The mayor of West Haven designated May 17 as West Haven Amateur Radio Club Civil Preparedness Day. SARA received high praise from city and race officials for their excellent handling of radio communications on April 13 for the Stamford Marathon. Over 35 operators participated with operators at each mile post and water station. Red Cross and medical centers and at the Marathon command center. FARA is holding its annual Dogwood QSO party and will issue distinctive certificates. The club station, W1B1CQO, will provide the public with free message service and expects to achieve BPL for the third time. The Fairfield Norwalk, Stamford and West Haven ARA's will be sponsoring the first annual Fairfield County Hamfest on Sept 7 at the Norwalk Armory. The hamfest will feature an ARRL forum, technical seminars, VE exams, a flea market and distributor exhibits. Mary, W1BGXZ rpts 98% rep to F.R.N. for April. That's all for this month. 73s. Traffic: W1BGXZ 308, W1EWF 224, W1C0M 148, K1IMK 145, N1DMA 85, K1ASWE 82, N1DMV 73, W1UNM 68, N1B0W 65, KY1E 50, W1W1P 47, K1ATB1 46, K1A0E 40, W1B0N 30, W1B4F2 24, W1B4FC 24, K1K1AG 23, W1Y0L 18, W1A1N1L 13, W1B1EFJ 13, K1A1NKE 13, W1C0UH 7, W2QV 7.

### EASTERN MASSACHUSETTS: SM, Luck Hurdur, KY1T

ASTM: K9HI SGL: K3HI CO/AA: K1AE SEC: K81PA STM: W1U1. ACC: K1AJZ. TC: K1L1L. PIO: K1ECL.

NET	MGR	FREQ	TIME/LOCALITY	QTC	QNI
EMRI	N1AJJ	3658	1900/2200 DY	239	340
EMRIPN	N1B0W	3880	1730 DY	188	245
EM2MN	K1AGM	145.23	2050 DY	170	363
NEEPN	K1BZD	3945	0830 SN	9	48
HHTN	W1B0CM	04/64	2330 DY	124	428
EMR1SS	N1CVC	3715	1600/2030 DY	106	215
C1TN	K81AF	745/045	1930 DY	130	283

Congrats to PIO K1HLZ, ACC K1AZZ, WA1IDA, and the countless others who succeeded in making the Boston Museum of Science Amateur Radio project a huge success. No small feat, and a job well done by Bill State Government Liaison K3HI busily contacting legislators on Beacon Hill & trying to keep his head above water at school. Section Traffic Manager K1U1. Net Managers, and many dedicated traffic handlers had ample opportunity to exercise their skills this month with both the Boston Museum of Science traffic effort and the ever-increasing output from Mass Maritime Academy vessel Patriot State. K1AE, W1B4XD, and K1A10N furiously pounding their keys as N1B0T/MM bobs their and you with 600 cadets aboard, sending traffic to family & loved ones. Technical Coordinator K1U1 reports another increase in the number of ATCs who've volunteered to assist those in need of technical advice. W1EJESY ARS reports that not only has their well-attended classes been completed for the year, but that the General class is in full swing AND plans for the Advanced class are well under way. Talk about a club that follows thru! Traffic: KW1U 753, KN1K 454, K1ASM 415, N1B0W 392, W1ATBY 315, W1A1FD 272, K1B1AF 264, W1ZCH 259, W1TKZ 258, KY1T 249, N1B1H 235, W1B1CM 148, K1ESEC 126, N1CVE 118, K1A10N 106, K1A1MR 105, N1AJZ 87, N1DDC 75, K1G1RP 74, K1B1PA 71, K1A1E1 64, K1A1B 50, K1B1A 53, W1CE 33, W1DMW 32, K1A1LH 29, K1A1LZ 24, N1B1S 20, N1D1V 14, W1A1FNM 13, K1LCO 9, W1BSNH 9, K1A1LK 2 - HAVE YOU EXPRESSED YOUR OPINIONS TO YOUR SECTION MGR AND/OR DIVISION DIRECTOR LATELY? 73

**MAINE:** SM, Cliff Laverty, W1RWG—ASM: W1KX, SEC: K8AUVG, STM: AKG, ACC: KY1C, BM: W1JTH, COO: W1KX, PIO: KY1SGL, K1N1T, K1E1F, W1Y1 with pleasure that I announce the appointment of Sally Dawson, K8AUVG, of Winthrop, Maine, as Section Emergency Coordinator. Her first official action was to appoint Tom Winsor, K1A1UN, EC of Oxford County. St. Albans hamfest has been set for Sunday Aug 10 with camping available from Thurs. Windsor Hamfest is set for Sat Sept 6, camping Fri-Sun.

Net

Sessions	QNS	QTC	Manager
SeaGull	26	883	123 K1GUP
L Pine Tree	22	76	12 W1A1NZ
CntlMeEmmer(Mar-Apr)	17	290	32 W1WCI
AroostookEmer	5	86	W1A1NZ
MePubSvc	4	63	2 K1FUG
RACES	4	97	4 W1RWG

I need more info about your club, net, and personal activities for this column. PSHR: W1A1NZ, W1B1CBP, W1RWG, N1B1JW, Traffic: AK1W 126, W1ISO 101, W1B1CBP 81, W1RWG 57, N1D1A 47, W1KX 41 (Mar 47), W1B1MX 38, N1B1JW 36, W1JTH 31, W1A1NZ 26, K1A1J0J 23, W1G0B 14, W1VEH 9, W1Q0T 6, W1IDA 5, K1A1FTL 5.

**NEW HAMPSHIRE:** SM, Bill Burden, W1B1RE—CO: N1NH, PIO: W1A2MBQ. Another busy month around the section! Our featured club is the Central NH Amateur Radio Club. They meet the first Tuesday of each month in Gilford. This is a technically oriented club with a great pool of engineers and communications specialists. Club president W1JY reports that they held their first volunteer exam in April coordinated by Bill N1AYT. They have just completed the largest Novice class in the state (so far) graduating about a dozen students. Dick N1LT who was instructor said that several graduates had already upgraded—their all the way to Extra! The club members are providing help to get the new folks on the air. Weekend breakfast gatherings are planned to increase social activities and to help new members get acquainted. Look in on the CNHARC if you are in the lakes region this summer! (147.9939). AROUND THE STATE—We ran the ARRL booth at the GBARA fleamarket in Dover this month. Thanks to W1NH, K1A1LDS and W1JY and other sections staffers for assisting. Many questions and good "QSO's". March of Dimes WalkAmerica walkathons and other public service activities supported by NARC, GBARA, W1A1RE, W1C1Y, W1S1A, and CVFMA. The Mt Mariah club in Salem had another successful volunteer exam with 19 candidates with total pass rate of 45%. The Nashua club reported 8 new novices from their class. TRY THIS—many non-hams listen to repeaters on scanners. Make sure club activities are announced often and "invited" listeners to meetings. Let them know when classes are scheduled—they are already interested and are a good source of new Ham! Traffic: GFSM 210, N1N 141, GSPN 47, N1CPX 363, W1HPEX 254, N1NH 218, KX1E 145, K8U0X 127, W1TN 99, W1ALE 71, N1AKS 69, K1IM 49, K1X1J 47, K1TQY 45, K1PQV 39, W1Y1R 15, W1B1GM 14, K1A1HP 11, W1A1YZN 6, N1ALM 5.

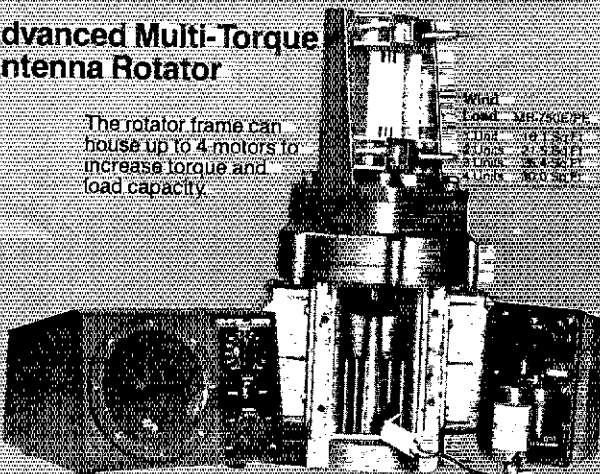
**RHODE ISLAND:** SM, John Bob Vota, W1B1FDY—I received a copy of The Networks, a newsletter for active traffic handlers, and was very much impressed with the ARRL, to be, or not to be, if you have not read this article please do so, I think you will be interesting. Becoming the BVARC Mass group, another club news letter and it looks like a very active group. I wish I could put all of the info I receive in the section news, but I am limited, but please keep sending them and I will get as much as I can. I hope the BVARC group enjoyed their trip to the Wireless Museum VE sessions still going strong. Clubs active BVARC OSARG, NPARC, EBWA, Please advise ur SM of up coming sessions. Traffic: K1AJXH 17, W1E0F 130, W1A1CY 30.

# Superior Ham Accessories

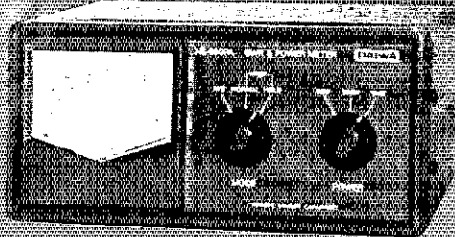
## Advanced Multi-Torque Antenna Rotator

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

Wind Load	MR-750/PE	MR-300E
11 mph	19.75 lb	1.92 lb
23 mph	79.25 lb	7.68 lb
35 mph	178.75 lb	17.28 lb
47 mph	318.25 lb	31.68 lb



## New Cross Needle SWR/Power Meters for All Bands



15° angle face for easy reading and operation

Model*	Freq. Range	Forward Power	Tolerance Full Scale	Connectors
860A	1.8-150 MHz	20/300 W/3 kW	±10%	SO-239
860PA	1.8-150 MHz	30/300 W/3 kW	±10% Av Pwr ±15% PEP	SO-239
863A/N	140-625 MHz	30/300 W/3 kW	±10%	SO-239/N Type
888	900 MHz-1.3 GHz	1.5/150 W	±10%	N Type

\*Optional sensors adapt each meter for use on other bands

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

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

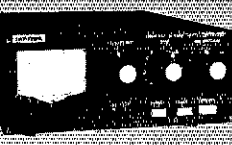
### Specifications

#### Rotator Unit

Rotation time	MR-750E/PE		MR-300E	
	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)	33 seconds (60 Hz input)
50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)	39 seconds (50 Hz input)	39 seconds (50 Hz input)
Output torque	1 motor	610 lbs/inch 5,200 lbs/inch	220 lbs/inch 1,700 lbs/inch	
	2 motor	1,200 lbs/inch 9,600 lbs/inch	440 lbs/inch 3,500 lbs/inch	
Brake power	3 motor	1,800 lbs/inch 13,900 lbs/inch	650 lbs/inch 5,200 lbs/inch	
	4 motor	2,400 lbs/inch 18,300 lbs/inch	870 lbs/inch 7,000 lbs/inch	
Rotation angle	375 degrees			
Permissible mast size	1½ - 2½ inch (38 - 63 mm) < diameter >			
Control cable	6-wire cable 0.5sq - 1.25sq (AWG16/18/20 etc.)			
Continuous running	5 minutes Max. permissible			
Dimensions	15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)			
Unit weight	16.5 lbs (7.5 kg) < with 1 motor unit fitted >			

#### Controller Unit

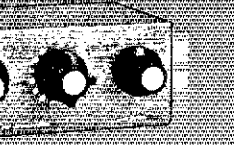
	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set



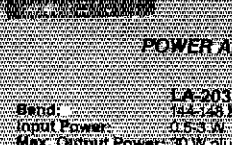
**CNW-518**  
Frequency: 2.5-30 MHz (8 bands)  
Power: 1 kW CW (50% duty)  
Impedance: 10-250/25-100 ohm (On 3.5 MHz)



**CNW-419**  
Frequency: 1.8-30 MHz (17 bands)  
Power: 200W CW (3.5-30 MHz), 200W CW (100W CW (1.8-3.4 MHz), 100W CW (1.8-3.4 MHz), 10-250ohm



**CL-680 (no metering)**  
Frequency: 1.8-30 MHz (17 bands)  
Power: 200W CW (3.5-30 MHz), 200W CW (100W CW (1.8-3.4 MHz), 10-250ohm



**CRW-919**  
Frequency: 140-150 MHz  
Power: 200W CW (3.5-30 MHz), 200W CW (100W CW (1.8-3.4 MHz), 10-250ohm



### External Sensors (For indoor/outdoor use)

Permit operation over range of 1.8 MHz through 1.3 GHz. Optional for use with NS-860 series meters.  
 (860) 1.8-150 MHz, Max 3kW, SO-239 Connectors  
 (863) 140-625 MHz, Max 300W, SO-239 Connectors  
 (888) 900-1300 MHz, Max 300W, N Type Connectors  
 (863A) 140-625 MHz, Max 300W, N Type Connectors  
 (888) 900 MHz-1.3 GHz, Max 300W, N Type Connectors  
 (863A) 140-625 MHz, Max 300W, N Type Connectors

### SWR & POWER CROSS NEEDLE METERS

**CN-820B and CN-720B**  
Frequency Range: 1.8-150 MHz  
Power Range: Forward 200/2000 W (Reflected 470/400 W)

**NS-448**  
Frequency Range: 300 MHz - 1.3 GHz  
Power Range: Forward 3/30 W (Reflected 3/30 W)  
Separate Sensor Type

**CN-820** Frequency Range: 1.8-80 MHz, Power Range: Forward 200/2000 W, Reflected 470/400 W

**CN-650** Frequency Range: 140-250 MHz, Power Range: Forward 10/100 W, Reflected 25/250 W

**CN-410M** Frequency Range: 3.5-150 MHz, Power Range: Forward 15/150 W, Reflected 3/30 W

**CN-480M** Frequency Range: 140-450 MHz, Power Range: Forward 15/150 W, Reflected 3/30 W

**CN-485M** Frequency Range: 140-450 MHz, Power Range: Forward 15/150 W, Reflected 3/30 W

Back Lit, with mobile bracket

### POWER AMPLIFIERS

**LA-2035R** Band: 144-148 MHz, Input Power: 0.5-3 W, Max. Output Power: 30 W plus

**LA-2065R** Band: 144-148 MHz, Input Power: 0.5-3 W, Max. Output Power: 60 W plus

**LA-4040R** Band: 280-450 MHz, Input Power: 10 W, Max. Output Power: 28 W

**LA-2155W** Band: 144-148 MHz, Input Power: 10-35 W, Max. Output Power: 30-150 W

Model	Maximum IF Continuous I	Output VDC
PS-3DXM	31A/24A	1-15
PS-310M	31A/24A	3-14.5
PS-310MD*	31A/24A	13 B
PS-600MD*	56A/44A	13 B

\*Sub-DC Outputs: 5.6A/4A, 5-14.5 VDC  
 \*Sub-DC Outputs: 10.6A/15 VDC

### POWER SUPPLIES



### COAXIAL SWITCHES

PAT. No. 59-000803

**CS-201** 2-position, 600 MHz Connectors, VSWR: Below 1:1.2, Insertion Loss: Less than 0.2 dB

**CS-201G** 2-position, 1.3 GHz N Type

**CS-401** 4-position, 800 MHz SO-239

**CS-401G** 4-position, 1.3 GHz N Type

**CS-4** 4-position, 1.3 GHz BNC type



### AUDIO FILTERS

**AF-605K**  
Four stages of filtering... variable bandwidth over broad range... razor sharp CW reception... built-in speaker... PLL Tone Decoder circuitry

### ELECTRONIC KEYS

**DK-210**  
Sharpen your "list" with Daiwa precision



**DAIWA U.S.A. INC.**  
1908A Del Amo Blvd.  
Torrance, CA 90501  
(213) 212-6057

MADE BY DAIWA INDUSTRY CO., LTD., TOKYO, JAPAN



**Toroid Cores.  
Iron Powder  
& Ferrite.  
Ferrite Beads.  
Ferrite Rods.**

Free catalog and winding chart on request.

# PALOMAR ENGINEERS

Box 455, Escondido, CA 92025  
Phone: (619) 747-3343

**WORLD FAMOUS**  
**CURTIS KEYSERS** **New**  
Write for Brochures **8044ABM-\$19.95**  
8044/8044B still \$16.70 ppd (plus \$1.75 shipping)  
**CURTIS ELECTRO DEVICES, INC.**  
(415) 964-3846  
Box 4090, Mountain View CA 94040

CW RTTY CW RTTY CW RTTY CW RTTY CW  
**APPLE II USERS**  
TRANSMIT/RECEIVE SOFTWARE FOR THE APPLE II  
NO OTHER HARDWARE REQUIRED  
CODE MACHINE \$29.95  
RTTY MACHINE \$29.95  
**COTEC**  
13462 HAMMONS AVE - SARATOGA, CA 95070

**VERMONT:** SM, Ralph Stetson, KD1R—Don't forget the BARC Hamfest is to be held at the ESSEX FAIRGROUNDS on Rte 15 Essex Junction, August 9 and 10. Not, repeat, NOT the Old Lantern Campgrounds!!! Contact Roger, WA1OZE, c/o BARC, PO Box 312, Burlington, VT 05402. As most of you who have been reading this column know, I have been looking for the Youngest Ham in VT. Well, she is Wendy Hession, KA1OIR, 9 years old from Pittsford. Wendy attended classes with her dad Bob, KA1OIC, and older brother, Eric, KA1OHR (he's 11). The instructors are Dutch ND1I, and Rudy, WA1DPA. The runner-up is Lawton, KA1OIN, and he is also 9 years old. ND1I is his dad. It must have been an interesting class as KA1OHP, age 10, KA1OHC, age 10, and KA1OIM XYI (nut said) were also licensed from the same effort. A real FB job by the Green Mtn Wireless Assoc. Once all the details are worked out, I will announce in next month's column what's been done for recognition of these fine young people. Along the same lines, the spring radio classes in Burlington area have new techs KA1OIS, KA1OIT, KA1OJU and KA1OIV with new generals KA1IJA and KA1OEL plus Mel awaiting his tech license and call. We really have a lot to be proud of here in the Green Mtn state with such an impressive group of new Hams, young and old, along with their patient Elmers. To all you, I wish a hearty welcome and thanks. Also understand that W1HJX came home a happy Extra from the April exam session in Montpelier along with several others whose calls I don't have. Next exams are July 12, Montpelier. Contact K1HKH. And August 10 at BARC Fest. Contact WB2JSJ. Well now that FD '86 is over, do you have any interesting pictures, slides or videos you would like to share. If so, please forward them to me at PO Box 123, Milton, VT 05468. More next month; running out of space. Don't forget while the long hot days of summer are upon us that those nuts you attended so faithfully last winter are still meeting and are only as good as your participation. Think about it!! Traffic: KT1O 532, WA2SPL 225, AE1T 7D, N1DHT 48, W1KRV 33, W1OAK 31. NET Reports: VTN 30/192/105, CAR 26/667/33, GMN 26/368/40, VTPHN 4/75/5, CVFM 4/95/5, VSB 30/213/40, VTRFD 3/21/5.

**WESTERN MASSACHUSETTS:** SM, Don Haney, KA1T—OO/RFI: N1CM, PIO/ACC: K1BE, SEC/SGL: WB1HIH, TC: KA1JIM, STM: W1UD. The FCC Proposal to Enhance Novice Privileges has been out for a while now and the comment deadline is coming up on July 16. If you have not already done so, be sure to send them your recommendations on this proposal which could be very important to future amateur radio. Opening the Novice license up to additional modes should surely make it more attractive. And another part of it takes me back to the 50's when Novices held 100w privileges on 2 meters, in the days of AM phone. NOBARC did another super job with the Bay State Winter Game communications and had a human down-link by going ski-lit mobile. UMass ARA handled comms for first aid units at a benefit road race. Contact K1BXE if you are interested in the HORA VEC exams on July 9, an evening session. Hope all have an enjoyable summer. Buckle up and arrive alive.

### NORTHWESTERN DIVISION

**ALASKA:** SM, Jim Moody, Jr., NL7C—The Section has a new SEC. He is Steve, KL7JIM. I know we will all support him fully as he coordinates the emergency planning for Alaska. Another Field Day has successfully been completed in Alaska and lots of experience was gained by the Alaska Field Day Group while its annual picnic the weekend of 26-27 July and should be great fun and a time to meet and greet old and new friends. Packet is experiencing a tremendous growth in this section. The Fairbanks Packeteers have links with Anchorage, Tok (which will eventually reach Valdez). At this rate it will not be long before the whole state can be linked on Packet—Great Job!

**IDAHO:** SM, Lem Allen, W7JMH—Club News: Clearwater Valley ARC is conducting Novice classes, plans a Field Day activity and ARRL affiliation. Bonner County ARC meets at 7 PM, first Friday of each month at Federal Bldg, 1 mi. W. of Sandpoint on Hwy 2. Boise ARC planning more Novice and other classes, provided communications on 2 meters for the State Soccer Tournament with 15 Hams participating under leadership of K7CXK. Pocatello ARC also sponsoring Novice classes and plans Field Day activities. ARRL MATTERS: Jo Hubble, ex W6GDD) now N7HJZ is EC Bonner Co. PEOPLE AND THINGS: W7WU back from 3700-mile trip thru AZ, CA, NV, UT visiting friends and relatives, kept skeds on 40 meters with Boise. W7GCL back from VA visit to daughter for 2 wks. WA7VPW gone on month trip to Midwest area, has HF gear for skeds. N7FDX gone for 3 wks visit to IL relatives, has 2-meter gear along. N7GA and W7PKA back from AZ wintering. N7HET is now KE7MO.

NET REPORTS:

NET	FREQ-TIME	SES	QNI	QTC
FARM	2937	Lsp 9 P Da	27	1931 19
ID CID	3990	Lsp 810 A M-F	22	817 29
IMN	3635	CW 9 P Da	30	1298 75
NW TFC	146.38/98	FM 730 P Da	30	868 24

GENERAL: By all means go out on Field Day, but be extra careful with fire and gasoline. Traffic: N7BHC 207, W7GHT 120, W7JMH 34, KB7ZO 7.

**MONTANA:** SM, Les Belyea, N7AIK—WB7TWG, our ACC, has relocated to Arizona. Many tnx to her for getting our club program organized. KA7MAH, the pres of the Capitol City ARC, has accepted the position of Montana's ACC; am sure she will do a very good job. Upgrades reported: to Extra—WA7SVQ, WA7TUW, to adv—N7FFR, N7HVB, WB7FGO (now KE7PV), to gen—N7ICC, N7HYZ, KA7FVD to tech—KA7YGG, KA7MOS. New officers for RACOM: K6FE, chairman, vice-chairman—K7FDK, sec'y—KB7KB, KA7RFR is new president of the Hi-Line ARC. KE7NO, mgr of the IMNS net, is looking for more stns to check into the net. 0130Z TUE and THR on a freq of 3715 kHz. PSHR—KF7R, WB7WVD.

NET	SESS	QNI	QTC	MGR
NET	30	2262	139	KF7R
MSN	4	77	0	K0PP
IMN	30	298	75	WA7GQO
IMN	5	7	0	KE7NO

Traffic: KF7R 44, WB7WVD 34, N7AIK 24.

**OREGON:** SM, William R. Shrader, W7QMU—STM: W7VSE, SEC: N7CPA, PIO: K7YIN, SGL: KA7KSK, STC: N7ENI, ACC: KB7CC, OO: N7SC, RFI: AK7T. Upgrades: KA7YHL, KA7YLG (Novice); KA7WYW, KA7WVL, KA7YD, KA7YIL, KA7SFV, KA7RXY (Tech); KA7NSL, K7UKV, KA7WSS, N7HUC, KA7YDO (Gen); N7HUF, N7FEX, W7FYU, WB7UFB (Adv); W7FLP, N7FFC (Extra); W7PNS and his Lady proud parents of a baby boy. Congratulations to all! Rogue Valley ARC now has 100 plus paid members. Pine Mt repeater, 147.66/06 MHz, operational again in central Oregon. Hoodview ARC held their annual Spring Banquet recently to honor members of the club that DID something to help the club and to help our hobby. I was real pleased to note that a huge number of certificates were handed out most with more than one honor. Not all clubs have this participation (the same FEW do all the labor and the rest do nothing). When everyone digs

# 1986 ARRL NATIONAL CONVENTION

*feels  
san diego  
good all  
over!*  
**ADVANCE  
REGISTRATION FORM**



Find your "Sun Spot" at the

**ARRL 1986 NATIONAL CONVENTION**  
September 5, 6, & 7, 1986

**MEETING SITE**  
**TOWN & COUNTRY HOTEL & CONVENTION CENTER**  
**SAN DIEGO, CALIFORNIA**



● To Reserve a Room at the Convention Hotel or Obtain Reduced Airline Fares, Call Toll Free: California (800) 542-6082, USA (800) 854-2608. Ask for ARRL Convention Rates.

**CONVENTION INFORMATION HOTLINE: (619) 292-7918**

**REGISTRATION DATA FORM (Print or Type)**  
Mail With Check Payable to:  
**SANDARC, PO BOX 82642, San Diego, CA 92138**  
Pick Up Tickets and Badges at the door

Name \_\_\_\_\_ Call \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_  
Make Badges As Follows:  
Call \_\_\_\_\_ Name \_\_\_\_\_ City \_\_\_\_\_  
Call \_\_\_\_\_ Name \_\_\_\_\_ City \_\_\_\_\_  
Call \_\_\_\_\_ Name \_\_\_\_\_ City \_\_\_\_\_


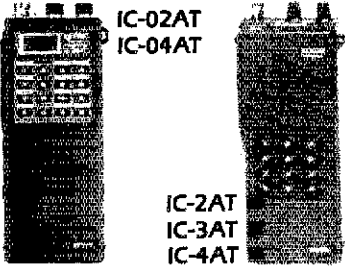
HOW MANY	COST	AMOUNT
_____ Advance Registrations	@ 7.00	_____
_____ Registration After 8/15/86	@ 10.00	_____
_____ Banquet (Prime Rib) (1st 1100)	@ 25.00	_____
_____ Dinner Cruise (1st 200)	@ 33.00	_____
_____ International Bkfst (1st 500)	@ 10.00	_____
_____ Total Enclosed	\$	_____

**Hams 18 Years & Under - Free Admission At Door**



# ICOM

THE HAM RADIO SPECIALISTS

**IC-02AT**  
**IC-04AT**

**IC-2AT**  
**IC-3AT**  
**IC-4AT**

**VHF/UHF  
HANDHELDS**




**IC-735**

New compact general coverage receiver/ham band transceiver.

**Call to Place  
Your Order**



**ALL MODE VHF/UHF  
BASE STATION**




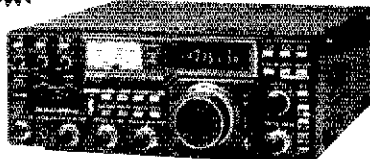
**IC-271A/H 2 Meter**  
**IC-471A/H 430-450MHz**

**IC-1271 1260-1300MHz**




**HANDHELD ACCESSORIES**

LC-14 Vinyl Case for IC-02AT ..... \$18.49  
 BC-35 Drop In Charger ..... 74.95  
 BP-2 425mA 7.2V NICAD Battery ... 42.50  
 BP-3 250mA 8.4V NICAD Battery ... 31.25  
 BP-4 Alkaline Battery Case ..... 13.75  
 BP-5 425mA 10.8V Battery ..... 49.50  
 BP-7 425mA 13.2V NICAD Battery ... 67.50  
 BP-8 800mA 8.4V NICAD Battery ... 62.50  
 HM-9 Speaker Mic ..... 39.00  
 CP-1 Cigarette Lighter Cord ..... 10.75  
 DC-1 DC OP Pack ..... 18.75  
 Leather Case for IC-2AT ..... 39.95  
 HS10 Headset for HTs ..... 19.50  
 HS10SA VOX Unit for IC-02AT ..... 19.50  
 HS10SB PTT Switch Box ..... 19.50

**IC-751A**



- All Ham Band Transceiver/General Coverage Receiver
- New Design
- 100% Duty Cycle Transmitter
- 105dB Dynamic Range
- All Modes Built-In
- 12 Volt Operation
- QSK up to 40WPM
- Built-in FL-32A 9MHz/500Hz CW Filter
- Electronic Keyer Unit Included
- 100 Watts Output
- 32 Memories
- New LED Annunciator






**IC-3200A**

Dual Band  
2M and 70CM

**IC-R71A**

.1 - 30MHz deluxe general coverage receiver



**IC-R7000**

25 - 1300MHz receiver direct entry and scanning




**IC-28A**  
**2 METER MOBILE**

- Compact size
- Large LCD readout
- 21 memory channels

**Call for YOUR Low Price!**



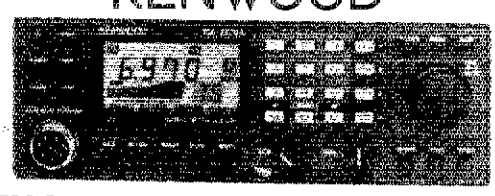
**NEW**

**KENWOOD**



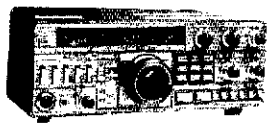
**TS-440S**

**KENWOOD**



**TM-2530 TM-2550 TM2570**  
Call For Your Price

**KENWOOD**

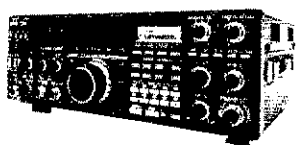


**TS-430S**

Popular transceiver with general coverage receiver for fixed, mobile or portable use.

Call for Low Price

**KENWOOD**



**TS-940S**

A new standard for competition grade transceivers and an outstanding value.

The Popular  
**TS-930S**  
Still Available

**TELEX**  
**hy-gain**

**ANTENNA PRODUCTS SALE**

**TOWERS**

- HG52SS
- HG37SS
- HG54HD
- HG70HD

**ANTENNAS**

- TH7DXS
- TH5MK11S
- EX-14

**ROTATORS**

- T2 X
- HAM IV
- CD45 II

\*Special pricing includes free shipping in the 48 contiguous states.

\*Alaska and Hawaii orders shipped freight collect-charges from Seattle only.

\*Free shipping applies to prepaid orders for towers or tower/rotator/antenna packages.

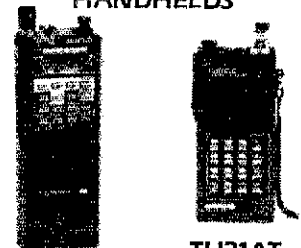
**KENWOOD**

**HANDHELD ACCESSORIES**

- HMC-1 Handset w/VOX ..... \$39.95
- SMC-30 Speaker Mic ..... 34.95
- ST-2 Base Charger for TR2600 ..... 89.95
- MS-1 Mobile Charger for TR2600 ..... 42.95
- PB-26 NiCd Battery for TR2600 ..... 36.95
- LH-3 Leather Case for TR2600 ..... 37.95
- SC-9 Soft Case for TR2600 ..... 20.95
- BT-3 Battery Case for TR2600 ..... 11.95
- PB-21 NiCd Pack for TH-21/41 ..... 19.95
- PB-21H 500 MAH NiCd Pack for TH-21/41 ..... 30.95
- BT-2 Battery Case for TH-21/41 ..... 7.95
- SC-8T Soft Case for TH-21AT/41AT ..... 10.95
- BC-6 Two-Pack Oulck Charger ..... 84.95
- BC-2 Wall Charger for BP-21H ..... 10.95
- AJ-3 BNC Adapter for TH-21/41 ..... 6.95

**KENWOOD**

**HANDHELDS**



**TR2600A TR3600A TH21AT TH31AT TH41AT**

Full line of accessories available.

**FREE UPS GROUND SERVICE ON MOST ITEMS.**



**K7HBN**  
George

**W7GAB**  
Dale

**K7DS**  
Frank

**N7GN**  
Craig

**800-426-6528**

**TOLL FREE — Including Alaska and Hawaii.**

**ATTENTION WATS CALLERS:** We have expanded our telephone hours Monday thru Friday 7:30a.m. - 5:30p.m. PST (10:30a.m. - 8:30p.m. EST) for the convenience of our East Coast and early morning buyers.

**Washington Residents:** Call (206) 784-7337

All prices, specifications and availability subject to change without notice. Washington residents add applicable sales tax. Free UPS Ground Service applies to most transceivers with related accessories excluding antennas.

**C-COMM / 6115 15th Ave. N.W. / Seattle, WA 98107**

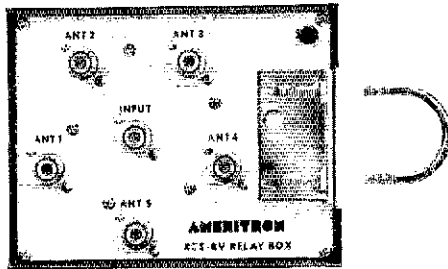
**STORE HOURS:**

- Mon.-Fri. 9:00a.m. - 5:30p.m.
- Saturday 10:00a.m. - 4:30p.m.

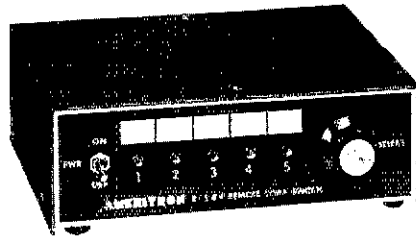
**C-COMM**

George, Dale, Frank, Craig and other knowledgeable professionals are willing to help you.

# AMERITRON REMOTE COAX SWITCHES



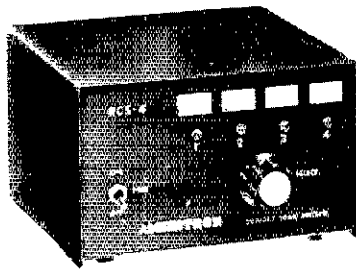
## RCS-8V High Performance From DC Through UHF



The Ameritron RCS-8V is a remote controlled coaxial switch that selects up to five coax ports. Unused coax ports can be grounded or floated. Any number of ports can be engaged at the same time. Applications include stacking of antennas, cross-switching of coaxial lines or independent selection of five separate lines to a common port. The RCS-8V operates from 120 VAC 220/240 VAC export model available.

**Specifications:** Loss at 150 MHz: less than .1 dB. VSWR: under 1.2 to 1 from DC to 250 MHz. Impedance 50 ohms. Power capability: 5KW below 30 MHz, 1KW at 150 MHz.

## RCS-4 Simple Installation For 1.8 Through 30 MHz



The Ameritron RCS-4 is a remote controlled coaxial switch that selects one of four antennas by supplying all control voltages through the coax feed line. The elimination of a control cable results in a neat and inexpensive installation. The indoor control console has bright LED antenna selection indicators. The remote relay box is tower or mast mounted with a single clamp.

**Specifications:** VSWR: Under 1.1 to 1 from 1.8 to 30 MHz. Loss at 30 MHz. Less than .05 dB. Power Capability: 1500 watts average, 2500 watts pep max.

Send for catalog of other quality Ameritron Products.

AMERITRON, Division of Prime Instruments, Inc.  
9805 Walford Avenue • Cleveland, Ohio 44102  
(216) 651-1740

## Our Very-Hard to Find Components List

### Semiconductors

MRF-208	\$12.00	MRF-9D1	\$ 1.75	MPSH-81	\$ .50	1N6263	\$ 75
MRF-240	18.40	MHW-710-1	61.00	MV2205	.58	2N2907	60
MRF-247	34.80	2N6944	10.35	LM3800	1.90	2N4401	75
MRF-309	33.81	MC1330P	1.60	LM565CN	1.85	2N5190	1.50
MRF-421	37.00	MC1350P	1.20	LM741CN	1.65	2N5192	1.50
MRF-422	41.40	MC1358P	.25	1N756A	.55	2N5194	1.50
MRF-429	46.00	MC1458P	.65	1N4001	.25	2N5989	2.80
MRF-454	20.00	MC1723G	2.80	1N4148	.30	2N5990	2.80
MRF-644	27.60	MC3405	2.50	1N4937	1.50	2N5991	3.00
MRF-646	29.90	MC78L08CP	.50	1N5400	.35	2N6486	1.25
MRF-648	33.50	MPS-2222	.35	1N5363A	2.00		

### Kemet Chip Capacitors

NPO C1210 Size - .50 ea	NPO C1210C Size - .75 ea	NPO C1813 Size-\$1.00 ea	BX C2225 Size
10 pf 75 pf 470 pf	4.7 pf	3300 pf 5600 pf 6800 pf	.33µf \$1.90
39 pf 82 pf 560 pf		.1µf BX	88µf \$3.90
51 pf 100 pf 680 pf			
56 pf 390 pf 1000 pf			

We also carry a line of VHF, UHF amplifiers and ATV equipment. Call or write for our free catalog.

**CCI Communication Concepts Inc.**  
2548 North Aragon Ave • Dayton, Ohio 45420 • (513) 298-1411

in and helps the fun begin. Public Service projects, Field Day, On the Air Contests, Swaptests, Social Events, VE Exams are just a few CLUB activities. Don't just sit there, pitch in, make your club alive and vital and make yourself useful promoting our hobby. Contact KB7CC for info on improving your club operations. Traffic: W7VSE 369, W7ZB 175, K7OVK 144, N7FXJ 109, W7HLF 53, N7BGW 44, KA7AID 43, W7FBP 43, W7LNE 10, N7DRP 38 (Mar).

**WASHINGTON:** SM, Gene Sprague, KD7G—SEC: N7DRT. ASM: KR7L. ACC: KC7PH. OOC: N7IL. STM: KD7ME. TC: W7BUN. AWARDS: Jean, WA7OII, President of the Radio Club of Tacoma has received the 1985 "Doc Spike" Inspiration Award in appreciation for leadership, inspiration, devotion to her home and family and the members of the club. Randy, NU7D, President of the Lower Columbia Amateur Radio Association was presented the "Ham of the Year" award for his work in many areas of Amateur Radio. The Radio Club of Tacoma was presented a Certificate of Merit by the Section Manager for their outstanding service to Amateur Radio at the RCT awards banquet. Congratulations to all of you. EVENTS: Annual Northwest DX Convention on July 25-27 at Renton, WA, presented by the WWDX Club. Hamfair '86 on Aug 16 & 17 at Tacoma, WA, presented by the Radio Club of Tacoma. APPOINTMENTS: W7BUN has been appointed the HF Awards Manager, and KA7HAM has been appointed the VHF Awards Manager for the Radio Club of Tacoma, a Special Service Club. Thank you both for taking on this important task. PUBLIC SERVICE: W7JIE reports that 179 Amateurs worked on 74 routes for the Diabetes Bike-O-Thon. Super job Gib, and thanks to all for making Amateur Radio look so good. No reports on the March of Dimes Walk-A-Thon, but I know Amateur Radio was involved. Kudos to the EC's, RO's and other members of the WEN team who manned their radios on the Washington Emergency Net when Mt. St Helens showed new activity in April. GEN INFO: Did you know there is a Packet Radio ragchew on 3877.5 kHz at 2000 and 145.33 (BEARS repeater) at 2100 each Thursday, local time? For 3 months this column has been sent by modem to the ARRL NETS:

Net	Freq	Time(Local)	QNI	UTC	Mgr.
WIN	3987	0930	(Washington Area)		W7GNR
WEN	3987	1830(Mon)	ARES/RACES Net		KD7G
NTN	3970	1200	3598	280	W7UJ
EWTN	146.64	1730/2230	213	209	WA7CBN
PSTS	145.33	1730/2230	440	271	W7UE
WARTS	3970	1800	8637	561	W7GC
WSN	3550	1845/2145	1324	170	W7GB
NWSSB	3946	1830	1271	332	W7VDR

(No Feb report for NWSSB) Refer to ARRL Net Directory for other Nets. APR '86 TRAFFIC: WITH SCORES: W8TWO/WO 281, W7LGB 148, W7GB 94, K7GXZ 94, WA7CBN 74, KS7I 52, W7IEU 48, N6EQZ 46, K7AJT 32, W7APS 25, K7RF 24, K7TCE 22, K7SUX 21, N7GJ 19, W7IGG 18, N7GDM 14, WA7CTS 12, KC7PH 9, K7OXL 8, N7FXM 5, KA7AEF 3, W7AIB 2, KD7ME 1 - NO INDIVIDUAL SCORES: KD7G, KR7L & KD7ME - NO CALLS OR SCORES: (Traffic was handled). Congratulations to new Amateurs and up-grades. 73.

### PACIFIC DIVISION

**EAST BAY:** SM, Bob Vallo, W6RGG—ASMs: K6ZPF and N6DHN. SEC: W6LKE. STM: K6APW. I have no report for the month of April because at the time I normally collect the material and submit it to HQ. I will be on Clipperton Island operating FOX with WA7AT, W6SZN, N7NG and A16V. I hope we worked many East Bay Section members. My regular column will resume with the May report.

**NEVADA:** SM, Joe Lambert, W8XJ—ASM: K7HRW. TC: K7ICW. Congrats to LVFRAC for its efforts to attract new hams to the hobby. Also, they have recently installed a new repeater controller on 146.94. NCT7 reports that he was on a 19-day DXpedition to Tonga with 4,000 QSOs. K7AZ recently returned from Red China. SNARS has recently become the proud owners of their own mountain top repeater site. Special thanks to FARS RFI Committee, TC K7ICW and KC7DR for helping KD7CL in his recent tower zoning victory. N7FZG was Net Control for the March of Dimes Walkathon in Boulder City, assisted by KA7GAR, KD7B, N7PFP, W8LJC, N7FSQ was Net Control for the Las Vegas Walkathon assisted by KW6HF, W7EQI, N7HSS, N7BJH, N7UN and W7VXK and Roger Dust RA. Congrats to our Section Manager, Joe Lambert, for receiving his ARRL 40-year pin!

**PACIFIC:** SM, Army Curtis, AH6P—Aloha and hula adai to all of the Pacific. New calls on Maui: W6BEG now NH6FT, K6JMG now K6JZ, K6JZ ten international novices so far this semester at Waimea High School on Kauai. March of Dimes walk-a-thons saw KH6JJC, KH6DRT, AH6CG, and KH6S helping on Kauai, KH6UJ and KH6JWB walking while 13 others helped on Maui, and AH6G, W6BBDH, NH6FP, KH6FKG, W6B8BK, AH6GD, NH6FL, NH6FO, KA6PBB, NH6FN, K1GAO, KH6TR, NH6ES, AH6P, and KH6LE all helped on the Big Island. Outstanding job folks! FCC has assigned RM-5361 to KH6B's petition for additional novice privileges on 40. Send in those cards and letters of support! Dean also reports PROJECT 6L6 is alive and well internationally. Too good to let fall exams in hilly areas be upgraded to NH6ES, NH6FN, W6BBAV, and new licenses for James White, Daniel Pierson, and Glen Fujiwaga. NH6FL went to Oahu to get his upgrade. Very good! Traffic: KH6S 41, KH6H 21, AH6J 1.

**SACRAMENTO VALLEY:** SM, Bob Watson, W6IEW—STM: W6WIZ. SGL: N6IG. ACC & TC: W6RFF. DEC North: KF6JK. DEC Sierra: KA6GHI. We have a new Section Level Official—Paul Sewel, N6MDL has agreed to tackle the job of PUBLIC INFORMATION OFFICER for the Section. Thanks, Paul! He can appoint Public Information Assistants at the local level as recommended by clubs or local ARRL officials. SECTION NET: First Sunday each Month, 7:30 PM Net Control: W6IEW or W6RFF. Held on 146.085 (input + 600) repeater W6GAX/MR. Thanks to the Yuba/Sutter ARC for allowing the use of their repeater. Loren Young, W6BZC, an ORS and President of the Nevada County ARC reports picking up traffic at the local Sierra Center—an excellent idea. Hams can provide a real service to seniors by handling their messages, especially at holidays. Vic Longmore, KB6CFX, an ORS and OES, has upgraded to Advanced Class. Congratulations. Vic and thank you for being so faithful in sending in monthly reports; it is much appreciated. W6NWE-1 is connected into NTS via auto-store-and-forward and Bob Cloud, W6CFO is acting as temporary NTS/PACKET liaison. The Trinity County ARC, Bill Jackson, W6WOW President, has applied for ARRL affiliation. Among other activities, that club is very active in providing communications for search-and-rescue in their beautiful but rugged mountains. Traffic: N6LJY 221, W6BCL 219, W6WJZ 160, K6S 141, N6CVC 57, W6BZC 38, W6RFF 36, W6SQR 4, W6EEZ 4, WA6ERZ 2, WA6ZD 16.

**SAN FRANCISCO:** SM, Bob Smith, NA6T—Experimenters take note: QEX is now only \$6.00 per year. News: VEC info: VEC HOTLINE 408-984-8353 of Packet BBS updated weekly by KK1A (W6IKU or W6UCU-1). REDXA was out in force at IDXC at Visalia, but will they meet the FD

# EVERY ISSUE OF QST on Microfiche!!!

We are now accepting orders for the entire run of QST from December, 1915 thru December, 1985.

Now you can have access to the treasures of QST without several hundred pounds of back issues and the space they take on the shelf. Our 24 x microfiche have 98 pages each and will fit in a card file on your desk. We offer a hand held viewer for \$50.00 and a desk model for \$135.00 (or use your library).

The price is \$350 for over 1600 microfiche. Please include \$5 for shipping (USA).

Your full satisfaction is guaranteed or your money back. VISA/Mastercard accepted.

## BUCKMASTER PUBLISHING

"Whitehall" — Route 3, Box 56  
Mineral, Virginia 23117

703: 894-5777

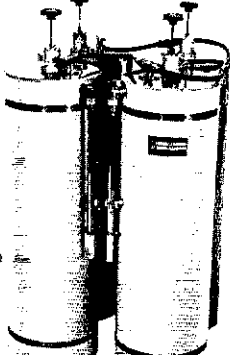
# WACOM DUPLEXERS

Our Exclusive Bandpass-Reject Duplexers  
With Our Patented

## B<sub>p</sub> B<sub>r</sub> CIRCUIT® FILTERS

provide superior performance... especially at close frequency separation.

Models available for all commercial and ham bands within the frequency range of 30 to 960 MHz.



CALL  
817/848-4435

**WACOM PRODUCTS, INC.**

P.O. BOX 21145

WACO, TEXAS 76702 • 817/848-4435

## Antennas

<b>BUTTERNUT</b>	80' 10' vertical	\$26.00	<b>HY-GAIN</b>	7' w/ 1/2 band	\$30.95	<b>TET</b>	HB433SE 40-1A 10' 3.8L	\$44.95
HPV	80' 40' vertical	\$14.00	TH5MK28	8' w/ 1/2 band	\$37.95	MV38H	7.21-28 vert	\$8.95
2M CV5	4MT vertical	\$6.95	EX-14	4' w/ 1/2 band	\$62.95	MV38HR	7.21/28 vert	\$0.45 with radio
BMK	300' mfg kit	\$1.95	TR3JBS	2' w/ 75CM dip	\$18.95	MLA-2	loop 3' 3/4/2/1/2	\$39.95
TBR18DS	180m add on	\$5.00	18A/V18WS	7' band trap vert	\$21.95	SD-10	28 MHz Swiss Quad	\$18.95
MPS	100m post sleeve	\$5.50	14A/V00WS	4' band trap vert	\$24.88	SD-10	28 MHz Swiss Quad	\$18.95
	AND MORE!		V2S	2mt omni direct	\$0.95	SD-10	2mt Swiss Quad	\$5.95
			V4	20cm omni direct	\$5.95			
<b>BUCHCRAFT</b>			VB124MAG	2mt mag mt	\$1.95			
A4	4' w/ 1/2 band	\$30.00		AND MORE!				
A5	5' w/ 1/2 band	\$34.00						
RC	0.15 20 remote tuned							
	mt	\$26.95	<b>ILM</b>					
AV4	4 band trap vert	\$05.00	KT34A	1/2 band 4 el	\$37.95			
SP-19	18 el 2mt boom	\$6.95	KT34Z	1/2 band 5 el	\$45.95			
RTSVB	15 el wide band 2mt	\$6.95	2M-14'	2mt satellite	\$7.95			
	boom	\$9.95	2M-22'	2mt satellite	\$17.95			
AB4B	35 el 70cm boom	\$2.95	A35-18C	70cm satellite	\$13.95			
A16TB	6 el OSCAR 436	\$0.00	A35-40C	70cm satellite	\$33.95			
	mt							
A144-10T	10 el OSCAR 145.9	\$3.00						
	mt	\$3.00						
AOP-1	OSCAR pack 2mt &	\$50.00						
	70cm	\$24.95						
AK-2	2mt vert hoop	\$0.00	<b>MOSLEY</b>					
ARK-2	2mt vert hoop	\$0.00	TAC3	3 el 1/2 band	\$39.00			
ARX-2B	2mt vert hoop	\$7.00	TAC3UR	3 el 1/2 band	\$39.00			
	range	\$0.00	CL36	6 el 1/2 band	\$89.00			
	AND MORE!		CL33	3 el 1/2 band	\$89.00			
			PRQ37	7 el 1/2 band	\$65.00			
<b>HUSSLER</b>								
8BTY	8 band trap vert	\$28.95	<b>VAN GORDEN</b>					
9BTY	9 band trap vert	\$28.95	PD8010	40-10 dipole kit	\$4.95			
4BTY	4 band trap vert	\$4.95	PD8040	80-40 dipole kit	\$9.50			
G7-144	Fix stat 2mt	\$16.95	PD4010	40-10 dipole kit	\$0.95			
	collinear	\$16.95	SD80	80 shortened dipole	\$8.95			
MO-1/MO-2	mobile mast	\$1.95	SD40	40 shortened dipole	\$5.95			
RM10/RM15	10m-15m resonator	\$1.95		AND MORE!				
	(sta)	\$1.95						
RM10S/RM15S	super resonator	\$8.95	<b>LARSEN</b>					
RM20/RM20S	std & super	\$15.95/21.95	LM150MM	150' mast	\$1.90			
	resonator	\$15.95/21.95	NCA150MM	NCA 150' mast	\$5.90			
RM30	30m std resonator	\$6.95	NMO150MM	NMO 150' mast	\$6.95			
RM40/RM40S	std. and super	\$7.95/26.95	K04-142-HO	142' HO	\$6.95			
RM75/RM80	75 or 80 std	\$8.95		AND MORE!				
RM75S/RM80S	75 or 80 super	\$6.95						
BM-1	mounted mt	\$5.95	<b>CABLE &amp; CONNECTORS</b>					
SSM-2	stainless ball mt	\$7.95	Belden 9913	100' Belden 9913	\$4.95			
SSM-1	stainless ball & spring	\$2.95	Columbia RG 213	100' Columbia RG 213	\$3.95			
	mt	\$2.95	BG8/U	100' BG8/U	\$3.95			
QC-1	quick disconnect	\$3.95	RG 8X	100' RG 8X	\$5.95			
SGM-2	2mt 5/8 mag mt	\$8.95	RG59/U	100' RG59/U	\$10.95			
ROI	mpk mt w/spring	\$6.95	PL259/Silver	100' PL259/Silver	\$4.95			
	AND MORE!		N-Male for 8/U	N-Male for 8/U	\$4.80			
			BNC(M)-UH(F)	BNC(M)-UH(F)	\$4.80			
				AND MORE!				

## Radios

<b>ALINCO ALR-206T</b>	<b>SPECIAL &amp; CALL</b>
* 5 & 25 watts — 10 CH memory	
* Smart control on MIC	
* Built in SSB Audio Tone	
* The ALR-206T is the safest mobile rig on the market. No need to take your eyes off the road — COMPLETELY PROGRAMMABLE FROM MIC	
<b>ALINCO ALM-203T</b>	<b>SALE &amp; CALL</b>
Don't buy any HT until you study this fantastic unit. Programmability identical to ALR-206T. You only need to learn one radio when you have both! Features: scan, memory, 5 watts, 2 sub audio tones, receives 140-180 MHz	
<b>ICOM R71A HP</b> — High Performance	
EEB has modified the world class R71A and enhanced its performance beyond the manufacturer's dream.	
* 24 hour bench test and 6 month warranty	
* SSB filter upgrade to improve AM Narrow SSB selectivity and dynamic range	
* Front end upgrade improves dynamic range plus preamp enables operation below 1600 kHz	
* 4 kHz filter replaces 5 kHz wide filter — improves AM selectivity	
* Audio output upgrade gives more audio at less distortion — more easy listening	
* AGC time constant for optimum AGC control	
* Shockley diodes for clear sound — increased performance	
* Spike protection installed at the power supply for max spike and surge protection	
* Final check out alignment	
* We also install ICOM options at no charge:	
• R71A HP MF Mechanical Filter add \$200.00 to R71A	
• R71A HP KF 8 pole Xtal Filter add \$250.00 to R71A	
• R71A HP XFS-2 1 kHz Xtal Filter add \$300.00 to R71A	
• R71A 24 hour tested — no more \$869.95	
<b>ICOM R7000 VHF/UFH</b> — \$449.00	
EEB will offer a R7000 HP — Dual Release date July 86.	
<b>MEC 71a</b>	
Now you can control & enhance the performance of ICOM R71A, R71A, 271A, 471A, 1271A with amazing MEC 71a computer interface for the IC-64	
* Display 1 print & receive memories	
* Store or log 705 memories w/computer	
* Unlimited memory w/Disc storage	
* Keyboard entry of freq, mode, memory scan	
Get all the details — Call or write today. MEC 71a introductory price at \$199.95. Established Dealer. Inquiries Invited.	

## Towers

## RTTY-AMTOR Packet

<b>ROHN</b>	10' sect	\$1.50	
20AG	20' top sect	\$3.00	
20G	10' sect	\$1.50	
28AG	2.4' top sect	\$2.10	
35G	10' sect	\$1.50	
49AG	2.3' top sect	\$2.60	
49AG	access shell	\$6.00	
49AG	access shell	\$8.75	
18-3	thrust bear	\$5.95	
M200	10' mast	\$2.25	
SB25G	short base	\$6.25	
SB45G	short base	\$8.50	
E72545G	short base	\$8.75	
<b>HY-GAIN ROTORS</b>			
T2X	20 sq. ft	\$15.95	
HAM IV	15 sq. ft	\$82.95	
CD45U	6.5 sq. ft	\$84.95	
<b>KENPRO ROTOR</b>			
KR-500	elevation 12 sq. ft	\$81.95	
<b>ALLIANCE ROTOR</b>			
UL110	3 sq. ft	\$8.00	
<b>DAIWA 750E ROTOR</b>			
Compare These Specs & Pricing:			
MR750E	1 Motor	2 Motor	4 Motor
Wind Load			
60' Ft	16.1	21.5	30
Turn Pwr			
Lbs	610	1200	2400
Break Pwr			
Lbs	5200	9600	19300
Price	\$250.00	\$340.00	\$520.00
Additional Motors \$80.00 Present Add \$35.00			
Free U.S. Great Circle Tracster Map w/Rotor			
<b>ALINCO "Quad Pod"</b> — the perfect match for today's antenna installations. I.R. OSCAR systems, liquid HE beams, VHF-UFH beams, 4 legs — strong — rotor plate — accepts epoxyed thrust bearing, lightweight, durable aluminum construction — easy installation			
ETS-120	48"	\$167.00	
ETS-150	55"	\$129.00	
ETS-180	67"	\$135.00	
ETS-210	79"	\$107.00	
AA7-7A	Thrust Bear	\$136.00	
AA7-7	Rotor & Control	\$121.00	
	See Alinco Ads for Details		

## BIRD

EEB is Bird's No. 1 East Coast Dealer. Large Inventory — Package Deal, \$-CAT, & Bird 43 — elements — rods.

## EEB ELECTRONIC EQUIPMENT BANK

516 Mill Street NE  
Vienna, VA 22180 USA

Prices & specs subject to change. Shipping charges not included. Returns subject to 20% restock charge. Free catalog in USA. All other 3.00/c. ORDER TOLL FREE 800-368-3270. Tech Info — VA orders 703-938-3356.

**ege, inc.**

**EGE VIRGINIA**  
13646 Jefferson Davis Highway  
Woodbridge, Virginia 22191  
Information: (703) 643-1063  
Service Department: (703) 494-8750

Store Hours: MTh: 10 a.m. - 6 p.m.  
Tu: Closed  
WF: 10 a.m. - 8 p.m.  
Sat: 10 a.m. - 4 p.m.  
Order Hours: M-F 9 a.m. - 7 p.m.  
Sat 10 a.m. - 4 p.m.

**EGE NEW ENGLAND**  
8 Stiles Road  
Salem, New Hampshire 03079  
New Hampshire Orders,\*  
Information & Service: (603) 898-3750

Store Hours: Monday: Closed  
Tu-Wed: 10 a.m. - 4 p.m.  
Th-F: 12 noon - 8 p.m.  
Sun: 12 noon - 5 p.m.\*\*

\*Order and we'll credit you \$1 for the call.  
\*\*Closed some Hamfest Sundays.

**Buyer's Guide-Catalog Available - Send \$1.**

**LACOMBE DISTRIBUTORS**

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

Dealer Inquiries Invited

**Hard to get  
through on our  
800 number?**

Call before 10 a.m. or after 5 p.m.  
or call one of our regular numbers.  
If you pay for the call and order,  
we'll credit your order with \$1.

# Ham Sweltering Swine Swinging

**ICOM**

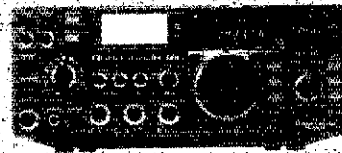


**NEW IC 751A**  
HF Transceiver with  
General Coverage Receiver

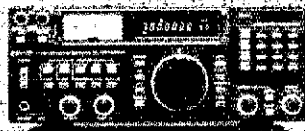
**CALL  
FOR  
QUOTES**



**IC 3200**  
2m/440 MHz Mobile



**IC 745**  
HF Transceiver with  
General Coverage Receiver



**R 7000**  
General Coverage Receiver

**IC 02AT/04AT**  
Handheld for 2m/440 MHz

**KENWOOD**



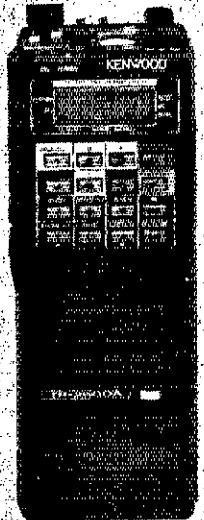
**R 2000**  
General Coverage Receiver



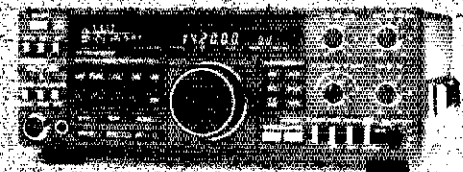
**TS 940S**  
HF Transceiver with  
General Coverage Receiver



**TS 430S**  
HF Transceiver with  
General Coverage Receiver  
**NEW LOW PRICE - CALL**



**TR-2600A**  
2m FM Handheld



**New TS 440**  
HF Transceiver  
with Antenna Tuner

**EXTENDED  
WARRANTIES  
AVAILABLE**

**BEARCAT**  
100XL 16-channel handheld 199.95  
800XLT 40-ch. 800 MHz 319.00  
145XL 16-ch. 10-band 99.95  
175XL 1b-ch with aircraft 154.95  
50XL 10-ch. handheld 120.00  
210XW 199.95

**UNIDEN**  
Radar Detectors Call  
CB Radios Call

**SONY**  
2002 SWL Receiver 199.95  
NEW 2010 SWL Receiver 279.95  
4910 SWL Receiver 89.95

**PANASONIC SWL** CALL

**COBRA CBs/RADAR DETECTORS**

**MIDLAND CBs** CALL

**WHISTLER RADAR DETECTORS**

**HARDWARE**

MJ1224 with MFJ C-64/V-20 Soft 85.95  
MFJ New 1229 159.95  
Kantronics Interface II 210.95  
Kantronics UTU Interface 169.95  
Kantronics UTU-XI 299.95

**SOFTWARE**

**Kantronics Hamtext**  
Vic-20, C-64, Apple, Atari Call

**Kantronics Hamssoft**  
Vic-20, Apple, Atari, TI-99 Call

**Kantronics Hamssoft/Amtor**  
Vic-20, C-64, Atari 69.95

**Kantronics Amtorsoft**  
Vic-20, C-64 79.95  
Apple 119.95

**Microlog Air Disk**  
Vic-20 and C-64 Disk 39.95  
Cartridge 56.95



ST 6000 RTTY Demodulator 895.50  
ET 2200 Communications Term 799.95  
ETI 200 RTTY/CW Interface 259.95

**PACKET**

MFJ 1270 Packet 125.00  
New Kantronics Packet PK1Z 199.95



**Amateur Software for the VIC-20 and Commodore 64**  
Specify tape or disk

VIC-20 C-64  
Contest Log 24.95 24.95  
Antenna Design 9.95 9.95  
Computer Morse 9.95 9.95  
Propagation Chart 16.95 16.95  
Super Log 19.95 19.95  
Net Controller 16.95 16.95  
Dix Tool kit 24.95 24.95  
Master Log (Disk) 29.95 29.95

**hy-gain**

**REBATES**  
on Towers,  
Antennas, and  
Rotators

**Special offer in  
effect July 1 -  
September 30, 1986**  
See our separate rebate  
special ad in this issue.

**TE SYSTEMS  
RF AMPLIFIERS**

With receive  
GaAs FET Pre-amplifier  
for superior weak signal  
reception with improved  
strong signal  
intermod rejection.

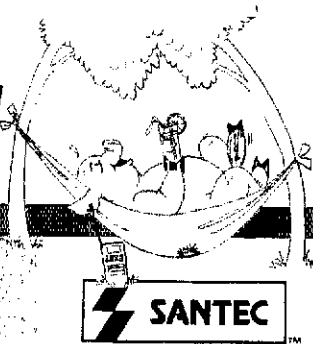


1412G 2m Amp 10W in-160 out 309.00  
1412G 2m Amp 30W in-160 out 289.00  
4410G 440 Amp 10W in-100 out 309.00  
4412G 440 Amp 30W in-100 out 309.00

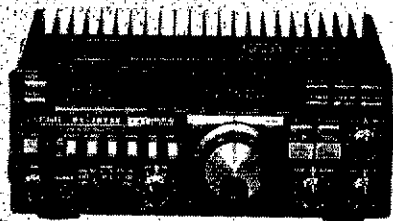
**ege, inc.**

**For Orders and Quotes Call Toll Free: 800-336-4799**  
In New England Call 800-237-0047  
In Virginia Call 800-572-4201

# Sweet Swill



## YAESU



**FT 757GX**  
HF Transceiver with  
General Coverage Receiver



**FT 209RH/709R**  
Handhelds for 2m/7.440 MHz



**FT 980 CAT**  
Computer Controlled  
HF Transceiver



**FT 726R**  
2m Especially for Oscar.  
Optional modules for  
full cross-band duplex.



**FRG 8800**  
General Coverage Receiver  
All mode 150kHz-30MHz



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

**ASK FOR  
QUOTES ON  
RADIO/  
ACCESSORY  
PACKAGES**

## SANTEC



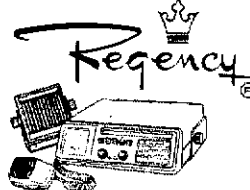
**ST-20T 2m HT**  
**ST-400ET 440 MHz HT**  
**ST-200ET 220 MHz HT**

**KDK**  
**FM240 2m, 25-watt**

## TEN-TEC



**CORSAIR II Model 561**



## SCANNERS

- HX1200 20-ch Handheld ..... 229.95
- MX4000 mobile 30-900 MHz ..... 289.95
- MX5500 20-ch 25-512 MHz cont 359.95
- MX7000 25 MHz-1.2 GHz ..... 399.95
- R1060 10-ch, 6-band ..... 99.95

## POLARIS MARINE AND REGENCY LAND MOBILE

# ANTENNAS & TOWERS

## Unarco-Rohn Limited Quantities

- Self-supporting towers:**
- H8X40 40-foot with Base ..... 209.95
  - H8X48 48-foot with Base ..... 279.95
  - H8X56 56-foot with Base ..... 349.95
  - H8B40 Higher load with Base ..... 269.95
  - H8B48 Higher load with Base ..... 339.95
- Other BX, HBX, H8BX in stock

- Quayed foldover towers:**
- FK2558 58-foot 25G ..... 940.00
  - FK4554 54-foot 45G ..... 1296.00
- Other sizes at similar savings.  
Foldovers shipped freight paid.  
10% higher west of the Rockies.

- Straight Sections:**
- 20G Straight Section ..... 39.95
  - 25G Straight Section ..... 49.95
  - 45G Straight Section ..... 110.95

- Complete Tower Packages:**
- | 25G      | 45G  |
|----------|------|
| 40' Call | Call |
| 50' Call | Call |
| 60' Call | Call |

Each package includes top section and section, base, rotor shaft, guy brackets, guy wire, turnbuckles, guy anchor plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages are shipped freight collect FOB our warehouse.

## HY-GAIN TOWERS

- HG375S 37-foot tall ..... CALL
  - HG525S 52-foot tall ..... CALL
  - HG54HD 54-foot/higher load ..... CALL
  - HG70HD 60-foot/higher load ..... CALL
- Order Hy-Gain tower, Hy-Gain antenna, and Hy-Gain rotor and receive free shipping on all.



- W36 36-foot tall ..... 549.00
  - WT51 51-foot tall ..... 929.00
  - M354 54-foot/higher load ..... 1575.00
  - DX86 86-foot/motor/highest load Call
- Shipping not included. Shipped direct from factory to save you money.

## PHILLYSTRAN

- CABLE BY SAXTON ..... CALL
- RR213 Mill Spec ..... 29¢/ft
- RG8/U Foam 95% Shield ..... 25¢/ft
- 3-wire Rotor 2 #18, 5 #22 ..... 17¢/ft
- Mini-8 95% Shield ..... 13¢/ft

## Cablewave Hardline

- ROTATORS
- Alliance HD73 ..... 105.00
- Hy-Gain Ham IV ..... CALL
- Hy-Gain Iantwister TX ..... CALL
- Hy-Gain Heavy-duty 300 ..... CALL
- Kenpro KR500 Elevation Rotor ..... 159.95
- Kenpro KR5400 azimuth/elevation ..... 299.95

- CUSHCRAFT**
- A3 3-element 10-15-20m ..... 217.95
  - A4 4-element 10-15-20m ..... 292.95
  - R3 10-15-20m Vertical ..... 268.95
  - 215WB SSB/FM 2m Boomer ..... 82.95
  - ARX-28 2m Ringo Ranger ..... 36.50
  - 4218XL 2m Boomer ..... 103.95
  - 10-4CD 4-element 10m ..... 111.95
  - 15-4CD 4-element 15m ..... 125.95
  - 40-2CD 2-element 40m ..... 296.95
- Other Cushcraft models available CALL

- KLM**
- KT34A 4-element 10-15-20m ..... 334.95
  - KT34XA 6-element 10-15-20m ..... 479.95
  - 2m-11X 11-element 2m ..... 59.95
  - 2m-16L BX 16-element 2m ..... 91.95
  - 432-30L BX 30-ele 440 MHz ..... 91.95
  - Fiberglass mast 5' ..... 19.95
  - Fiberglass mast 7' ..... 33.95

- MOSLEY**
- CL-33 3-element Triband Beam ..... 265.95
  - TA-33 3-element 10-15-20m ..... 239.95
  - Pro 37 7-element 10-15-20m ..... 465.95
  - Pro 57 10-12-15-17-20m ..... CALL
  - Pro 67 10-12-15-17-20-40m ..... CALL

- HUSTLER**
- 6-BTV 10-80m Vertical with 30m ..... 128.95
  - 5-BTV 10-80m Vertical ..... 108.95
  - 4-BTV 10-40m Vertical ..... 87.95
  - G6-440 440 MHz Base Vertical ..... 99.95
  - G7-144 2-meter Base Vertical ..... 115.95
  - G6-144B 2m Base Vertical ..... 97.95
  - MO-1/MO-2 Masts ..... 21.50
  - BM-1 Bumper Mount ..... 14.95
- MOBILE RESONATORS** Standard Super
- 10 and 15 meter ..... 11.95 17.95
  - 20 meters ..... 15.50 21.85
  - 30 and 40 meters ..... 17.95 25.95
  - 75 meters ..... 19.95 36.95

- HY-GAIN ANTENNAS**
- 391S TH7DX 7-ele 10-15-20m ..... CALL
  - 293S TH5DX 5-ele 10-15-20m ..... CALL
  - 395S Explorer 14 10-15-20m ..... CALL
  - 203S 3-element 2-meter Beam ..... CALL
  - 208S 8-element 2-meter Beam ..... CALL
  - 214S 14-element 2-meter Beam ..... CALL
  - BN86 Beam Balun ..... CALL
  - Y2S 2-meter Vertical ..... CALL
  - V4S 440 MHz Vertical ..... CALL

- MORE ANTENNAS**
- AVANTI HM 151.3G 2m On-glass ..... 31.95
  - LARSEN LM-150 5/8 Mag Mount ..... 39.95
  - MINIQUAD HD-1 ..... 141.95
  - BUTTERNUT HF6V 10-80m Vnt ..... 115.95
  - BUTTERNUT HF46 2-ele Beam ..... 189.95
  - BUTTERNUT 2MCV5 2m ..... 42.75
  - VOCOM 5/8-wave 2m Handheld ..... 15.95

- ANTENNAS FOR OSCAR**
- Cushcraft 416TB Twist ..... 59.95
  - Cushcraft A14410T 10-ele ..... 53.30
  - Cushcraft A14420T 20-ele ..... 76.95
  - Cushcraft AQP1 Package ..... 149.95
  - KLM 2m-14C 2m 14-ele Circular ..... 88.95
  - KLM 435-18C 18-ele Circ Polar ..... 111.19
  - KLM 2m-22C 22-ele Circ 2m ..... 109.00

- MIRAGE**
- B23A 2m Amplifier 2-30 ..... 84.95
  - B1016 7m Amplifier 10-160 ..... 242.95
  - B3016 2m Amplifier 30-160 ..... 199.95
  - D1010 10-100 Amp for 430-50 ..... 269.95
  - D1010N UHF Amp/N connectors ..... 279.95
  - B215 2m Amp 2 in, 150 out ..... 245.95
  - A1015 6m Amp: 10 in, 150 out ..... 242.95

- AMERITRON HF AMPS**
- ATR15 Ant Tuner 1500 watt ..... 289.95
  - ATR10 Ant Tuner 1 kW ..... 242.95
  - RC58 Remote Coax Switch ..... 113.95
  - NEW AL1200 1.5 kW Amp ..... 1399.95
  - NEW AL80A 1200 watt Amp ..... 658.95
  - AL84 HF Amp 160-15 ..... 389.95

- AMP SUPPLY**
- LA 1000A 160-15m Amp ..... 399.95
  - LK 500ZBNT HF Amp no tune ..... 1399.95
  - AT 1200A 1200 PFP Tuner ..... 173.95
  - LK 500ZB 2.5 kW hipersil ..... 1135.95

This is a partial list—  
IF YOU DON'T SEE  
WHAT YOU WANT... CALL

- DAIWA**
- LA-2065R 2m Amp, 2 in, 60 out ..... 125.95
  - LA-2035R 2m Amp with preAmp ..... 74.95
- VOCOM AMPLIFIERS**
- 2 watts in, 30 watts out 2m Amp ..... 69.95
  - 2 watts in, 60 watts out 2m Amp ..... 107.95
  - 2 watts in, 120 watts out 2m Amp ..... 169.95
  - 200mW in, 30 watts out 2m Amp ..... 84.95
- KENWOOD TL922 2kW** ..... CALL

- ASTRON POWER SUPPLIES**
- RS7A ..... 49.95
  - RS12A ..... 69.95
  - RS20A ..... 89.95
  - RS35A ..... 133.95
  - RS50A ..... 189.95
  - RS20M ..... 104.95
  - RS35M ..... 149.95
  - VS20M ..... 124.95
  - VS35M ..... 169.95
  - VS50M ..... 209.95

- BENCHER PADDLES**
- Black/Chrome ..... 41.95/53.95

- B & W**
- 375 8-position Coax Switch ..... 24.50
  - 376 5-position Coax Switch ..... 24.50
  - 425 1 kW Low Pass Filter ..... 28.50
  - 593 3-position Coax Switch ..... 25.25
  - 595 6-position Coax Switch ..... 29.95
  - AP-10 5-band Apartment Antenna ..... 39.95
  - 370-15 All-band Dipole Antenna ..... 129.95
- Other antennas in stock—

- DAIWA**
- CN-520/CN-540 Meters ..... 59.95/69.95
  - CN-620B Meters ..... 106.00
  - CN-630 Meter ..... 126.00
  - CN-720B 2kW HF Watt Meter ..... 120.00
  - CN-419 Antenna Tuner 500 W ..... 174.95
  - CN-518 Antenna Tuner 2.5 kW ..... 279.95
  - CN410M SWR/wt mtr 3.5-150 MHz ..... 64.95
  - CS201 2-position Switch ..... 21.95
  - CS401 4-position Switch ..... 64.95

- TELEX HEADPHONES**
- Procom 350 ultra light set ..... 58.95
  - Procom 250 soft phone/mike ..... 72.90
  - Procom 450 padded phones ..... 35.50
  - Procom 400 desk mike ..... 57.75
  - Procom 460 padded phones ..... 37.20
  - SW- 610 light headphone ..... 8.75
  - C-180 light headphone ..... 7.95
- Others in stock Please Call

## BIG DISCOUNTS

- MFJ PRODUCTS**
- 989 3 kW Antenna Tuner ..... 295.95
  - 962 1.5 kW Tuner switch/meter ..... 189.95
  - 949C 300-watt Deluxe Tuner ..... 129.95
  - 941D 300-watt Tuner swch/meter ..... 89.95
  - 1020A Active Antenna ..... 69.95
  - 202B Noise Bridge ..... 48.95
  - 752B Dual Tunable SSB/CW Filter ..... 79.95
  - Keys—407, 422, 484 ..... CALL
- Other MFJ products in stock CALL

- AMPHENOL CONNECTORS**
- 831SP PL259 silver ..... 1.10
  - 831SP 1050 Nickel PL259 ..... 0.75
  - 8261 Type N RG68 ..... 2.50
  - 2900 SD239-BNC ..... 2.99
  - 3112 BNC RG59 ..... 1.35
  - 3112 BNC RG58 ..... 1.25
  - 83185 Reducer RG58 ..... 0.25
  - 83168 Reducer RG59/mini 8 ..... 0.25
  - 831R UHF panel ..... 0.79
- Special discounts on 100-piece purchases

## BK PRECISION

- TEST EQUIPMENT**
- Oscilloscopes
  - Digital Multi Meters
  - Telephone Test Equipment
  - Function Generators
- Now in stock ..... CALL

**For Orders and Quotes Call Toll Free: 800-336-4799**  
In New England Call 800-237-0047 In Virginia Call 800-572-4201

**ege, inc.**

ORDER TOLL FREE

# 1-800-233-2482

MINNESOTA & ALASKA or DY CALL 218-765-3254  
or 612-255-0855

We Ship Worldwide  
Hofatol Personal  
Service

## ANTENNAS

HY-GAIN	CALL FOR PRICES	KLM
TH7DX.....		KT34A.....
TH5Mk2.....	KT34XA.....	479.00
Explorer-14.....	40M-1.....	169.00
30/40 add-on.....	40M-2.....	300.00
204BAS.....	40M-3.....	449.00
205BAS.....	40M-4.....	639.00
155BAS.....	2M-11X.....	56.95
105BAS.....	2M-13LBA.....	76.95
Disc. 7-1.....	2M-16LBX.....	95.00
Disc. 7-2.....	220-14X.....	79.95
Dir. Kit 7-3.....	220-LBX.....	95.00
18AVT/WBS.....	432-20LBX.....	67.95
14AVQ/WBS.....	432-30LBX.....	95.00
2BDQ.....	2M-22C.....	112.00
5BDQ.....	435-40CX.....	147.00
V2S.....		

### NEW HY-GAIN OSCAR SYSTEM

ALL TELEX/HY-GAIN PRODUCTS IN STOCK!

### BUTTERNUT

HF6V.....	112.00
HF2V.....	109.00
TBR-160 Coils.....	46.95
RMK II.....	41.95
STR II.....	29.95
TLK.....	14.95
HF4B.....	189.00
2MCV.....	42.95
2MCV-5.....	49.95

### MOSLEY

TA33Jr.....	179.95
TA-33.....	235.00
TA-40KR.....	89.95
CL-33.....	269.00
PRO-57.....	465.00

### HUSTLER

Our choice in HF mobile systems. Top quality line of HF, VHF, & UHF verticals.

### LARSEN

Our choice in quality, versatile VHF and UHF mobile antennas.

### MFJ

Tuners and accessories to complement your antenna system.

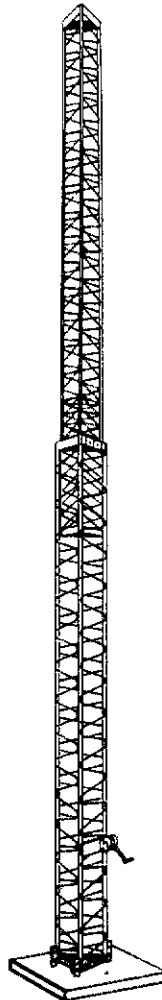
### AMERITRON & MIRAGE

Amplifiers to deliver power when you need it.

### CUSHCRAFT

A3.....
A4.....
R3.....
DW3.....
AV3.....
AV4.....
AV5.....
40-2CD.....
A50-5.....
617-6B.....
ARX-2B.....
147-11.....
A147-22.....
A147-20T.....
215WB.....
32-19.....
42-18.....
220B.....
424B.....
416TB.....
A144-20T.....
AOP-1.....

CALL FOR PRICES



LET US BID A FREIGHT PREPAID HY-GAIN TOWER-ANTENNA FOR YOU.

## TOWERS

### UNR-ROHN

#### FREE-STANDING:

HBX-40.....	198.00
HBX-48.....	265.00
HBX-56.....	335.00
HDBX-40.....	249.00
HDBX-48.....	325.00

Today's best buy in a tower. All steel, galvanized and Rated at 10 and 18 sq. ft.

#### FOLD-OVERS:

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

Fold-over towers shipped freight prepaid. Prices 10% higher in western states.

### HY-GAIN CRANK-UP TOWERS

HG-37SS	CALL/WRITE FOR PRICING.
HG-52SS	
HG-54HD	
HG-70HD	<b>REBATES!</b>

Hy-gain towers shipped freight prepaid in continental U.S.

#### ROHN GUYED TOWERS:

25G sections.....	48.00
45G sections.....	109.00
TB-3 bearing.....	49.95

Full line of genuine ROHN accessories for complete tower installations.

PHILLYSTRAN (Non-conducting, electrically transparent guy systems) in stock.

**WE STOCK:** Roof Towers and Tripods, Masts, Guy Cable, Anchors, Guy Insulators, Brackets and Bases.

## ROTORS

### TELEX

AR40.....
CD 45 II.....
HAM IV.....
T2X.....
HDR-300.....

CALL

### KENPRO

KR-400.....	125.00
KR-600.....	199.00
KR-2000RC.....	399.00
KR-500.....	159.95
KR-5400.....	259.00
KR-5600.....	319.00

## WIRE, CABLE, & SUPPLIES

### ANTENNA WIRE

#12 Copperweld....	0.12/ft
#14 Copperweld....	0.10/ft
Ladder line.....	0.10/ft
450 ohm	

### ROTOR CABLE

Std: (6-22, 2-18).....	0.19/ft
Hvy: (6-18, 2-16).....	0.35/ft

### BELDEN COAX

9913 low loss.....	0.42/ft
RG-213/U (8267).....	0.40/ft
RG-8/U (8237).....	0.32/ft
RG-8/U (8214).....	0.35/ft
RG-8X (9258).....	0.19/ft
RG-11A/U(8261).....	0.37/ft
RG-59/U (8241).....	0.14/ft
RG-58/U (8240).....	0.13/ft

ANDREW HELIAX®, ALPHA-DELTA PRODUCTS, BALUNS, INSULATORS, COAX-SEAL, NYLON ROPE, CONNECTORS, SWITCHES, ETC. — CALL!



antennas & towers

rf enterprises

Route No. 7  
St. Cloud, Minnesota 56301



VISA/MASTERCARD

Prices subject to change without notice. Minnesota residents add 8% tax.

Shipping additional, express extra.



# Celebrate your buying decision with the money you've saved.

When it comes to getting maximum HF performance for your dollar, the choice is clear. Yaesu's FT-757GX.

Nowhere else will you find so many HF features packed into one compact, mobile-ready package. At a price that's got the competition baffled.

For starters, each 757 includes an electronic keyer, 600-Hz CW filter, AM and FM modes, AF speech processor. And a 25-kHz marker generator. All at no extra charge.

And working the DX has never been easier with dual VFOs, single-button VFO/memory swap for split-frequency operation, eight

memories, and push-button quick memory and band scan.

The 757 also lets you listen from 500 kHz to 30 MHz with its high-performance general coverage receiver. The transmitter covers 160 through 10 meters, including the new WARC bands, with 100 watts output on sideband, FM and CW.

CW buffs will enjoy the delights of full QSK operation. Plus the massive heatsink and duct-flow cooling system allow continuous RTTY operation for up to 30 minutes. Use the FP-757HD heavy-duty power supply option for continuous-duty applications.

And of course, there's the 757's highly attractive price. It's the

perfect way to get all the HF performance you desire, with money left over to apply toward other ham gear. Perhaps a power supply for base station use. An antenna or antenna tuner. Or whatever else makes your operation complete.

So ask your dealer today about Yaesu's FT-757GX. The most celebrated HF price/performer on the air.

## YAESU

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

# MULTI BAND TRAP ANTENNAS

Model	Bands	Traps	Length	Price
D-47	10/15/20/40	4	65	\$39.95
D-52	10/15/20/40/80	5	105	64.95
D-56	10/15/20/40/80	6	92"	109.95
D-58	10/15/20/40/80/160	6	103"	129.95

## TRAP VERTICALS - "SLOPERS" \*

VN-41	10/15/20/40	2	26"	44.95
VN-42	10/15/20/40/80	3	48"	55.95
VN-53	10/15/20/40/80	3	42"	69.95
VN-54	10/15/20/40/80/160	4	75"	89.95

\*Can be used without radials  
\*Feed line can be buried if desired

\*Permanent or Portable Use

All TRAP ANTENNAS are Ready to use - Factory assembled  
- Commercial quality - Handle full power - Comes complete with Deluxe Traps, Deluxe center connector, 14 ga Stranded CopperWeld ant. wire and End Insulators. Automatic Band Switching - Tuner usually never required - For all transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

## SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
I-15	15	20'	14.95
I-20	20	27'	19.95
I-30	30	46'	29.95
I-40	40/75	130'	25.95
I-160	160	290'	34.95

Includes assembly instructions, Deluxe center connector, 14 ga Stranded CopperWeld Antenna wire and End Insulators.

## COAX CABLE: (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58	50'	\$8.00	\$11.95
RG-7X	90'	12.00	16.95

## DELUXE CENTER CONNECTOR

- NO RUST! Brass Terminals
- NO Jumper Wires Used
- NO Soldering
- Built-in Lightning Arrestor
- With SO-239 Receptacle
- Handles Full Power
- Completely Sealed, Weatherproof
- Easy to Adjust
- Commercial Quality



CE-1

\$8.95

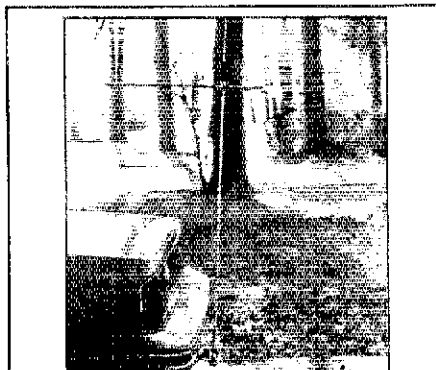
## DELUXE ANTENNA TRAPS: Completely sealed & weatherproof - Solid brass terminals - Handles Full Power - NO jumpers - NO Soldering. Instructions included.

- For 4-band Dipole Ant. 40/20/15/10 \$36.00/pr.
- For 5-band Dipole Ant. 80/40/20/15/10 \$38.00/pr.

ORDER DIRECT FROM FACTORY. All orders shipped US Postpaid. VISA/MC - give card #, Exp. date, Signature

**SPI-RO MANUFACTURING, INC.**  
Dept. 106, P.O. Box 1538  
Hendersonville, NC 28793

Dealer Inquiries Invited



## DC SALES has PRO-AM!

5 Band mobile antenna plus Tenna Hitch equals the solution to e-z mobile operation.  
Antenna \$79.95 + 5.00 UPS/HND.  
Tenna Hitch \$29.95 + 5.00 UPS/HND.

## DC SALES

1602 Chestnut Ridge Road  
Kingwood, TX 77339 (713) 358-0051

Challenge of SCRA? We'll find out next month! SCRA has their new "73" Rptr. up and running, the "bells and whistles" are next. KE6WL got 1st place in the HB contest for SCRA with a FE HB Solid State Linear. DNARC lost-found and lost their 2nd rptr only to find out that it is coming back in a lot better shape. Iks to W6RNL and W6WRA. GS Ladd RC used the "BEEP-BAU" in van in 4 PS events in April. SCRC is getting very active in PS events with April, Jim WA6DDM, SFRC pres. echoed the plea of all section club officers with "Participation in PS events gets Amateur Radio into the Public Eye... Get out and pay your dues". All the clubs need help in PS events as well as real emergencies, and the PS events are the TRAINING GROUNDS for the Emergencies. Don't forget the PACIFIC DIVISION CONVENTION the first Weekend in October in San Jose, set that weekend aside on your calendar! Traffic: N6FWG 140, K6TP 39, K6TJW 37, W6RNL 222, KK1A 138, W6PW 96.

**SAN JOAQUIN VALLEY:** SM, Charles McConnell, W6DDP - SEC: WA6YAB, STM: N6AWH, TC: WA6EXV, ACC: N6ECH. Asst. SMs W6TRP and K6YK. N6KWM and N6AM are SILENT KEYS. The 44th Fresno Hamfest was a good one with improved attendance. KB6GXX won the FT203. The Xyl of W6SYP won the 7575G. The record for the QL contest was 19.6 w/40. Congratulations to the following operators: EXTRA - WB6KIB, WB6FAP, K6ABO, and K6ICY; ADVANCED - KL7GHT, K6ZRV, K6WOU, and W6NQU; GENERAL - N6NGB, N6NGC, and K6BJN; N6LOK; TECHNICIAN - K6BLSD, K6BRKX, K6BL8S, and K6BLWY. N6JRC is K6DE. N6LSB is W6QW. W6BWH and W6GR have TS430s. K6BETA and N6HWH have FT103s. N6MXG has a PC5500. The 1986 ARRL Pacific Division Convention will be October 3-5, 1986 in San Jose. Traffic: N6AWH 142, N6MOY 100, W6DDP 8, WA6YAB 6, N6MXG 3.

## ROANOKE DIVISION

**NORTH CAROLINA:** SM, Rae Everhart, K4SWN - SEC: AB4W, STM: K4NLK, SM: K4IWW, ACC: W6CAT, PIO: WA4OBR, TC: K4ITL, QOC: K1PLR, SGL: KE4ML, Field Day is over. Did YOU operate under emergency conditions? If answer is NO, then change your operating habit and prepare for an actual emergency. FD was truly a lot of fun this year. Amateurs were placed on alert by State Office of Emergency Management for large forest fire in Pendler County. KA4PAZ, DEC, Pendler Co. reported amateur radio was utilized for communications between Forestry Service and Heavy Equipment operators. Large turbine plant fire reported by EC in Davidson Co. ARES members placed on alert for one-mile evacuation of disaster which did not materialize, however, the call to line list was well. Do you have a plan? Do you have a plan in your ARES plan? It is nice to see all at the ARRL State Convention in Raleigh. Tnx W4DW. WANTED: 25 Official Observers in Section. If you have the time to monitor the ham bands HF, VHF, UHF, please contact K1PLR or SM immediately. YOU MUST be a league member for any station appointment. W4HRR gave interesting program on link repeater net regarding NTS/MARS traffic. Packet radio booming at W4BFB, Charlotte, and K4CEB Concord. K4CAV presented an interested program on packet. If you are planning packet activity in your area, let K4CAV know pronto. Glad to have K4JHF back at mountain home for summer. N4JRE feeling better after hospitalization. Have been advised by State of NC that the Office of Emergency Management and the Department of Crime Control and Public Safety would appreciate a copy of each club NEWSLETTER. They are reading some news about AMATEUR RADIO and are very interested in us. Please put them on your mailing list. In case of a STATE OF EMERGENCY, declared by State of NC, please monitor 3923 kHz. for information and assistance. If a QSO is on this frequency, listed + kHz. DO NOT DISRUPT AN ONGOING QSO. Want to increase the NOVICE ranks? Support the ARRL Notice Enhancement proposal PR Docket 86-161. File comment deadline July 16. Middle of vacations? Don't tell your friends on all you are going to be gone from home. That invites trouble. This month also marks the beginning of Hurricane season. Hamlets: Cary July 19. Asheville July 28/27. Late News: FCARS/FARC amateur radio heavily involved in Emergency Medical Communications for Bing Crosby Golf Tournament. Tnx N4MIB. State Highway Patrol has given approval to all Highway Patrol officers who are Amateurs to install ham equipment in their patrol cars and use their callsign as follows: 1. W4XYZA123. Last four digits indicates their HP call sign. Tnx KA4PAZ. Traffic: K4NLK 361, N4AL 240, K4JHF 225, K4ATL 177, AB0Y 113, W4BHR 105, K64OGR 80, WA6JNR 73, W4WLL 53, N4NY 52, W4AN 51, AA4MP 50, K4IYW 43, K4SWM 43, K4EYF 37, W4NLS 35, K4IYV 33, NE4J 32, N4JEO 31, K4GJ 27, K4AYMY 25, W4EHF 24, W4DEQK 24, N4LUO 24, N4TK 22, N4NTO 21, N4MNM 14, W4MDRD 13, AK1E 12, N4LUB 12, W4COYN 10, N4MQU 10, W4DDQL 8, N4CJ 6, W4DDB 6, K4FOY 4, W4DRMQ 1. Total: SAs 37. TFC 2091.

**SOUTH CAROLINA:** SM, Jimmy Walker, W4HLZ - I have developed a talk concerning the Amateur Radio Public Service Programs in SC. The slide presentation, talk and question period last 40 to 45 minutes. Business travel prevented me from scheduling with more clubs during first five months of the year. Beginning July, I will be in a position to continue the talks. Contact me for a date. SC Voluntary Organizations Active in Disaster (SoCarVOAD) will assemble July 10 at the Red Cross Building in Columbia. The meeting time is 10 AM and you are invited to attend. Space prevents me from describing the functions of SoCarVOAD, but Amateur Radio has the same voice as 16 other organizations in SC and that makes YOU, as an amateur, an important person in SC. The July meeting will address Operational Plans for the possible influx of American citizens from Europe as a result of hostilities. Projections are for 14,000 to 20,000 persons coming into Charleston and 5,000 to 7,000 coming into Myrtle Beach. Agencies expect Amateur Radio (YOLU) to handle communications for this emergency. If the phone service fails between Charleston and Myrtle Beach, how would amateurs possibly handle the large volume of traffic? I need your ideas and suggestions. Traffic: K4ZN 154, K34BZA 95, W4ANK 7, W4FMZ 54, KA4LRM 47, W6RIT 35, K4ZB 23, W4UDK 22, KA4YEA 16.

**VIRGINIA:** SM, Claude Feigley, W3ATQ - STM: KB4WT, SEC: W84JUC, ACC: N74JOC, WAHU, BM, AB4U, TC: W84MAE. The VA QSD Party was very successful award winners were: N4MM Mixed Mode: NJ4F High CW, N4FTKM Mobile, W4FOA QRP, Shenandoah Amateur Radio Club had the highest score in the 4th Call Area and WA4NTP received the award as the high "SPARC" member. I regret to announce that W4MAY is a Silent Key. New "ECs" are W4JZC for Rockingham county, N4MOJ for Powhatan and KA4JRL for Wythe county. W8RIT continues to do an outstanding job of monitoring the bands as an OJAUJ stn. Many of the ARES groups report activity in supplying communications for marathons, bike-a-thons, walkathons, etc. Is your group participating in this type of community service? Improving your own operating skills and testing of equipment under actual field conditions? Good to hear WB4KSG back in the traffic field and acting as a VN NCS. I am trying to revive the Virginia Ham

and if all goes well you may have received a copy by this time. The Richmond area VE group report that in 1985, 6 sessions were held in 1985, 161 candidates, 18 contests were given and 177 written elements with a 57% passing rate. Future exam schedules: Richmond, July 26, Sept. 27, Virginia Beach, July 12, Hampton Road, Aug. 2. Roanoke Division Convention at Virginia Beach, Aug. 24. The STARRS ARES VHF net on 146.97 has been changed from 8 to 9 PM Tuesdays and Fridays. KJ4MF is the new EC for James City County - Williamsburg. K4JST remains as EC for Charles City County. Congrats to the Roanoke valley Amateur Radio Club on becoming the section's 3rd Special Service Club. The Portsmouth Amateur Radio Club has completed a year as a Special Service Club and they have met the requirements for renewal of their appointment for another year. The Roanoke club presented an award to the winner of "Radio Communications" category of the local high school Math and Science Fair. Reminder! Affiliated club Annual Reports are past due also ARRL renewal membership thru your club will return \$2.00 to you, new memberships return \$5.00. Upcoming hamfests: Berryville, Aug. 3, Roanoke Division Convention, Aug. 23-24. Again, if you have any questions, opinions, or comments on the section's organization or operation pass them to the Section Manager. Traffic total for the month was 3394 with 34 stations reporting both N4GHI and N4XCO made PB. Traffic: N4GHI 521, N4XCO 544, W4JLJ 426, K4JAI 225, AA4I 178, W4OACV 150, WA4OJK 143, K4JLJ 133, K4NTX 132, W3ATO 112, K4JST 94, KB4NGO 91, N4KSO 76, W4DMAS 64, WA4LJ 59, K4JAM 58, W4JLS 57, K4GR 46, W4TZO 45, N4S 42, N6ANO 40, K4AXF 39, N4AI 38, KB4PW 34, K4MLC 31, K4VWK 27, W4BKT 25, K4BZG 24, W4EDB 22, K4JH 4, N4FNT 8, W4BHC 7, W4YE 7, W4ZNB 7.

**WEST VIRGINIA:** SM, Karl S. Thompson, K8KT - SEC: K8QEV, STM: K8BG, ACC: WA8TC, SGL: K8BS, TC: K8CG. Regret to report that W8OO has become a Silent Key. K8LG has been appointed as acting NM for W4RN. I thanks for the job to K8DRD who has resigned. Please encourage all new novices to QNI WVNN at 5:15 dy on 3730.  
Net Freq Time QNI OTC Sess NM  
W4WFN 3865 8:00 736 113 30 W4BYP  
W4WMD 7235 11:45 764 33 30 W4FZP  
W4WFN 3640 6:30 245 62 30 K8LQ  
W4WN 3567 0:00 269 88 30 K8ZCO  
W4NN 7330 5:15 319 39 29 W4DLDY  
HiBilby 14290 Noonoo 178 12 W4YP  
Traffic: W4LDY 220, W4YP 197, K8TFE 115, K8UCY 92, W4FZP 89, N8GJL 78, WA3NU 60, K4ATK 39, K4WNO 38, K8K1 33, W4BJWX 30, K8DG 25, K8QEV 24, N8FX 10, K8BOGF 8, N8JB 8, N8BG 7, W8BBMX 5.

## ROCKY MOUNTAIN DIVISION

**COLORADO:** SM, Bill Sheffield, K0BJ - ASM: W8RSG, KA0MGA, SEC: W8FOQB, STM: N0DZA, OO: W8ACH, ACC: W8DDUV, PIO: W8OFE, SGL: W8DQGL, TC: N0GF, BM: KA0CZV. Welcome to Mountain ARC of Woodland Park, the sections newest Affiliated Club. Sky Country ARC Swapfest is July 26-28 in Greenwood, VE. Please contact me for info K0DMA. There always fun swap with many of the East Slope Hams in caravan to the West Slope for Swapping, Swimming & Fishing. The Colorado State Convention will be hosted by RMRL on August 10th at the Jefferson County Fairgrounds in Golden, further info is available from N0FKI. Looking forward to seeing all of you at the RMRL Swapfest & Colorado State Convention. Good attendance at the "Packetfest" hosted by RMPRA. Congrats to the many hams who participated in the March of Dimes Walkathon, & to W4DRWG for coordinating the Mayors Cup 5 K Race in the WYO area. Thanks to K0RHW, N0GF, K8LQF, W8U1G, K0DMA, K0RWR, N0GTB for the many hours of time and effort in setting up the state wide linking system. 73, K0BJ, NETS: CO: QNI 1829, QTC 25 - into 88 26 sess. CO: Races: QNI 147, OTC 1:35 inf. QTC: QNI 94, OTC 81, 25 sess. CWXN: QNI 3468, OTC 2679, 30 sess. HNN: QNI 1674, OTC 107:303 inf., 30 sess. NCTN: QNI 338, OTC 113, 30 sess. SCTN: QNI 172, OTC 34, 21 sess. Traffic: N8QOP 2793, WA0HJ 244, K0RJK 662, W8ACH 542, KA0CZV 458, W8DAUN 353, K4JAN 353, KBZ 136, W8DBS 92, N0DZA 71, W8PFFV 71, W0NFW 51, N8GBE 59, W5HRS 29, K8C1 27, A1BW 21, KA0NL 19.

**NEW MEXICO:** SM, Joe T. Knight, W5PDY - ASM: W5HD, DEC: K85XD, STM: N5DT, NMS: WA5UNO K6LL, W5VFO, TC: WRGY, ACC: W5HD. Southwest Net (SWNN) meets daily on 3563/7083 at 0230 UTC and handled 123 msgs with 197 stations in. New Mexico Floodrunner Net meets daily on 3939 at 0100 UTC and handled 114 messages daily in. New Mexico Breakfest Net meets daily on 3939 at 0330 UTC and handled 114 msgs with 1185 stations in. Yuca 2-mtr Net 7/18 handled 133 msgs with 587 checkins. Caravan Club 2-mtr Net 6/6/06 handled 7 msgs with 693 checkins. SCAT 2-mtr Net 6/6/06 handled 6 msgs with 561 checkins. Bean Feed was WINDY, but a good time was reported. Everyone now looking forward to Flagstaff July 26. Congrats to K5OIN and W5CAW on winning the QST Cover Award for their article in Nov QST on DFing with the Interferometer. Traffic: N5DT 335, W5DAD 172, W6SX 29.

**UTAH:** SM, Jim Brown, N4TG - SEC: Rich Fisher, NS7K, STM: John Sampson, W7OCC. Visited the Ogden ARC at their last meeting and spoke to the membership about emergency communications, and demonstrated the CFM Comm Van after the meeting. I am impressed with the OARC - the Ogden area hams have a good club. WA7MEL got his WAS on 160 - congrats! Mike Carter, KN7U will be leaving Utah in June for a move to Arizona. Our cw-only Field Day group will never be the same! G! Mike, 73 de N4TG. Traffic: WA7MEL 84, WA7KHE 42, NS7K 16, N4TG 15, W7OCX 8.

**WYOMING:** SM, Dick Wunder, WA7WFC - ASM: KA7AWS, Steve Cochran, SEC: W7TVK, Jim Anderson, STM: NS7X, Mary Ann Lentz, Wyoming Hamfest is July 13 & 14 at Wyo. State Fair Grounds in Douglas, Wyoming. Cheyenne held its first VE Team exam with numerous upgrades including W7COK & KA7FDL to Extra. KA7AWS & KA7DKH to ADV, KA7WJK, KA7WHL, & KA7YEB to GEN, and W7B7Y, KA7UKH, & KA7WLLK to TECH. Congrats to all. Tnx to N9QK for copy of fine newsletter from SHERIDAN AMATEUR RADIO LEAGUE. It is nice to hear from the local clubs. K7ZAR reports the Wyo Cowboy Net held 22 sessions with 879 QNI & 10 QTC. Traffic: N7H3 135, W7HLA 41, N7Q7 21.

## SOUTHEASTERN DIVISION

**ALABAMA:** SM, Joseph Smith Jr., WA4RNP - YM: N4JAW, SGL: KA4WVU, BM: KF4VV, OO: FA4AJX, AA4BL, TC: N4AU, ATC: W4BYQ, ACC: WA4RNP. The Atlanta hamfest will be held this month on the 19th and 20th and I hope to see a lot of you there. Packet has taken off again now that the "MFJ" TNC's are available. I hope to talk with each of you some evening on packet. The Gadsden 02/62 repeater should be on Bald Rock by the time you read this; it should have excellent coverage so give it a try. The new rules concerning repeater to repeater interference go into effect the 12th of this month. If you are a Silent Key, please advise the Hammond H. Flag of Huntsville. He will be missed, very 73 till next month. Joe. Traffic for March: CAND, 843 messages in 31 sessions



# KENWOOD

...pacesetter in Amateur radio

## The Smallest HT!

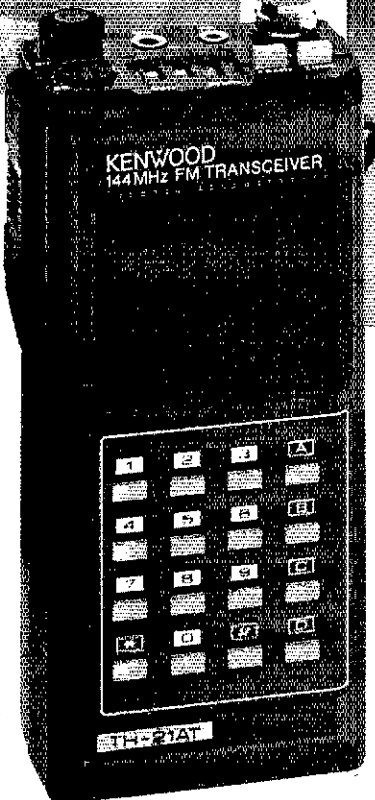
### TH-21AT/31AT/41AT

Kenwood's advanced technology brings you a new standard in pocket/handheld transceivers!

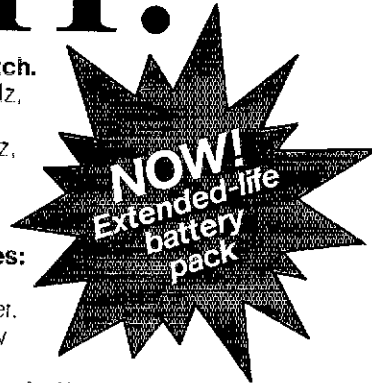
- **High or low power.**  
Choose 1 watt—enough to "hit" most local repeaters; or a battery-saving 150 mW low.
- **Pocket portability!**  
Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) with PB-21.
- **Expanded frequency coverage (TH-21AT/A).**  
Covers 141,000-150,995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.  
**TH-31AT/A:** 220,000-224,995 MHz in 5 kHz steps.  
**TH-41AT/A:** 440,000-449,995 MHz in 5 kHz steps.



- **Easy-to-operate, functional design.**  
Three digit thumbwheel frequency selection and handy top-mounted controls increase operating ease.



- **Repeater offset switch.**  
**TH-21AT/A:**  $\pm 600$  kHz, simplex.  
**TH-31AT/A:**  $-1.6$  MHz, reverse, simplex.  
**TH-41AT/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. See your authorized Kenwood dealer and take home a pocketful of performance today!



#### Optional accessories:

- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 NiCd 180 mAh battery
- PB-21H NiCd 500 mAh battery
- 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
- TU-6 programmable sub-tone unit
- AJ-3 thread-loc to BNC female adapter
- BC-6 2-pack quick charger
- BC-2 wall charger for PB-21H
- RA-8A/9A/10A StubbyDuk antenna
- BH-3 belt hook

# KENWOOD

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

TH-series transceivers shown with optional StubbyDuk antenna. TH-31AT shown with PB-21H. Specifications and prices are subject to change without notice or obligation. Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.



Rob, WA3QLS

# Delaware Amateur Supply



Paul, WA3QPX

71 Meadow Road, New Castle, Del. 19720

302-328-7728

*Factory Authorized Dealer!*

9-5 Daily, 9-8 Friday, 9-3 Saturday

**KENWOOD YAESU ICOM TENEC  
MICROLOG KDK SANTEC KANTRONICS  
AEA, AMERITRON, AND MUCH MORE!**

Large Inventory, Daily UPS Service

## 800-441-7008

Katherine, KA3IYO



### *New Equipment Order & Pricing*

Prices are subject to change without notice or obligation. Products are not sold for evaluation.

**NO Sales Tax in Delaware! one mile off I-95  
SERVICE, USED GEAR INFO: 302-328-7728**



**- AIR CONDITIONED - ALL INDOORS - AIR CONDITIONED -**

**---Atlanta HamFestival---**  
**WORLD CONGRESS CENTER-ATLANTA GEORGIA**  
**SATURDAY, JULY 19TH & SUNDAY, JULY 20TH**



- Location-Georgia World Congress Center
- Indoor Airconditioned FleaMarket
- License Exams Given Both Days
- Plenty of Parking Nearby

- Admission-\$6 Advance-\$7 at the Door  
(All Admissions Valid Both Days of HamFestival)
- Reservations Encouraged & Accepted
- Make Checks Payable to: Atlanta HamFestival

FOR INFORMATION WRITE:

**ATLANTA HAMFESTIVAL-P.O. BOX 77171-ATLANTA, GA. 30357**

**- AIR CONDITIONED - ALL INDOORS - AIR CONDITIONED -**

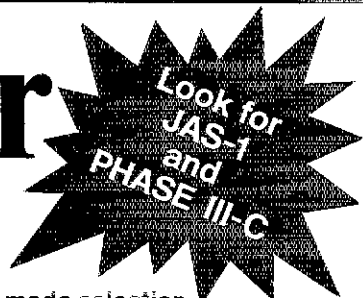
# KENWOOD

...pacesetter in Amateur radio

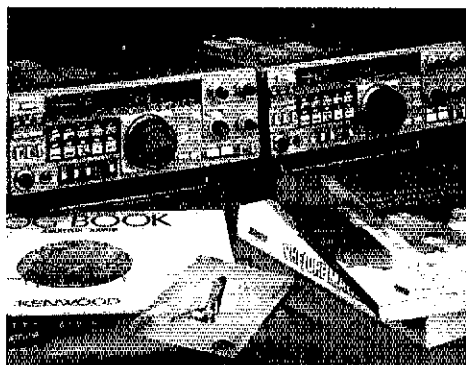
Good for Satellite Digital OSOs

## Matching Pair

### TS-711A/811A VHF/UHF all-mode base stations



The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.



**Highly stable dual digital VFOs**

The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).

**Large fluorescent multi-function display**

Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.

**40 multi-function memories**

Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.

**Versatile scanning functions**

Programmable band and memory scan (with channel lock-out), "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**

**RF power output control**

Continuously adjustable from 2 to 25 watts.

**Automatic mode selection**

You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.

**All-mode squelch**

**High performance noise blanker**

**Speech processor**

For maximum efficiency on SSB and FM.

**IF shift**

**"Quick-Step" tuning**

Vary the tuning characteristics from "conventional VFO feel" to a stepping action.

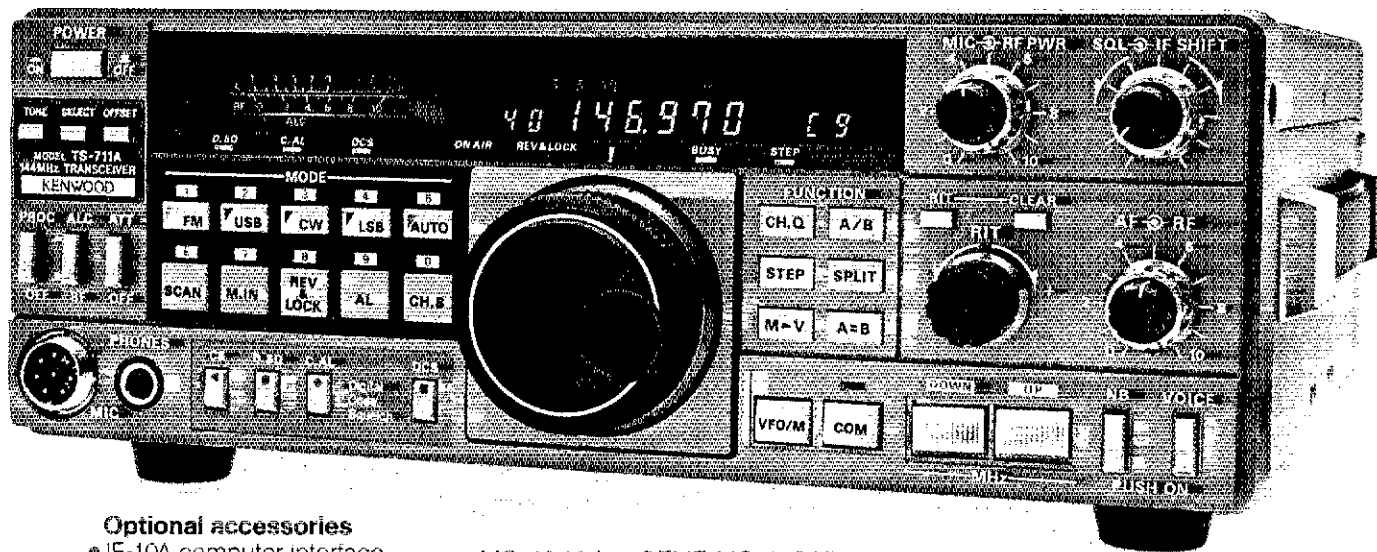
**Built-in AC power supply**

Operation on 12 volts DC is also possible.

**Semi break-in CW, with side tone**

**VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.



**Optional accessories**

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48 16-key DTMF, MC-42S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters: SW-200A 1.8-150 MHz SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2J DC power cable

# KENWOOD

TRIO-KENWOOD COMMUNICATIONS  
111 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.

# Alpha Delta Limited Space High Performance Antennas...

THE SOLUTION TO  
160-80-40 METER  
OPERATION IN SMALL  
AREAS!

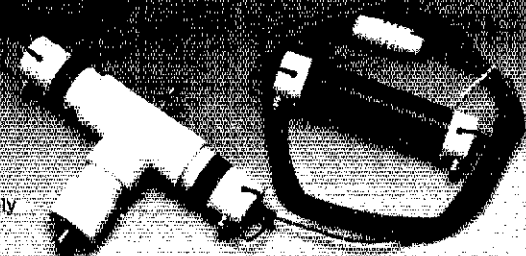
No trap design. Unlike trap antennas, there are no capacitors to break down under high RF voltages, and a tuner may be safely used for multi-band operation if desired.

- Direct 50 ohm feed. Tuners usually not required when operating in resonant bands.
- Full power operation.
- Uses "ISO-RES" inductors.
- Stainless steel hardware.
- Fully assembled.

Model DX-A 160-80-40 Meter Quarter Wave Twin Sloper —

- The premier low frequency DX antenna.
- Combines the tremendous DX firepower of the quarter wave sloper with the wide bandwidth of the half wave dipole.
- One leg is 67', the other 55'. Installs like an inverted-V. Ground return through tower or down-lead. \$49.95 each

Model DX-D shown



Model DX-D 160-80 Meter Electrical Half Wave Dipole —

- Also operates on 160 through 10 meters with a wide range tuner and either coax or balanced feed.
- Only 66' overall length . . . \$89.95 each

Model DX-80 80 Meter Electrical Half Wave Dipole —

- Also operates on 160 through 10 meters with a wide range tuner and either coax or balanced feed.
- Only 38' overall length . . . \$69.95 each

Available from your local Alpha Delta Dealer or direct. Add \$4.00 shipping and handling (USA only). Exports quoted



## ALPHA DELTA COMMUNICATIONS, INC.

P.O. Box 571 Centerville, OH 45459  
(513) 435-4772 Orders • (513) 376-4180 Antenna Tech Info  
current solutions to current problems

rep by WACKS, DRN5, 761 messages in 60 sessions rep by WA4JDH, W4CKS, NW4X, W4WJF and KC4GS. AENB, 57 messages in 31 sessions. AFND, 74 messages in 31 sessions. Traffic for April: CAND, 589 messages in 30 sessions rep by WA4JDH, and W4CKS DRN5, 427 messages in 60 sessions rep by WA4JDH, W4CKS, NW4X, KC4GS, and W4WJF. AENB, 44 messages in 30 sessions. AEND, 58 messages in 30 sessions. BPL for Mar: WA4JDH Apr: WA4JDH, P5HR for Mar: WA4JDH, W4CKS, WD4NYL, W4RNP. Apr: WA4JDH, W4CKS, WD4NYL, W4RNP. Combining totals for Mar/Apr: WA4JDH 1832, W4CKS 223, W4WJF 159, NW4X 84, K4AOZ 96, W4WJF 66, W4RNP 66, W4DGH 36, W4CNO 18, WB4TVY 14.

GEORGIA: SM, Eddy Kossobucki, K4JNL—ASM & BM: K4VHC, SEC: NC4E, STM: W4PIM, ACC: WA4ABY, OOC: NA4I, PIO: WA4PNY, SGL: W4BTZ, TC: K4UDR. This is the month to gather in Atlanta on July 19 & 20 for the Atlanta Hamfest. The World Congress Center is the place & the committee has promised that it will even be better than it was last year. Remember next year we host the ARRL National Convention. QST is always looking for articles & info of all sorts. If ur club or group does something that u think should be in print please send it directly to them. If u can pse send me a copy. They will acknowledge ur article etc. Sending it to me sometimes can delay it because I might be out of town, on vacation etc. Also be the subject of reports. p5hr send me all the rfc reports which go to the STM. W4PIM. I would much appreciate ur reports no later than the 5th of the month because I have a new deadline to meet. According to Jack, NC4E, the section SEC we now have more ARRES members in the section than ever before. PLEASE when u go to the Atlanta Hamfest or any that u will attend to come by the ARRL booth & take time to fill out one of the forms. This info is of great importance to us in times of emergency. During the month of April the following made the P5HR rolls: WB4WOL, W4PIM, K4EV, W4JWO, K4MGO, KB4JPN, WB4DBO, KF4FG & W4HON. I know that many more of u can qualify. It only takes a few minutes to figure it up & then send it to me. Remember ur name & I will participate & as u well know, AMATEUR RADIO EXISTS BECAUSE OF PUBLIC SERVICE! Many don't realize this but this is the name of the game. Trx to all the clubs & groups who send me ur bulletins. I want to agn commend the editors who devote their time & efforts to make these excellent reading. CU at the forthcoming Hamfest or club meeting. Traffic: W4WXA 123, WB4WOL 113, W4PIM 102, K4MGO 80, WB4DVZ 45, W4CBT 42, W9NXC 41, WB4DBO 41, KF4FG 41, W4JWO 38, KA4HHE 34, K4EV 32, N4UJZ 28, K4NM 17, WB4SPB 14, WB4RUJ 14, W4HON 13, K4IG 9, K4BA 7.

NORTHERN FLORIDA: SM, Phil O'Dwyer, WF4X—ASM/ACC: N4ADI, BM: KB4LB, SEC: WA4PJP, PIO: WA4PUJ, STM: WB4GHU, SGL: KC4N, OOC: K4UJE, TC: N4KF. The word that we are getting from many sources is that HT's are not permitted in Epcot or Disney World, so suggest that we word our ads in that way. I have heard that we are headed that way! Proud to announce that one of our Special Service Clubs has had two members appointed as HF Awards Managers for WAS and 5 Band WAS by ARRL, congrats to Lyn, WB4HBH, and Ed, W0RAO of the Lake Monroe Club. Clubs interested in the prestigious Special Service privileges should contact our ACC, Roy, N4ADI for details. Our Bulletin Manager, KB4LB, says that our newest Official Bulletin Station is Todd, KB4MHH. We welcome Todd and offer congrats on his recent upgrade to General Class and offer congrats that it won't be long before he is a regular on the 501 list. With the change to Daylight Time there are some propagation problems to stay in touch with your favorite nets to see if the time or frequency has been changed. Traffic for April has been light but with Mother's Day coming it is sure to pick up. Traffic: WF4X 480, WX4H 449, KB9L 444, WD4HO 322, N4PL 305, WB4ADL 289, AA4HT 253, KB4MHH 215, W4AQXT 186, KC4VK 174, KD4KK 163, WA4EYU 161, WF4Y 135, WD4IUI 122, KF4U 113, KB4LB 112, N4EDH 111, WB4GHU 110, N4GMU 89, WC4D 89, NF4O 88, N4JAQ 66, N4DY 52, W4MGO 45, WB4TZR 43, W4KIX 42, KF4TM 40, W44SXW 39, KB4FTY 38, N4ADI 36, K4CQ 34, WA4PLV 33, WB4FY 30, W4V4 27, WD4EQR 25, W4WY 23, NQ4P 20, WB1M 19, K4HS 15, N2AOX 14, N4IF 12, WA4PUJ 11, KF4Y 10, NS4C 9, WB4AWG 8, KA4KAH 6, KV4HI 5, N4ENL 2.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PHK—SEC: W4SS, STM: K4ZK, TC: K4I, BM: WD4KBW, PIO: WA4WYR, SGL: KC4N, OOC: W4SS, ACC: WA4NBE, NW4R reports by radiogram that he is back in the area—in Auburndale, and that he will be back on the air in the near future when his antennas are up. AA4WJ reports that he participated in one public-service event this month but no traffic. CAVEC exams in his area yielded three technicians. Three general, one advanced and one code certificate. W4DUG, the club station in Tampa reports that all of their April traffic resulted from one day of activity at the Girl Scout Extravaganza held at the state fair grounds in Tampa. W4SME writes that he will be leaving Florida about June 1st for Maine. He should be back in Florida around the first of October. KA4ZL was the focus of a full page article on the front page of the Life/Arts section of the Cape Coral Daily Breeze. It features her work as the only fulltime computer teacher at the middle school level in Lee County. The article also brought out that both she and son, KA4GUV, are ham radio operators. KA4GUV is a computer electronics major at the University of Central Florida in Orlando. WD4KBW reports 103 bulletins received and 80 transmitted this month by AA4BN 14, W4DL 36, WA4EIC 42, W4ESH 3, W4F4 10, KA4GUS 8, KE4EK 14, WD4KBW 22 and AA4MI 14. An Official Bulletin Station is needed in the St. Petersburg and Tampa areas. If interested contact W4KBW for details. Receive a radiogram from W1NJU, his SAR and the good news that he arrived home in one piece on April 14, 73 de WA4PFK. Traffic: W3CUL 3586, W3VR 1364, W4DUG 561, WA4PFK 393, K4EUK 296, K4SCL 240, KA4FZ 236, W4NFK 226, WA4EIC 203, KF4JA 191, K4ZK 172, AA4BN 166, WD4KBW 159, K4IA 130, WB4WY 130, WA4RUE 126, N4KB 125, NAKFU 121, KA4GUS 107, WD4CHO 88, W4TAH 81, W4SME 74, K4Y8 69, N4MXH 60, KF4RL 59, N4JOA 58, KA4NFX 55, W4PKP 52, W4DL 47, KB4MND 47, KA4YHS 39, WB4GCK 37, K4HS 35, W4ESH 34, W3TLV 34, K4FQ 30, KB4LPI 32, K4BLM 30, W4WY 27, W4WY 23, W3UR 23, WA4NBE 22, N4MM 19, KA4SIH 17, AA4MI 16, K49AKY 14, WD4NKK 14, W4WY 14, KY0T 14, W4SEH 14, KB4LKT 13, N4ET 13, KB4KAW 11, WD9AEP 10, W1NJM 9, KB4EWO 9, K4BCXQ 9, W4ABQM 8, K4IHT 8, K4OVC 8, WK4F 7, WD4MCC 6, W4MPV 6, K4AKDD 5, K4DGR 5, W4MCJ 5, W4MFD 5, AA4IF 4, W49WN 4, KA4GDU 4, W4DWN 3, N4ILNS, AA4CH 1, KB4SQF 1. (Mar.) W4NFK 465, N4HAS 66, WD9AEP 36, W4MPV 17.

WEST INDIES: SM, Alberto L. Valdejuili, WP4CSG—The new 20-kHz separation bandplan has been put into effect within the Section. The PRARC, frequency coordinator called a meeting and hamfest to discuss the implementation of said bandplan. The activity was attended by many interested hams, and the discussion was most interesting. For copies or the new bandplan, please contact the PRARC or the SM. Not too many changes were made to the existing 2M allocation of repeater frequencies, as the bandplan in effect prior to the recent changes were mainly at 20 kHz separation. Still some repeaters had

CAN'T AFFORD A "ZZZ"?



But you want a new excitement machine? Are you ever in luck! For a whole lot less than the price of a new "Z", you can buy a new Bencher paddle - an investment for a lifetime of responsive, smooth keying that "Z" owners can only dream of. See your Bencher dealer. Ask for a test drive. Check out the model and color selection. And get set for a thrill! from Bencher - we make CW fun again.

**BENCHER, INC.**  
343 W LAKE ST CHICAGO IL 60606—(312) 283-1876

## QST PROTECTOR!



You have an investment in your copies of QST. Protect this investment with sturdy QST binders.

Binder for QST prior to January, 1976: \$9.00. Binder for QST beginning with the January, 1976 issue: \$10.00. Available in the U.S. Possessions and Canada.

THE AMERICAN RADIO RELAY LEAGUE  
225 MAIN ST.  
NEWINGTON, CT 06111

# KENWOOD

...pacesetter in Amateur radio

**NEW**  
Compact 45 W 2 m

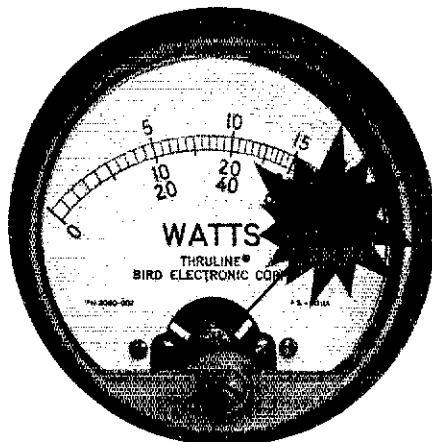
## 45 Affordable Watts!

### TM-201B/401B

#### Super-compact mobile transceivers

The TM-201B boasts a powerful 45 watts output, easy-to-operate front panel controls, and ultra-compact size. The GaAsFET receiver front end provides high sensitivity and wide dynamic range. Receive and transmit characteristics are tailored for minimum distortion and excellent audio quality. Both the TM-201B and the TM-401B are supplied with a high-quality external speaker, 16-key DTMF microphone and mounting bracket.

- 45 watt output, with HI/LO power switch (TM-401B has 25 watts output.) 15 W low.
- Dual digital VFOs
- TM-201B covers 142-149 MHz, includes certain MARS and CAP frequencies
- TM-401B covers 440-450 MHz
- 5 memories plus "COM" channel, with lithium battery back-up

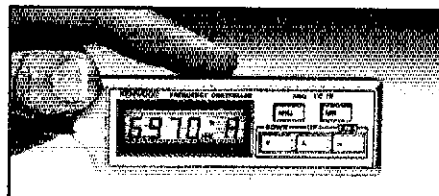


- Programmable, multi-function scanning
- High quality external speaker supplied
- Audible beeper confirms operation

#### Optional accessories:

- PS-430 power supply
- TU-3 or TU-3A two frequency tone encoder
- FC-10 frequency controller
- MC-55 (8-pin) mobile microphone
- SP-40 compact mobile speaker

- SP-50 deluxe mobile speaker
- SW-100A/B SWR/power meters
- SW-200A/B SWR/power meters
- SWT-1 2 m antenna tuner
- SWT-2 70 cm antenna tuner
- PG-2K extra DC cable
- PG-3A DC line noise filter
- MB-201 extra mobile bracket



#### Optional FC-10 frequency controller

Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel).

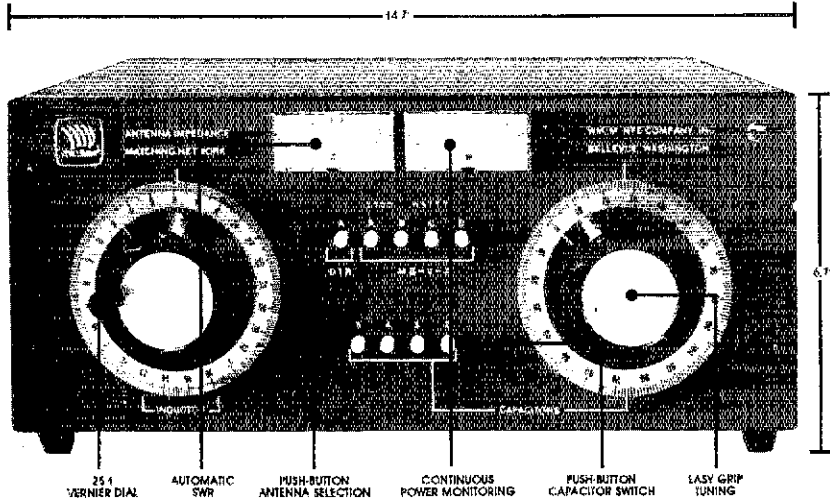
More information on the TM-201B/401B is available from authorized dealers.



# KENWOOD

TM-401B is similar to the TM-201B, but covers 440-450 MHz and is 25 watts. Specifications and prices subject to change without notice or obligation. Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

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



# IT'S NYE TIME TO TUNE UP WITH A NYE VIKING MB-V-A

Discover this durably built, feature packed MB-V-A Antenna Tuner. You'll find operating conveniences that make antenna tuning a snap. The MB-V-A is value engineered to do the job over wide operating ranges. Compare quality, features and the exclusive NYE VIKING TWO YEAR WARRANTY!

**Maximize Power Transfer.** Match your transmitter output impedance to almost any antenna system for maximum power transfer.

**PI Network.** Low Pass PI Network tuning — 1.8 to 30MHz. Heavy duty, silver plated continuously variable inductor with 25:1 vernier dial, 7000 volt variable capacitor and 15,000v switch selected fixed capacitors on output side. Tunes 40 to 2000 ohm antennas. Also provides harmonic suppression.

**Automatic SWR.** Hands free metering of SWR. No reset or calibration needed. Separate power meter — 300 or 3000 watts — automatically switched. Easy to read 25:1 recessed, backlit meter shows SWR and power continuously. Precision Jaws meters.

**Antenna Switch.** New! PUSH-BUTTON antenna switching to 4 antennas (2 coax, single wire and twin lead). Tuner bypass on first coax output. We designed this rugged switch to handle the power.

**3KW Balun.** Intra wound, triple core toroid gives balanced output to twin feeders from 200 to 1000 ohms and unbalanced output down to 20 ohms.

**Model Options.** MB-IV-A1 includes all MB-V-A features less antenna switch and balun. MB-IV-A2 is identical to MB-IV-A1 with the addition of a triple core balun.

1.8 MHz will not tune on some antennas.

**OTHER NYE VIKING PRODUCTS:** Straight Keys, Squeeze Keys, Code Practice Sets, Heaters and Memory Keys, Phone Patches, 3KW Low Pass Filter, Automatic SWR and Power Meters for HF and 2m (plus a meter for the band), 20KW FFP Antenna Tuner, All-Band Antenna and more.

Ask for a free catalog.

**WM. M. NYE COMPANY**  
1614-130th Ave NE  
Bellevue, WA 98005  
(206) 454-4524



## SEE IT FOR YOURSELF AT YOUR DEALER!

to be moved to new frequencies and/or locations as necessary in order to make additional room for new available frequencies. Plans are on the making for the upcoming Field Day. At this moment it is not yet finalized where the PHARC will set up its shack. More on this when something more concrete is known. No recent news has been received from the VEs to date, but it is known that great efforts are under way there to have emergency networks up and going; and ARES program is being structured. We are again nearing the hurricane season and preparations need be made, hopefully not to be needed. WINS: Sessions 31; QND 155 mins; QTC D; QNI 98; NM KP4DJ. WINE: Sessions 23; QTC 2; QNI 65; NM W0DX. Traffic: KP4DJ 17.

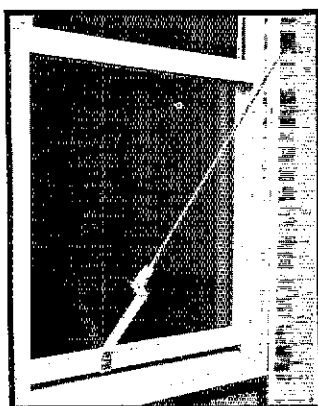
### SOUTHWESTERN DIVISION

**ARIZONA:** SM, Jim Swafford, W7FF—STM; W7EP. NMs: K6LL, KA7HEV, WB7CAG. Coconino ARC reports supporting the Equestrian Endurance ride in April, and in so doing checked out their new ARES portable repeater system. Also NNTA, N7FU, N0TD and N7CCE worked QRP contest with two water on battery power. OBS W7DRH in Page reports Navajo Mtn repeater will change to 146.38/96 in June. Ray, W7JU, at Riviera reports recent Western AZ HC VE exams to seventeen candidates and says N7HID of Kingman scored one-hundred percent on both Extra code and theory! Congrats. N7AOU solicits inputs from operators using SSTV, FSIV, as well as FAX-Oscar-EME-RTTY. Contact Bill at P.O.B. 906, Yarnell, AZ 85362. W8GQW former AMSAT official and net manager, and long-time OSCAR operator is now permanently ensconced at new QTH in Phoenix. Welcome to Arizona, Wray. Congrats to Glenn, WA7EHL, for his award certificate received from National Communications System in appreciation for his efforts in recent unplanned emergency drill. Good work. KB7FE also contributed to success of drill. W7WGW volunteered to coordinate ham radio support for "Hands Across America" campaign. Oliver is being assisted by KX7P and NJ7E, among others. SWN is a FB CW traffic net with a bunch of good operators serving AZ-NM. They meet daily on 3583 at 0130 UTC. For voice, Cactus net on 3915 at 0100 daily, and ATEN on 3992 at 0200. Try 'em, you'll like 'em. K7PYK has moved his 147.100 packet radio repeater from Mt. Bigelow to Phoenix area where it is now on solar power. Tucson packet operators are planning a new packet repeater for Mt. Bigelow. Pima Co. RACES members manned the Emergency Services Radio Van at recent County Fair. Among visitors was Byron Looney, K6FI SM of Santa Barbara, and Coordinator of Emergency Services for Santa Barbara Co. Phil, KX7J has been appointed Awards Manager for Green Valley RC. KAT7ML made BPL for last straight month. Congratulations, Mike. Don't forget the Ft. Tuthill affair July 25-27, and of course the big ARRL National at San Diego Sept. 5-7. See you there! 73. Jim, W9SDY and WB7DII, in Yuma, have new towers and beams. Arizona is proud to have K6LL, SWN Net Mgr, head the pack in November SS. Traffic: KAT7ML 549, W7EP 10, K6LL, WB7CAG 80, KB7FE 56, N5TC 55, W7LVB 46, KA7KOE 29, W7GAQ 29, N7E TP 25, WA7KXE 9, W7JTB 8, WA7KOE 8.

**LOS ANGELES:** SM, Bob Poole, AJ6F—ASM; K6IYK, SEC; AK6Y, STM; W6INL, ACC; X77C, QOC; K6BMG, IC; WB6QPO. April and spring bring many public events and the Section troops were there to support. March-of-Dimes WalkAmerica groups were all over the section on 26 April. Southwestern ARES and URAC joined SEC: AK6Y along with K6YMS, WA6JMT, KA6GSE, KB6DCB and KA6ZRG who covered the Southern area with the additional help of REACT led by N6NHF (tnx N6KNO) while K6YMJ and crew were in the Westside/Marina area; VEBA and ASM K6IYK handled Valley chores nicely (tnx K6IYK) while the W6FNQ/R group in the San Gabriel-Pomona area attended to the efforts there (tnx K6ZD). The RAC group, incidentally, had the City of Covina Centennial Parade, was under control on April 12 as well as providing a total emergency public service count of 264 pieces of traffic via W6FNQ/R. The LAACARC along with SCRA, Hughes ARC, Northrop ARC and Downey ARC again, in spite of the busy season, are taking the responsibility of bringing Ham Radio to the Boy Scouts at the annual Camporee at the CSDH campus; N6BSA rides again! ARALB had the Queen Mary station on the air for the recent Hands Across America event; hundreds of ARES and other hams were on "HAND", for this gigantic event. Congratulations to the folks who donated time and effort to yet another selfless Ham Radio effort. Numbers in the HAA event were too staggering to print here! The So. Cal. DX Club had a splendid turnout and a lot of fun at the Int'l DX Convention in Visalia; yours truly was in attendance (and can personally vouch for the fun). Another recent convention found VHF'ers in Fullerton exchanging notes and information; great job on the part of the Committee responsible for the West Coast VHF Conference! General Dynamics (Pomona) Ham Club is now sponsoring a Swap Meet in Cucamonga on the 2nd Sat. of the month; call-in on 146.91 for details. Our new Section Technical Coordinator is WB6QPO. AJ brings expertise to the technical end of things here and is looking for interested technical types to serve as ATCs. TORRA, the Rose Parade organization is looking for volunteer operators for the 1987 event; contact Fred, WB6QJ; Bud, WA6AAD or Cliff, KB6IA on 145.18; (tnx WARA FEEDBACK). Packeteers please be good neighbors and adjust your VHF deviation such as to preclude adjacent channel interference; plenty of info on BBSs on how to do this. Welcome to the Westside ARC, our newest club; meets each 3rd Thursday, 7:30 PM at the Santa Monica Hed Cross. AUTOPATCH HAMS ATTENTION: KB6HQS has formed HAMS (Highway Amateur Monitoring System) in the L.A. area the purpose of which is to advise the CH of suspicious drivers on the road. If you're interested, form this Ad-hoc group after the death of his friend Alex age 17, a high-school co-ed, in a drunk driving case. Write Richard Baiser, 17985 Medley Dr., Encino, CA 91316 for more information. The OCWA meetings recently held were a success especially the chapter 7 dinner held at the Long Beach Naval base, the turn out was over a hundred. At this writing we are preparing for the OOTC meeting in Downey which will be over by the time you read this. They are planning on twice a year meeting, so get in touch with Bert Ayers W6CL or W6YV for more information. Traffic: K6UYK 486, W6INL 255, N6LHE 85, W6ORF 44, W6NKE 41.

**ORANGE:** SM, Joe H. Brown, W6UBQ—SM. This my first year as Section (SM) The SM is elected for two years. I wish to thank you for your support. Programs we have been working on are the FCC Auxiliary, Technical Coordinator program, Amateur Radio Club Affiliation and, of course, the ever widening requirements and responsibilities of Public Service thru involvement in ARES, RACES, NTS, CLUBS, TRAINING, RECRUITING and other organized activities, the many problems facing the Amateur Radio Service can be minimized. We need you! There are eight Section level appointees to help you make Amateur Radio a better and a more enjoyable Service (Hobby). They are listed as follows: Section Emergency Coordinator Jim Vamer AE6N, PO Box 1452, Wrightwood, CA 92397 (619-249-5523). Affiliated Club Coordinator Phillip E. Bellencourt KB6FRW, 517 Sturgeon, Costa Mesa, CA 92626. Technical Coordinator, John Alan Lind KD7XC, 2194 Connelio St. Corona, CA 92703-4001 (714-793-8249). Section Emergency Coordinator, Ralph Alexander, W6FRF, 2621 Red Hill, Tustin, CA 92680 (714-544-1974). Section Traffic Manager, Ernie Schultz WA6OCA, 315 33rd St., New Port Beach, CA

## PORTABLE ANTENNA



**MODEL AP-10**

**PRICE \$51.95**

Add \$3.00 Shipping and Handling

Designed for APARTMENTS — MOTELS — VACATIONS

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

**BARKER & WILLIAMSON**

Quality Communication Products Since 1932

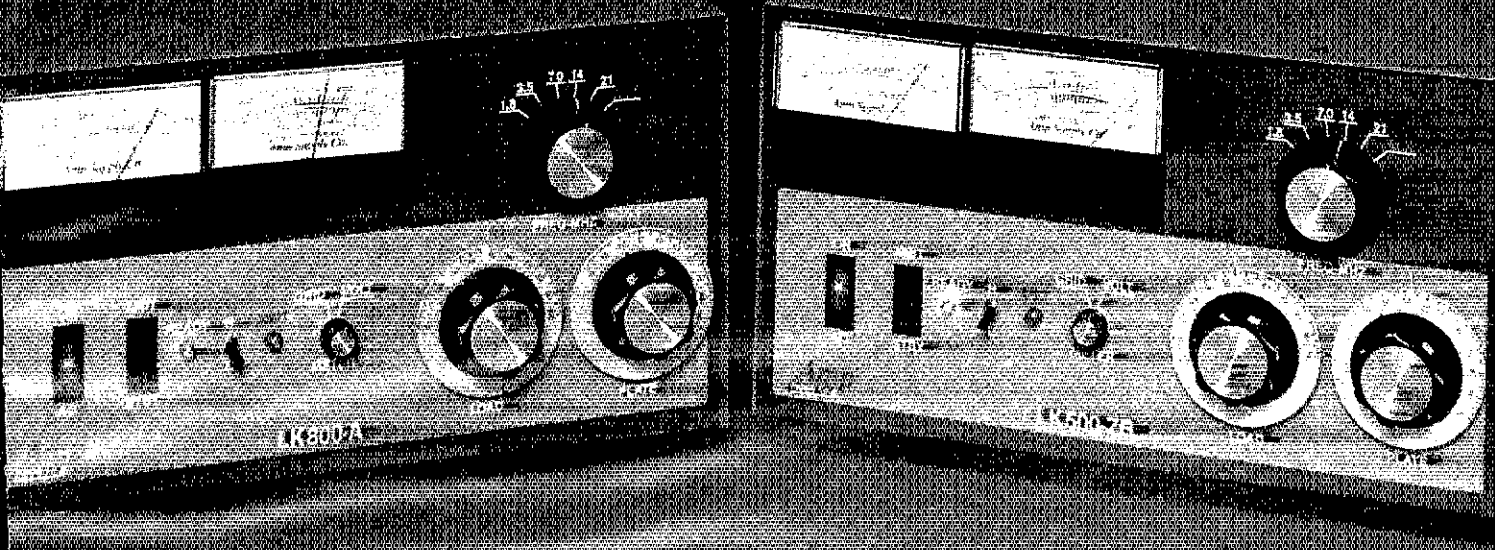
At your Distributors write or call

10 Canal Street, Bristol PA 19007

(215) 788-5581



# FORWARD AMATEUR

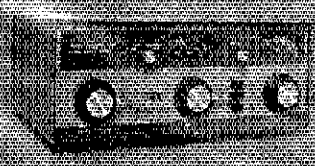


Very few amplifiers have provided the excitement and emotional involvement associated with the power of an ICA Amplifier. We found the commercial export version of this "rock crusher" in the FCC type certified 1500 watt output model. It is now offered to the discriminating Amateur.

For 1988 Amp Supply has taken one more step in the thoughtful evolution of the classic LK-500ZB. We think you'll agree that the front panel is smashing—and that the LK-500ZB will be one of the most attractive pieces of equipment you will own. And no matter how you equip your LK-800 or LK-500 series amplifier, it comes the full 2 year warranty.

We feel the LK series amplifiers are the best all-around HF amateur amplifiers in the world. Wouldn't you like the strength and power of an Amp Supply LK-800 or LK-500 behind your signal?

- LK-800A has Three 3CX800A7's
- LK-500ZB has Two 3-600Z's
- New Styling
- QSK Full Break-In
- External Transformer
- Jamming Vacuum Relay
- No-Tune-Up Versions
- 2 Year Warranty
- Best Tuned Input
- Quiet Operation
- Made In USA
- 1500 Watts Output
- Built-In Power Supply
- Commercial Models Available



AK5000  
1500 Watt  
1500W



PAC-5 and PAC-8  
External Optional Power PAC  
Current: 1500W 2470W

LK-500ZB	\$2295.00
LK-500ZB without QSK and Vacuum Relay	\$1795.00
LK-500ZB No-Tune	\$1895.00
LK-800A	\$2095.00
LK-800 No-Tune	\$1895.00
PAC-5 Power Pack	\$495.00
PAC-8 Power Pack	\$595.00
AK3000 Caliber Tuner	\$395.00

All Prices F.O.B. USA

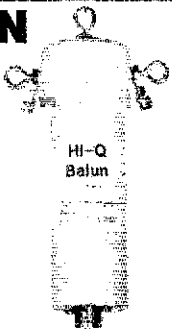
Call 919-821-5518



**AMP**  
Supply Co.

# HI-Q BALUN

- For dipoles, yagis, inverted vees and doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz.
- Small, lightweight and weatherproof
- 1:1 Impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector
- Built-in DC ground helps protect against lightning



Only \$14.95

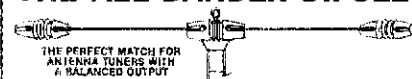
## HI-Q ANTENNA CENTER INSULATOR



- Small, rugged, lightweight, weatherproof
- Replaces center insulator
- Handles full legal power and more
- With SO 239 connector

\$6.95

## THE ALL-BANDER DIPOLE



- Completely factory assembled ready to use
- Heavy 14 (7/22) gauge stranded copper antenna wire to survive those severe storms
- Center fed with 100 feet of low loss PVC covered 450 ohm balanced transmission line
- Includes center insulator with an eye hook for center support
- Includes custom molded insulators molded of top quality material with high dielectric qualities and excellent weatherability
- Complete installation instructions included
- Overall length 135 feet, less when erected as an inverted vee or sloper
- Handles 2 kw PEP & covers 160 through 10 meters
- May be trimmed to fit small city lots

Only \$29.95

## DIPOLES

MODEL	BANDS	LENGTH	PRICE
<b>Dipoles</b>			
D-80	80/75	130'	\$31.95
D-40	40/15	66'	28.95
D-20	20	23'	27.95
D-15	15	22'	26.95
D-10	10	18'	25.95
<b>Shortened dipoles</b>			
SD-80	80/75	90'	35.95
SD-40	40	45'	33.95
<b>Parallel dipoles</b>			
PD-80/10	80, 40, 20, 10/15	130'	43.95
PD-40/10	40, 20, 10/15	66'	37.95
PD-80/40	80, 40/15	130'	39.95
PD-40/20	40, 20/15	66'	33.95
<b>Dipole shorteners — only, same as included in SD models</b>			
S-80	80/75		\$13.95/pr.
S-40	40		12.95/pr.

All antennas are complete with a HI-Q Balun, No. 14 antenna wire, insulators, 100' nylon antenna support rope (SD models only 50'), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

Antenna accessories — available with antenna orders:

- Nylon guy rope, 450 lb. test, 100 feet \$4.49
- Molded Dogbone Tee antenna insulators 1.00/pr.
- SO-239 coax connectors .55
- No. 14 7/22 Stranded hard drawn copper antenna wire .06/ft

ALL PRICES ARE UPS PAID CONTINENTAL USA

Available at your favorite dealer or order direct from:  
**Van Gorden Engineering**  
 P.O. Box 21305 • South Euclid, Ohio 44121  
 Dealer inquiries invited



**1-800-433-WIRE**  
 FOR ALL AMATEUR WIRE & CABLE  
 Belden & Equivalent  
 (803) 895-4195 (So. Caro. & Ragchew)  
**CERTIFIED COMMUNICATIONS**  
 ROUTE 2 - PITTMAN RD., LANDRUM, SC 29356

Stop By Your Local  
**ARRL Book Dealer.**  
 He'd Like To See You!

32663 (714-673-7378). Public Info Officer, Joseph J. Storto WB6DXT, 1356 Tiger Tail, Riverside, CA 92506 (714-780-1149). Bulletin Manager, Brooks Heltig K5GGS, 128 S Center St., Redlands, CA 92371 (714-332-1500). Government Liaison, Larry Lameters WA6IKJ, 18333 Santa Gertrudis, Fountain Valley, CA 92708 (714-962-3453). The Amateur Service has done a fantastic job supporting public service activities. More importantly it proved its value in emergencies to Public Safety and Public Service Officials. Training and organization is dependent on your support of ARES/FRACES net activities. The ARRL Net Directory lists more Public Service Nets for the Orange Section than any other. YOU ARE NEEDED! Contact Section Leaders and offer your support. The Amateur Radio Emergency Service (ARES) headed by the SEC and is organized thru each of the Counties by the (DEC) District Emergency Coordinators list: Inyo Co. DEC, Michael R Franz K6BHH, 1430 Rockwood, Santa Gertrudis, CA 93527 (818-872-2441). Riverside Co. DEC, Bob Mann W6LKN, 5127 Glen Haven Ave., Riverside, CA 92506 (714-686-3823). Orange Co. DEC, Ralph Swanson WB6JBI, 506 Hilda Circle, Anaheim, CA 92806 (714-776-9272). San Bernardino Co. DEC, Thomas L. Markley WA6IKH, 70 17400 Valley Blvd., Fontana, CA 92335 (714-350-2194). In closing, hope you will be able to attend the 1986 National ARRL Convention Sept 5-7 in San Diego. Drop by and visit the Orange Section Hospitality Room, PSHR: WF60, WB6QZ. Traffic: WF60 425, K6VCE 115, WB6QZ 106, N6GOT 86, KA6HJK 66, WA6QCA 57, W6CPE 24, K6DD 23.

**SAN DIEGO:** SM, Arthur R. Smith, W6INI—STM: N6GW, SEC: W6INI, PIO: K6GLF, TC: N6NR, Aug 15 is deadline for advanced registration for the 1986 National Convention, Sep 5-7, in San Diego. Write SANDARC, POB 82642, San Diego CA 92138 or phone (619) 292-7918 for info. Packet was used in May 20 for the earthquake drill with stations at SD County, EOC, SD City EOC and SD Police EOC. N6LYX has been apptd ED for Tri-City Dist which covers north coastal SD County. Escondido ARES is working with city's disaster planning, 1986 club officers: QCWA K6UV Pres, KE6VB VP, W6QSD Sec, WA6JQM Treas; Escondido ARS WA6IQY Pres, KB6DQ VP, N7HAW Sec, N6JHR Treas. Upgrades: Extra N6ADK, N6CLO. Advanced N6ANS, WB6EKO: General WA6JUS. ARES 160m net meets at 1100 each Sunday. Net Controls are WA6BYN, N6FBZ, K6SL, W6TET. Calif Dept of Forestry has organized an air unit with volunteer pilots to assist in Red Flag patrols and other fire prevention tasks. Each plane will carry an Amateur Radio coordinator/observer. (N County) C net met 29 times, handled 70 msgs. ARES CW held 4 sessions, 16 check-ins. Traffic: N6GW 45.

**SANTA BARBARA:** SM, Byron Looney, K6FL—Whether you are enjoying Field Day as an outing, emergency exercise, PR event or contest, have a contest for the first time. Drop in to the SM for 100 points. Marilyn Hains, N6LJF, is our newest EC, responsible for ARES activities in the Lompoc Area. Thanks for stepping forward, Marilyn. Special Olympics have become another opportunity for community service. Latest were at Vandenberg AF Base and Morro Bay. K6YD and KY6L were chefs for SCN/BB barbecue. This Section Traffic Net eats as well as it handles traffic. WK6K's packet demo group did an outstanding job at the Estero Club. Many visitors from throughout the section. W6POE spoke at Poinsettia Club on good, common sense operating practices. Other clubs should consider programs like this by one of their knowledgeable old timers. Traffic: K6YD 39, N6HYM 28.

### WEST GULF DIVISION

**NORTHERN TEXAS:** SM, Phil Clements, K5PC—Asst. SM/AOC: N5V, STM: AE5I, SGL: W5UXP, TC: W5LNL, PIO: K5HGL, BM: W5QXK, RFI: W5JBP. The big news from our Section this month; the major communications emergency associated with the killer tornado in Sweetwater, on April 29th, Nolan County EC, KA5RGC, Taylor County EC, N5ANO, and District EC AE5I quickly went into action, establishing links on two meters into several vital areas. The Roscoe 146.65 repeater was utilized for disaster site traffic, and the Abilene 146.70 machine was used for traffic into the area. The Red Cross, The 146.82 Big Spring repeater moved traffic to Midland and on. On Sunday, April 30th, as the emergency phase of the operation was declared under control, Nolan Co. EC KA5RGC set up a health and welfare net on forty meters. In all, over 800 pieces of traffic were processed with over 400 pieces of ttc. delivered into the disaster area by units of Nolan and Taylor Co. ARES. District EC AE5I worked as liaison to the Abilene Red Cross Chapter, and reports a line job done by all amateurs involved. SGL W5UXP was also on the scene during the first hours of operation to lend a hand. More on this as details come in. ARES reports a good time had by all at the annual 7390/TEX picnic at Kerrville. WD5GKH was elected new TEX NM at the get-together. K5EVI has been re-elected NM of the D/WF Tlc. Net at their annual meeting on April 27th. Asst. NM's of D/WF are KA5KQF and KA5SPO. I hope the tornado season has calmed a bit by now. Time to gear up for the hurricane season and its associated flooding threat that can affect our Section. PSHR for April: AE5I KA5SPT KA5RGC W5VMP KB5UL K5EVI.

**OKLAHOMA:** SM, Dave Cox, N85N—ASM: K5WG, SEC: W57TN, STM: KV5X, ACC: N5JY, BM: W5AS, PIO: WD5IFB, OOC: K5WG, SGL: W5NZS, TC: W5QMJ. Kudos to the following OK Section hams for their service to our neighbors to the south in the aftermath of the Sweetwater, TX tornado disaster: WA5IGU (Red Cross liaison), KD5IS (Red Cross H/W), W5REC (NCS), W5SRX (NCS), WD5ET, WD5GTC, NMSA, K5CAY, W5SZZP, W5SSZO, W3BX, KB5VA. Thanks to K5JBJ and W6GZ for tour of Woodward's radar facility, a very impressive setup. We're getting a new (our third) Special Service Club in the OK Section, Edmond ARS. Their application has met approval from the ACC, SM, and Div. Director and only awaits final approval by the ARRL Exec. Cmty, which meets in July. Kudos to all EARS members for that extra effort required to reach such heights. It's here at last - Field Day. Lets all get out and sharpen our emergency operating skills. Any FD sites wishing to transmit an FD message to the SM or the SEC for extra points can do so easiest by checking into the STN at 8:30 PM (local) on 3850 kHz or OTW/N at 8:00 pm local on 3900 kHz on Saturday the 28th, or the OPEN at 8 am Sunday on 3900 kHz. Coming soon - Ham Holiday '86. West Gulf Div. Conv.-Aug. 2-3 at Lincoln Plaza in OKC, bigger and better than ever. Traffic: K5CXP 219, W5AS 208, W5SRX 159, W5OHK 151, KV5X 80, N5IKN 76, N85N 64, W5RB 57, NX5I 56, NQ5W 55, W5REC 53, WA5OUV 45, WD5IFB 36, WA5ZOO 33, NX5E 30, WA5OGC 30, K5GGBN 28, NQ5O 28, W5VLW 27, W5VOR 20, K5CAY 19, KX5W 8, KA5WGS 8, NQ5Y 4.

**SOUTHERN TEXAS:** SM, Art Ross, W5KR—SEC: K5KRI, STM: K5QEW, ASM: N5TC, ACC: K5SV, OOC: WA2VJL, ATC: N25U, PIO: WA5U2B, OPS WD5GKH, Elected Net Mgr for TEX. Houston ECHO Soc. will conduct 5 FD exercises in 1986; all will be from Texas historical sites, including traditional FD; special QSL cards will be issued for each site. KA5JDT as Amateur Radio coordinator plus WA5GZX, KA5VTZ, N5IUC, K5EJG, W5BK, N5CR, and W5DPR provided communications for March of Dimes Walk America in north-west Harris County. The American Heart Assn Fun Run also had Amateur Radio communications; Run Coordinator

WA5GZX had help from WB5IN, N5CRR, WBSYR, N5ALO, WA5TP, KA5JDT, WBSMUJ, WA5QXE, KF5FH, NV5B, AC5Z, KA5QFH, K5GCG, W5IUM, WA5GAC, KA5DAT, KA5VTZ, KA5BE, N5IUC, WB7DYH, K5SYA, WA5F, and WBSBY. D-CAT members PIO WA5U2B and K5CVD put up a new antenna for handicapped WA5EPA and WB5FDU to keep them active on CAN, RN5 and TTN. NZ5J reports KA5WLX, Sequin Hi School Jr. won 2nd Grand Prize at Texas Jr. Academy of Science; his project will be exhibited at the International Science Fair in Ft Worth. WD5DOM is newly accredited VE; GVAEEN (Sequin) provided communications for March of Dimes Walkathon; W5FFG, K5IG (bicycle mobile) WD5DLN, K5TJA WD5DLN, K5TJA, N5NWJ and W5M TO did a great job. W5DOM, K5IG, WD5DLN, W5FFG, WA5W2X, K5TJA and NZ5J took part in STX Weather Exercise; N5IVU upgraded to General; N5IUC went to Advanced; DRNS Mgr WBSYD reports 427 msgs in 60 sessions; STX represented 100% by W5LW, W5EPA, WBSFQU, W5CTZ, K5CB, NX5V, K5SKQ, W5Z, N5DFO, A15K, W5TUK, and WBSYD. OBS W5LW reports 6 bulletins, 30 satellite bulletins, 5 propagation forecasts, 4 DX bulletins, 5 CRRL bulletins given 152 readings on 9 nets. CAND Mgr W5LW reports 589 messages in 30 sessions; STX stations QNT NX5V, W5LW, WBSFQU, W5EPA, N5DFO, K5WOB, W5TUK and K5KQ. Cameron County EC W5GUR ran the net for the Rio Grande Valley during the South Texas Weather Exercise; check-ins were heavy. K5GSA has been appointed HF Awards Mgr for the El Paso ARC, and ARRL SSC. Traffic: W5YDD 363, W5LW 259, N5JK 22, W5CTZ 206, N5DFO 90, WD5GKH 82, WBSFQU 51, W5Z 40, K5HZR 15, NZ5J 3.

**the good neighbor.**  
 The American Red Cross  
 advertising contributed for the public good

## THE ARRL DXCC COUNTRIES LIST

- COMPLETE DXCC RULES.
- SHOWS COUNTRIES WHERE CARDS MAY BE SENT THROUGH THE ARRL OUTGOING QSL BUREAU
- LISTS ITU AND CQ ZONES PLUS THE CONTINENT OF EACH COUNTRY
- CHECK-OFF BOXES FOR MIXED, PHONE, CW, RTTY, SATELLITE, AND FOR EACH BAND.

Now keep all of your DXCC records on this handy and complete 12 page form. Available postpaid for \$1.00 a copy.

Available from:  
**ARRL, 225 Main Street, Newington, CT 06111**

## 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 KA80HX, 91 Ridgefield Place, Ormond Beach, FL 32074 Florida Phone (904) 673-4066

**NEW NATION-WIDE TOLL-FREE TELEPHONE**  
 1-800-84-RADIO  
 1-800-84-7346

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





# ALINCO ELECTRONICS INC.

P.O. Box 20009 • Reno, Nev. 89515 Phone (702) 359-1414 • Telex 4993999 EGELECTR  
44 Glen Carran Circle • Sparks, Nev. 89431

SEE YOUR DEALER



**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!

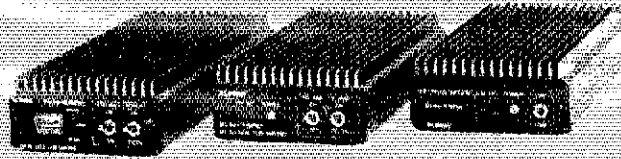
SEE YOUR DEALER



**ALR-206T List \$345.00**

- 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

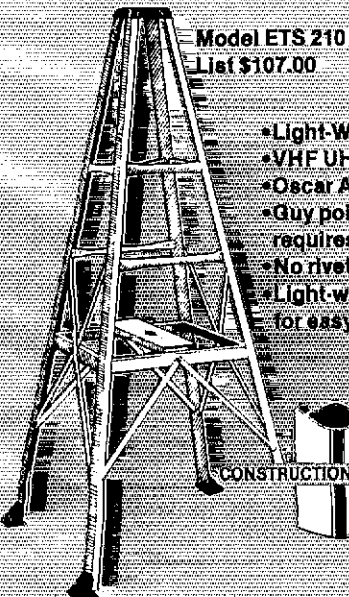
List Prices From \$69.95 to \$156.00

- 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 GaAs FET 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.



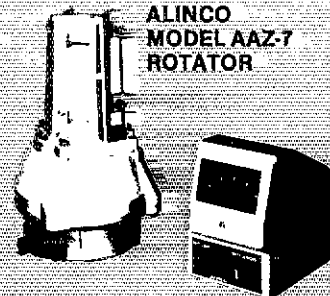
**Model ETS 210**  
List \$107.00

**ALINCO ANNOUNCES THE PERFECT MATCH FOR MEDIUM SIZE ANTENNA SYSTEMS. THE NEW ALINCO TOWERS ARE IDEAL FOR MOUNTING:**

- Light-Weight Beams
- VHF UHF Antennas
- Oscar Antenna Systems
- Guy points when added support is required
- No rivets - all steel bolts
- Light-weight aluminum construction for easy installation and durability

- All towers have four legs for easy mounting. Along with ALINCO's unique dual wall construction for unparalleled strength
- Rotor mounts inside the ALINCO Tower with provisions for top mounted thrust bearing

THRUST BEARING  
MODEL AAZ-7A  
\$36.00



**ALINCO MODEL AAZ-7 ROTATOR**

CONSTRUCTION OF LEGS

# ALINCO ELECTRONICS INC.

Contact your nearest dealer or Call Alinco for the location closest to you.

## The Personal Touch of Filters

**P**ersonal interests and pursuits are a natural part of each amateur's lifestyle, and ICOM proudly recognizes those individual preferences with a full line of exciting accessories. ICOM offers a variety of optional I.F. filters for its popular IC-751A, IC-751, IC-745, and IC-735 HF transceivers, for example, which are easy to install and operate. One can thus tailor a new (or existing) transceiver for CW, RTTY or SSB use according to personal desires and anticipated band conditions.

While standard factory versions of a particular transceiver may prove sufficient for one person's needs, others expand their pleasures tenfold through the inclusion of additional filters. The results are an increase in a transceiver's overall performance in terms of selectivity and adjacent channel rejection, or the ability to reduce interference from slightly off frequency stations.

The standard factory installed filters in ICOM's HF transceivers are quite impressive performers designed for general amateur use (mainly SSB, with occasional CW and/or RTTY operations). Their 6dB bandwidth is 2.4kHz, adjustable to 800Hz for CW/RTTY use with the Pass-band Tuning knob. Their 60dB, or strong signal bandwidth with standard filters is approximately 4kHz. Optional filters can reduce that strong signal (60dB) bandwidth for interference protection, however, while setting their normal signal (6dB) bandwidth at 500Hz or 250Hz for RTTY or CW operations, or at 2.4kHz for highest quality SSB activity.

The obvious question at this point is which filter(s) to choose for a particular mode of interest and model of ICOM transceiver. The first step in this direction involves visualizing your own operating preferences (CW, RTTY, SSB, or a combination of those modes), your HF transceiver's existing capabilities, and the additional benefits provided by optional

filters. For simplicity, let's separate those preferences into general, specialized, and highly specialized categories.

Next, use the accompanying filter selection chart for choosing a filter to suit your personal needs. When selecting filters, remember that only one optional 455kHz filter and one optional 9MHz filter can be installed in a 751A, 751, or 745 transceiver. The IC-745 also requires an optional filter to be installed in its 455kHz slot **before** an optional filter is installed in its 9MHz slot. One exception: The new IC-751A is factory equipped with a 500Hz FL-32 type filter installed in its 9MHz slot. Also, the economy model IC-735 accepts **only** 9MHz filters (FL-32A and FL-63).

ICOM suggests budget minded amateurs or specialized CW/RTTY opera-

tors initially add a 500Hz bandwidth filter to their transceiver for truly enhanced CW or RTTY operation. Highly specialized CW or RTTY operators can also add an optional 500Hz or 250Hz filter in their unit's 9MHz I.F. socket for ultimate performance. 250Hz filters are very narrowbanded and great for serious DXing. They require a steady hand on a transceiver's knob, however, and are too selective for most RTTY use. Filter selections are achieved via front panel switches to provide maximum operator flexibility.

That personal feature is only one more example of ICOM's dedication to producing the best and most versatile transceivers in amateur radio today. ICOM aims to keep you talking in top style.

### ICOM HF FILTER SELECTION GUIDE

TRANSCEIVER	MODE	DESIRED FILTER BANDWIDTH	OPTIONAL 455kHz FILTER SELECTION (FIRST CHOICE)	OPTIONAL 9MHz FILTER SELECTION	SPECIAL NOTES
<b>IC-751A</b>	CW	500Hz	FL-52A	FL-32*	Must remove FL-32 filter to install FL-63 or FL-33 Signal loss with FL-63 is 4dB more than FL-32 PBT control is not effective when FL-33 is selected
	CW	250Hz	FL-53A	FL-63	
	AM	5.2kHz	---	FL-33	
<b>IC-751</b>	CW	500Hz	FL-52A	FL-32	Front panel switches select either one or both of these filters. Front panel switches select either one or both of these filters. Signal loss with FL-63 is 4dB more than FL-32. PBT control is not effective when FL-33 is selected
	CW	250Hz	FL-53A	FL-63	
	AM	5.2kHz	---	FL-33	
<b>IC-745</b>	CW	500Hz	FL-52A	FL-45	FL-52A must be installed before FL-45 will operate FL-53A must be installed before FL-54 will operate High skirt selectivity SSB filter. Replaces standard ceramic filter.
	CW	250Hz	FL-53A	FL-54	
	SSB	2.4kHz	FL-44A	---	
<b>IC-735</b>	CW	500Hz	---	FL-32	Signal loss with FL-63 is 4dB more than FL-32
	CW	250Hz	---	FL-63	

\* FL-32 is factory installed in IC-751A





# ICOM IC-751A

## CAN YOU HANDLE THIS MUCH TRANSCEIVER?

**All HF Band Transceiver/  
General Coverage Receiver  
New Design  
100% Duty Cycle Transmitter  
65dB Dynamic Range  
All Modes Built-In USB, LSB,  
AM, FM, CW, RTTY  
12 Volt Operation**

The new IC-751A top-of-the-line base station transceiver is designed for the ham operator who demands high performance. Whether contesting or tuning for pleasure, the 100 watt IC-751A incorporates the best features of the IC-751, plus brings you to the forefront with the following most-asked additions.

**More CW Control.** For the CW enthusiast, the new IC-751A includes an electronic keyer unit, OSK rated at up to 20WPM, standard FL-32A 9MHz/100Hz CW filter and CW sidetone to

monitor your code in RX or TX modes... great for practice!

**All Amateur Band Coverage.** Plus general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

**Improved Smooth Tuning.** The IC-751A features a newly designed tuning knob for velvet smooth tuning.

**Added LED Annunciator.** For easily identifying if you're using the tuning speed, dial, or band switching functions.

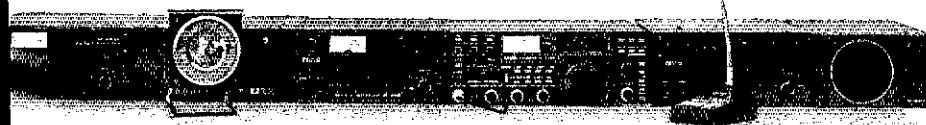
**32 Memories.** Mode and frequency may be stored in any of 32 memories...all the memory capability that you'll ever need.

**More Stable.** Even in the receive mode, the IC-751A has a sophisticated thermal sensor to monitor the internal temperature. The sensor automatically activates the cooling fan which gives maximum stability...critical for contesting.

**Newly Designed Features.** The IC-751A boasts a number of newly designed features for better performance...new 9MHz notch filter to drastically reduce QRM, new AGC system, new compressor for better audio and a new AF gain control system to improve control of the CW sidetone volume.

**Options Available.** Options for the IC-751A include the IC-PS30 external AC system power supply, IC-PS35 internal AC power supply, IC-AT500 antenna tuner, IC-EX309 microprocessor interface connector, SM-8 or SM-10 desk mics, IC-2KL linear amplifier, RC-10 remote controller, SP-7 or SP-3 speakers, IC-EX310 voice synthesizer and GC-5 world clock.

**Optional Filters.** FL-52A CW 455kHz at 500Hz, FL-53A CW-N 455kHz at 250Hz, FL-63A CW-N 9.0106MHz at 250Hz, FL-33 AM 9.010MHz at 6000Hz, and CR-64 high stability 30.72MHz crystal filter.

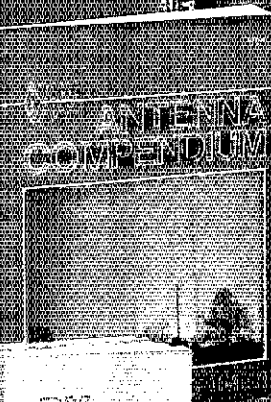



**First in Communications**

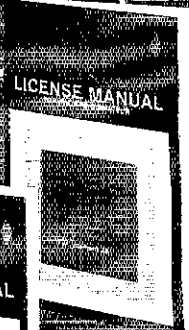
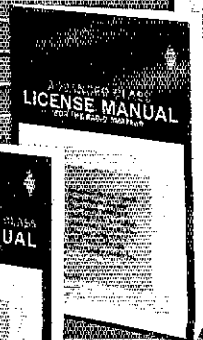
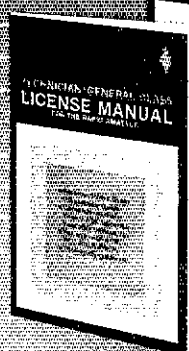
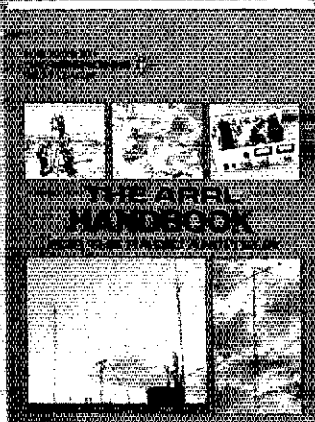
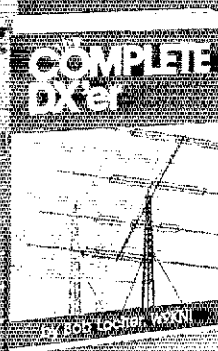
ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3150 Premier Drive, Suite 126, Irving, TX 75063

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 751A386

# The ARRL Bookshelf



DOZENS OF PUBLICATIONS FOR EVERYONE WHO LOVES AMATEUR RADIO!



COM Dual Bander

# IC-3200A



## The Most Compact Dual Bander at the Smallest Price

Finally there's a compact dual bander that's simple in design and operation, plus very affordable...the IC-3200A.

**Dual Bands.** The IC-3200A covers both the 2-meter (144.000-150.000MHz) and 70cm (440.000-450.000MHz) bands. The IC-3200A also features fully programmable offsets in 5KHz steps for MARS and CAP repeater operation.

**25 Watts.** The IC-3200A delivers 25 watts of output on both bands. Or the low power can be adjusted to one to ten watts.

**Compact.** The IC-3200A is only 5½"W x 2"H x 8½"D.

**Simple to Operate.** With only 14 front panel controls, the IC-3200A is by far the easiest dual bander to use.

**Memory Lockout.** For scanning only certain memory channels, ICOM utilizes a memory skip (M SKIP) function.

**10 Tunable Memories.** To store your favorite frequencies, 10 memories are provided. Each memory will store the receive frequency, transmit offset, offset direction and PL tone. Each memory can be tuned up or down when

selected, yet automatically returns to the original frequency when reselected. All memories are backed up with a lithium battery.

**Scanning.** The IC-3200A has four scanning systems... memory scan, band scan, program scan and priority scan.

**Other Outstanding Standard Features:**

- New LCD display, easy to read in bright sunlight
- Tone encoder (all PL/subaudible tones built-in)
- IC-HM14 mic with up/down scan and DIME

- One antenna connector (Duplexer already installed)
- Variable tuning increments: 5 and 15KHz (2-meters), 5 and 25KHz (70cm)
- Frequency dial lock
- Dual VFO's
- Mounting bracket

**Optional Accessories.** An optional IC-PS30 system power supply, voice synthesizer and IC-SP10 speaker are available.

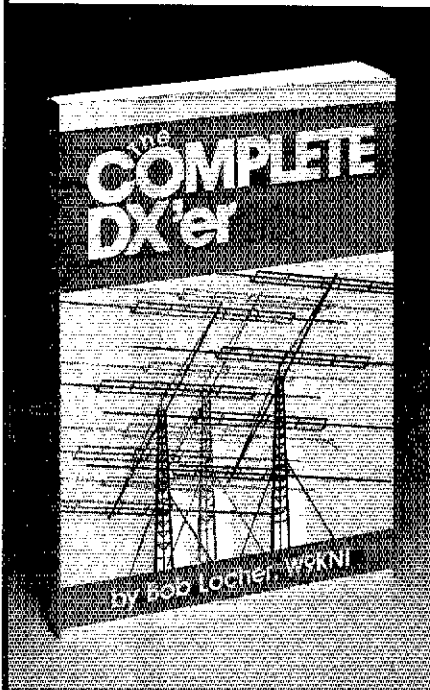
See the IC-3200A at your local ICOM dealer for the best buy on a full featured dual bander.



First in Communications

ICOM America, Inc., 7380-118th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234  
All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 3200A185

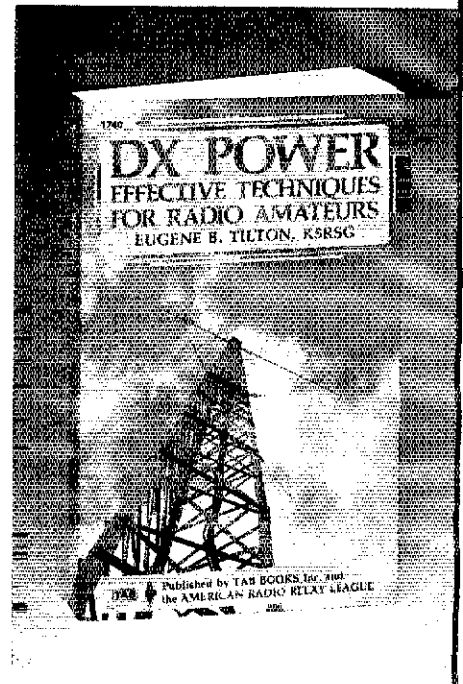
# DX POWER IS HERE!



The second great book on DXing is now available! **DX Power** by Eugene B. Tilton, K5RSG tells how to get started working DX and survive in the DX'ers highly charged and competitive world. You'll find tips on cracking pileups, propagation, operating aids, and station design. 244 pages, co-published by ARRL and Tab Books.

**The Complete DX'er** by Bob Locher, W9KNI covers all important aspects of the DX'ers life both in and out of the pileups: the art of listening, the chase, the capture and the quest for the elusive QSL. Gives advice on equipment and antenna selection. Contains 187 pages of practical information.

Both books are written by avid DX'ers, and you shouldn't be without either of these books. Both are paperbound and sell for \$10.00 each. Add \$2.50 (\$3.50 for UPS) per order for shipping and handling.



ARRL 225 MAIN ST., NEWINGTON, CT 06111



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

Store Hours  
MON-FRI 9AM-6PM  
SAT 9AM-3PM

WARRANTY SERVICE CENTER FOR:  
ICOM, YAESU, TEN-TEC

#### TERMS:

Prices Do Not Include Shipping,  
Price and Availability Subject to  
Change Without Notice  
UPS COD \$2.50 Per Package

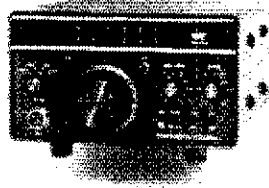
**MOST ORDERS SHIPPED  
SAME DAY**



FT270R

#### YAESU

10 Memories  
45 Watts  
With FTS-8  
ORDER NOW



TENTEC  
2510 Mode B  
Satellite Station



**NEW!** IC-751A  
HF Transceiver

#### ICOM

all modes built in  
•QSK up to 40 wpm  
•built-in 500 Hz CW filter  
•electronic keyer included  
•100% duty cycle

Ham Net \$1499.00 Call for  
Special Introductory Price



**NEW!** IC-28A  
2 Meter Mobile

#### ICOM

•25 watts  
•large LCD readout  
•wideband coverage  
•21 memory channels

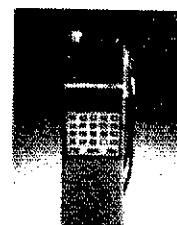
Ham Net \$419.00 Call for  
Special Introductory Price



Welz Meters

#### WELZ

Lots of Welz  
Meters in Stock  
Call for Special  
Pricing and  
Details



YAESU  
YAESU FT209RH  
5 watts  
Free FTS-6  
10 Memories  
CALL FOR YOUR  
SPECIAL PRICE

AEA • ARRL • ALINCO • ALLIANCE • ALPHA DELTA • AMECO • AMERITRON • ANTENNA  
SPECIALISTS • ASTRON • 8&W • BENCHER • BUTTERNUT • CSI • CALLBOOK  
• COMMUNICATION SPECIALISTS • CUSHCRAFT • DAIWA • DATASCAN • HEIL • HUSTLER  
• HYGAIN • ICOM • KDK • KLM • KANTRONICS • KEN PRO • LARSEN • MFJ • MICROLOG  
• MIRAGE • NYE • ROHN • SANTEC-SHURE • TEN TEC • TOKYO HY-POWER • UNADILLA  
• VALOR • VIBROPLEX • WELZ • YAESU

ORDERS AND PRICE CHECKS ONLY, PLEASE 1-800-523-7731  
INFORMATION AND INDIANA 812-422-0231  
SERVICE DEPT. 812-422-0252



# MOBILES

ICOM 144, 220 and 440MHz



## The World's Most Compact Mobiles

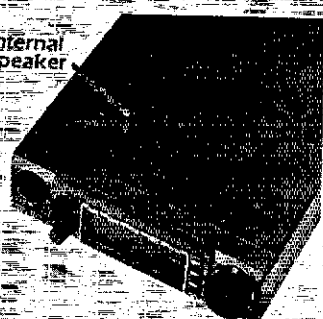
ICOM's three ultra compact mobiles...the IC-27A 144MHz, the IC-37A 220MHz and the IC-47A 440MHz...are the smallest mobiles available.

Even in such a small package the 25 watt mobiles contain an internal speaker which makes them fully self contained and easy to mount.

**Size.** The ICOM compacts measure only 5 1/2" W x 1 1/2" H x 1 1/2" D (IC-47A is 9/16" deep), which allows them to be mounted in various "compact" locations. Yet the compacts have large operating knobs which are easy to use in the mobile environment.

**More Features.** Other IC-27A/37A/47A standard features include a standard mount, IC-HM23 DTMF mic with up/down scan and memory scan, and internally adjustable transmit power. An optional IC-PS45 slim-line external power supply and IC-SP10 external speaker are also available.

Internal Speaker

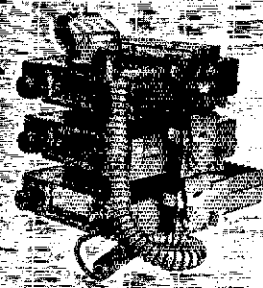


**32 PL Frequencies.** The IC-27A/37A/47A come complete with 32 PL frequencies.

**9 Memories.** The compact mobiles have 9 memories which will store the receive frequency, transmit offset, off-set direction and PL tone. All memories are backed up with a lithium battery.

**Speech Synthesizer.** To verbally announce the receive frequency, an optional UT-16 voice synthesizer is available.

**Scanning.** The ICOM compacts have four scanning systems...memory scan, band scan, program scan and priority scan. Priority may be a memory or a VFO channel...and the scanning speed is adjustable.



**Stacking Mobile Mounts.** The IC-27A/37A/47A can be stacked to provide a three-band mobile station. Each band is full featured and will operate even when another band is in use.

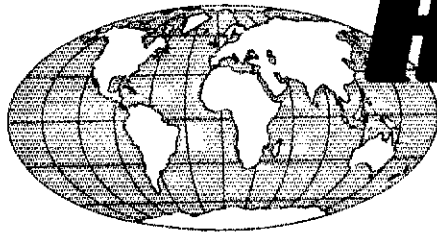
The IC-27A/37A/47A provide superb performance in the mobile radio environment. See them at your local ICOM dealer.



First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75224  
All stated specifications are approximate and subject to change without notice.

WORLDWIDE DISTRIBUTION



# HAM RADIO OUTLET

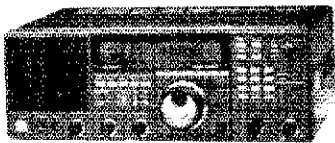
LARGEST HAM OUTLET IN THE WORLD

**NEW ATLANTA STORE!**  
EASY SERVICE FOR  
OUR EASTERN CUSTOMERS

## 7 STORE BUYING POWER



**YAESU  
FRG 8800**



High-Tech  
Short Wave Receiver

**CALL FOR PRICE**



**YAESU  
FT 757GX**



Compact HF Mobile Transceiver  
**CALL FOR PRICE**



**YAESU  
HANDHELD  
FT 209RH  
5 WATT 2M/HT**



**CALL  
NOW  
FOR  
LOW  
PRICE**



**YAESU  
FRG 9600**



60-905 MHz Scanning Receiver  
**INSTOCK FOR IMMEDIATE DELIVERY**

**FREE SHIPMENT**  
MOST ITEMS UPS SURFACE

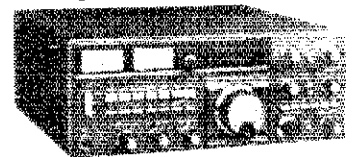
**NOW! RAPID DELIVERIES  
FROM OUR OUTLETS**



To Our Customers



**YAESU  
FT 726R**



Great for OSCAR 10 and VHF DXing  
**YOUR BEST BUY!**

**WE SHIP DIRECT TO YOU  
FROM ANY ONE OF OUR  
NATIONWIDE OUTLETS.**



**YAESU  
FT 2700RH**



Full Duplex FM 2M/70cm  
**CALL FOR 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 &  
Knott's Berry Farm  
**ATLANTA, GA 30340**  
8071 Buford Hwy.  
(404) 283-0700  
Neil, Mgr. KC4MJ  
Doraville, 1 m. 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  
Joe, Mgr. K5QS  
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  
Glenn, Mgr. K6NA  
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 Alaska & Hawaii. Phone Hrs: 7:00 a.m. to 5:30 p.m. Pacific Time. California and Arizona customers call or visit nearest store. California and Arizona residents please add sales tax. Prices, specifications, descriptions subject to change without notice.





New

New

# THE STANDARD OF EXCELLENCE

## Definitely Superior!

# AZDEN PCS-5000

COMMERCIAL — GRADE



**UNPRECEDENTED WIDE FREQUENCY RANGE:** Covers 140 000-153,000 MHz in steps that can be set to any multiple of 5 kHz up to 50 kHz.

**CAP/MARS/NAVY MARS, BUILT IN:** The wide frequency range facilitates use of CAP and ALL MARS FREQUENCIES including NAVY MARS. **COMPARE!**

**TINY SIZE:** Only 2 inches high, 5 1/2 inches wide and 7/8 inches deep!

**MICROCOMPUTER CONTROL:** Gives you the most advanced operating features available.

**UP TO 11 NONSTANDARD SPLITS:** **COMPARE** this with other units!

**20 CHANNELS OF MEMORY IN TWO SEPARATE BANKS:** Retains frequency, offset information, PL tone frequency.

**DUAL MEMORY SCAN:** Scan memory banks separately or together. ALL memory channels are tunable independently. **COMPARE!**

**MEMORY SCAN LOCKOUT:** Allows you to skip over channels you don't want to scan.

**TWO RANGES OF PROGRAMMABLE BAND SCANNING:** Limits are quickly reset. Scan ranges separately or together with independently selective steps in each range. **COMPARE!**

**BUSY SCAN AND DELAY SCAN:** Busy scan stops on an occupied channel. Delay scan provides automatic auto-resume.

**DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency desired when scanning.

**PRIORITY MEMORY AND ALERT:** Unit constantly monitors one memory channel for signals, alerting you when channel is occupied.

**LITHIUM BATTERY BACKUP:** Memory information can be stored for up to 5 years even if power is removed.

**FREQUENCY REVERSE:** Allows you to listen to repeater input frequency.

**ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Keys are easily seen in the dark, and actuation is positively verified audibly. **CRISP, BACKLIGHTED LCD DISPLAY:** Easily read no matter what the lighting conditions!

**DIGITAL S/R F METER:** Shows incoming signal strength and relative transmitter power.

**MULTI-FUNCTION INDICATOR:** Shows a variety of operating parameters on the display.

**FULL 16-KEY TOUCHTONE PAD:** Keyboard functions as auto-patch when transmitting.

**MICROPHONE CONTROLS:** Up/down frequency control and priority channel recall.

**PL TONE GENERATOR BUILT IN:** Instantly program any of the standard PL frequencies into the microcomputer. **COMPARE!**

**TRUE FM, NOT PHASE MODULATION:** Unsurpassed intelligibility and audio fidelity. **COMPARE!**

**HIGH/LOW POWER:** Select 25 watts or 5 watts output — fully adjustable.

**SUPERIOR RECEIVER:** Sensitivity is better than 0.15 microvolts for 20-db quieting. Commercial-grade design assures optimum dynamic range and noise suppression. **COMPARE!**

**DIRECT FREQUENCY ENTRY:** Streamlines channel selection and programming.

**OTHER FEATURES:** Rugged dynamic microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.

EXCLUSIVE DISTRIBUTOR DEALER INQUIRIES INVITED FOR YOUR NEAREST DEALER OR TO ORDER:  
**AMATEUR-WHOLESALE ELECTRONICS TOLL FREE...800-327-3102**  
 8817 S.W. 129th Terrace, Miami, Florida 33176 Telephone (305) 233-3631 Telex: 80-3356



MANUFACTURER:  
**JAPAN PIEZO CO., LTD.**  
 1-12-17 Kamirenjaku, Mitaka, Tokyo, 181 Japan

Telex: 781-2822452

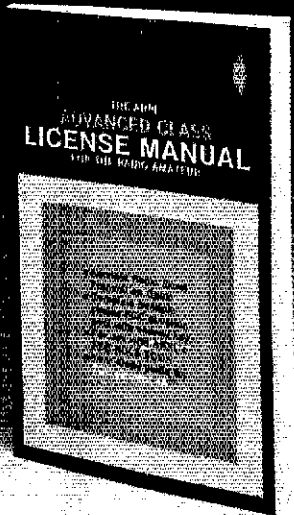
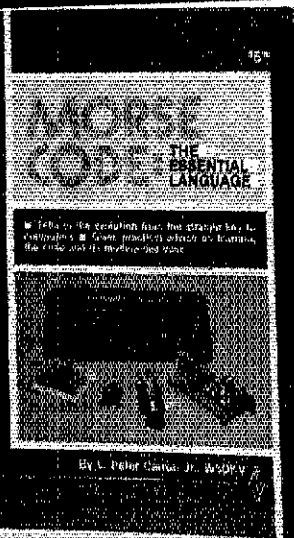
# NEW! FROM ARRL

**MORSE CODE: The Essential Language** tells of the evolution from the straight key to computers. Using the code is a fun and exciting way to communicate, and author Pete Carron, W3DKV has incorporated his own enthusiasm into this book. The beginner will find practical advice on learning to receive and send. There are chapters on high speed operation, distress calls and what the future has in store for CW operation. An extensive history of the code is presented and the appendix lists abbreviations, the RST system, associations and organizations of CW operators and manufacturers of equipment. If the sight of a radio operator sending a message in code generates a certain intrigue that makes the mind wander to thoughts of mysterious signals in the night, ships in distress and faint transmissions from distant lands; then *MORSE CODE: The Essential Language* is must reading for you! 111 pages, copyright 1986 #0356 \$5 plus postage and handling.\*

**The 1986-87 ARRL ADVANCED CLASS LICENSE MANUAL** is now available. It is based on the latest question pool released by the FCC. You'll find extensive text-explanations of the material covered in the exams with Key Word definitions at the beginning of each chapter. The final chapter consists of questions and distractors plus the answer key. There are conversion factors and lists of equations covered in the appendices. 268 pages, copyright 1986 #016X \$5 plus postage and handling\*

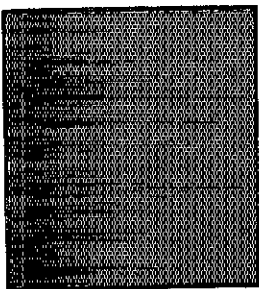
**GIL - A Collection of Classic Cartoons from QST** Phillip "Gil" Gildersleeve, W1CJD contributed over 1500 cartoons and drawings to ARRL from the late twenties until he became a silent key in 1966. This book presents only a small portion of the "best of Gil." Most hams would love to have a "Jeeves" character to do the tough chores around the ham shack, and what radio club doesn't have characters similar to those portrayed on the famous field day covers? Gil was an avid radio amateur, and a member of *Who's Who in American Art*. This book is a tribute to W1CJD, and we are sure that you will have as much fun reading and viewing Gil's work as we did in assembling the material. Approximately 110 pages, copyright 1986 #0364 \$5 plus postage and handling.\*

\*Shipping and handling charges are \$2.50 per order for book rate or parcel post, \$3.50 for UPS.



## GIL

A COLLECTION OF CLASSIC  
CARTOONS FROM QST



THE AMERICAN RADIO RELAY LEAGUE, INC.

225 MAIN STREET  
NEWINGTON, CT 06111

Exclusive offer for ARRL Members...SAVE \$15 on the

# BRITANNICA ATLAS

An indispensable reference guide for the radio amateur.

The more you work DX, the more you'll appreciate the Britannica Atlas—it's packed with valuable information that every ham shack needs. Not just locations of all your contacts, but also facts and figures about all the countries included! You'll wonder how you ever got along without the Britannica Atlas!

**A Decade in the Making!** It took ten years of research to create this outstanding atlas, but it was worth it; the Britannica Atlas is a truly international world atlas.

While some atlases feature the country where they're published, the Britannica Atlas covers the world equally, using mapmakers from 14 different countries.

**A Masterpiece of Accuracy!** The Britannica Atlas is the first ever to show all the world's countries in the exact size relationship to each other, rather than enlarging or reducing individual maps to fit the page size! So you'll see at a glance which countries really are large or small!

Big 11" x 15" format, in luxurious brown binding with the look of fine leather. A handsome addition to any ham shack or library.

568 pages in all, with 320 pages of full-color maps with unique cartographic design for a luminous 3-dimensional effect!

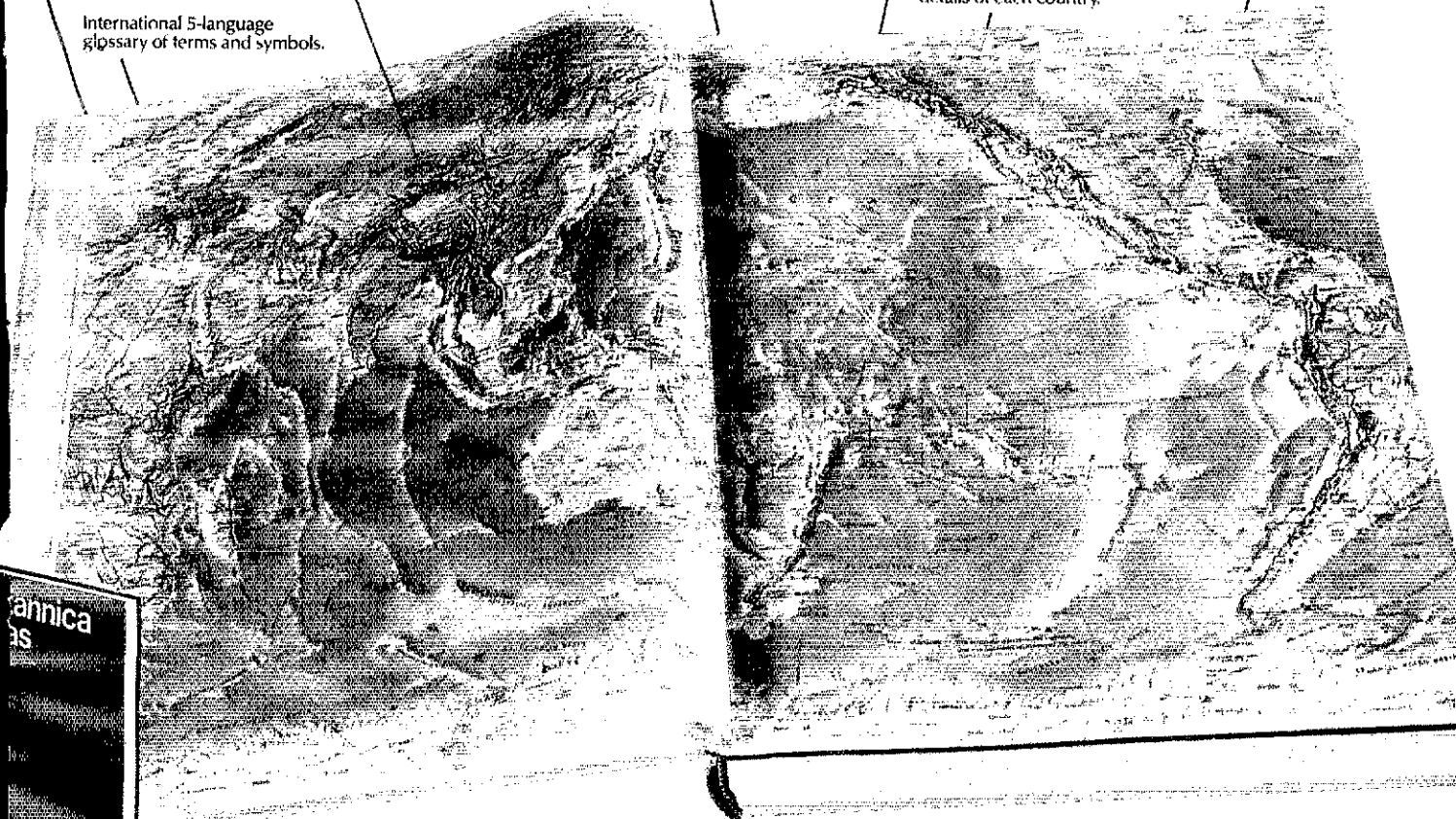
160,000 item, 232-page index pinpoints needed information including population and geo-coordinates.

60 detailed maps of the world's major cities and urban centers.

36-page World Scene—a unique, fully-illustrated section featuring world-wide facts and figures.

International 5-language glossary of terms and symbols.

Statistical tables show land area, population, political status, and other details of each country.



**SAVE \$15.00**  
when you order now!

**CALL TOLL-FREE 1-800-558-1204** IN ILLINOIS 1-800-231-7693  
or mail coupon to BRITCOM, 2200 S. Main St., Lombard, IL 60148

By special arrangement with Encyclopaedia Britannica, ARRL Members save a full \$15.00 off the regular \$79.50 price of this magnificent Britannica Atlas. And you can examine it FREE for 15 days so there's no risk. To order, call the toll-free number or return the coupon promptly. Your Atlas will be shipped promptly, within 2-3 weeks at the most. Order now.

**YES** please send me The Britannica Atlas at \$15.00 off the regular cost of \$79.50... I pay just \$64.50 (with shipping, handling, and applicable taxes the total cost is \$71.50). I understand that if I'm not completely satisfied, I may return it within 15 days at Britannica's expense for a prompt credit or refund.

Check enclosed for \$71.50 which includes shipping & handling, and all applicable taxes, made payable to Encyclopaedia Britannica.

Charge it to my  VISA  MasterCard

Account # 

--	--	--	--	--	--	--	--	--	--

 Exp. Date 

--	--	--	--	--

Mail to me at this address: \_\_\_\_\_  
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
Signature \_\_\_\_\_

# hy-gain<sup>®</sup> REBATES

on hy-gain amateur

- Crank-up Towers
- HF Beam Antennas
- Rotators

• Rebates are based on itemized proof of purchase dated July 1 to September 30, 1986. Each product must be itemized by model number and price.

• Rebate:  
\$200 on HG54HD/HG70HD Towers  
\$100 on HG37SS/HG52SS Towers  
\$ 50 on any Hy-Gain HF Beam Antenna purchased with Ham IV or T2X or HDR300 Rotator

• Rebate is limited to one of each product category (beam antenna, rotator, tower) and applies only to products purchased for personal use.)

• Rebate requests must be post-marked no later than October 31, 1986 and mailed to Telex Communications, Inc., 9600 Aldrich Ave. So., Minneapolis, MN 55420, Attn: Amateur Customer Service.

**Time is limited—  
Rebate Offer expires  
September 30, 1986.**

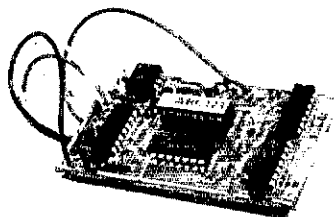
## FREE FREIGHT

Order any Hy-Gain tower from your dealer for factory shipment direct to you. Hy-Gain will pay the freight on the tower and any of our antennas, rotators and accessories ordered for shipment at the same time. This offer is limited to within the 48 contiguous United States.

**TELEX hy-gain**

TELEX COMMUNICATIONS, INC.  
9600 Aldrich Avenue South  
Minneapolis, Minnesota 55420

**PROUD OF YOUR CALL?  
WORRIED ABOUT THEFT?  
BUILDING A REPEATER?**  
Identify your FM transceiver with automatic code on each transmission.



**SMALL: 1 3/4" X 2 1/4" X 5/16"**  
Perfect means of RTTY code ID

PRICE \$49.95 Ppd.  
+\$3.00 for Calif. address.

Full feature repeater IDer with timer  
\$79.50 Ppd. +\$4.77 for Calif. address.

### WARRANTY

Returnable for full refund within ten day trial period. One year for repair or replacement.

Your call sign programmed at factory, please be sure to state call sign when ordering.

Inquire about commercial models.

### AUTOCODE

P.O. Box 7773 Dept. Q  
Westlake Village, CA 91359  
(805) 497-4620

## NEMAL ELECTRONICS

Your Authorized  
Distributor For



BELDEN

### INTRODUCTORY SALE

Belden No.	Nemal No.	Desc.	Per 100 Ft.	Per Ft.
8214	1102B	RG8/U Foam 96%	\$45.00	.50
8237	1100B	RG8/U Poly 96%	39.00	.44
8241	1500B	RG59/U Poly 96%	13.00	.15
8267	1130B	RG213/U Poly 96%	53.00	.59
9269	1600B	RG62A/U Poly 95%	15.00	.17
8216	1450B	RG174/U Poly 96%	12.00	.14
9913	1180	Low Loss 50 ohm	46.00	.58

### OTHER QUALITY CABLES

NEMAL NO.	DESC.	PER 100 FT.	PER FT.
1110	RG8X 95% Shield (mini B)	15.00	.17
1130	RG213/U Mil Spec. 96% shield	34.00	.36
1140	RG214/U Mil Spec. Silver	155.00	1.65
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 Silver	80.00	.85

### ROTOR CABLE — 8 COND.

8C1822	2-18 Ga 5-22 Ga	19.00	.21
8C1620	2-16 Ga 5-20 Ga Heavy Duty	34.00	.36

### CONNECTORS — MADE IN U.S.A.

NE720	Type N for Belden 9913	4.75
PL259	Standard Plug for RG8,213	4.75
PL259AM	Amphenol PL259	89
PL259TS	PL259 Teflon/Silver	1.59
UG21D	Type N for RG8,213,214	3.00
UG175	Adapter for RG58	.22

Call or write for complete Price List

Shipping: Cable — \$3.00 per 100 ft.

Connectors — add 10%, \$3.00 minimum

COD add \$2.00. Florida Residents add 5%.

Orders under \$20 Add \$2 Handling

### NEMAL ELECTRONICS, INC.

12240 N.E. 14th Ave., Dept. Q, Miami, FL 33161

Telephone (305) 893-3924

## Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" x 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 14 through September 13 will appear in November QST. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in QST advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of QST will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

### Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers—W7GAC/6 Box 530, Santa Rosa, CA 95402.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14 280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08883.

JOIN the Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. 1417 Stonebrook, Mamaroneck, NY 10543.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

MORSE TELEGRAPH CLUB, established 1942, seeks landline and radio operators interested in telegraphy and Morse history. 46 chapters USA & Canada. For information and sample paper contact W.K. Dunbar, AD9E, 1101 Maplewood Dr., Normal, IL 61761 309-454-2029.

THE FLORIDA Amateur Digital Communications Association (FADCA) publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

FCC EXAMS, Novice-Extra Sunnyvale VEC ARC. 408-255-9000, 24 hour. 73, Gordon, W6NGL, VEC.

THANK YOU for attending Warren Ohio Hamfest. See you August 17, 1986.

PENNSYLVANIA (MEADVILLE)—July 5: Firecracker Hamfest by Crawford Amateur Radio Society. Electronics, radios, computers. New location at Meadville Recreation Center just off Rt 27E in Meadville. All indoors, no rain-out. One olympic and two child-size deluxe swim pools with lockers and showers and other sports available in Center. Free indoor flea market space and tables! available by preregistration; reserve early. Admission adult-\$2.00, children free, swimming for small extra. Talk-in 144.534/145.13, W0MIE/R. For information: write CARS HAMFEST-86, P.O. Box 653, Meadville, PA 16335 or call Ben Frerer, KF3F, 814-724-2432.

NORTHERN NEW JERSEY—Sussex County Fairgrounds, Augusta, N.J. 8:00 AM. Indoor/Outdoor space. Acres of parking. Refreshments. Talk-in 147.90/30 and 146.52. For information call Donald Stickle, K2OX, 201-663-0677.

ILLINOIS: Sept. 20 & 21, The Peoria Area Amateur Radio Club presents Peoria Superfest '86 at Exposition Gardens, W. Northmoor Rd., Peoria, IL. Admission \$3 advance, \$4 gate, children under 16 free. Gate opens 8:00 A.M., commercial buildings 9:00 A.M. Talk-in 146.18/76 call W9UJL. Latest Amateur & computer product displays, huge flea market, free Sunday bus to Northwoods Mall. FCC exams Saturday & Sunday, all classes. Full camping facilities. For tickets and info SASE to Superfest '86, Box 3461, Peoria, IL 61614.

"12-12" WORLDWIDE is promoting activity, and good operating practices on the new 12-meter band. Get your Number, Certificate, and Quarterly Newsletter by joining, \$4 per year. "12-12" Worldwide, NW5N, Box 4087 - Route 4, Pearland, TX 77581.

TCRA (Tri County Radio Association) thanks all our customers and vendors who made our May 4 Stirling N.J. Hamfest a big success. We look forward to seeing you next year.

**QSL Cards/Rubber Stamps/Engraving**

POST CARD QSL Kit - Converts Post Cards, Photos, to QSLs! Stamp brings circular. Labelcraft, P.O. Box 412, West Sand Lake, NY 12196.

DON'T buy QSL cards until you see my free samples—or draw your own design. I specialize in custom cards. Send black and white sketch; will give quote. Little Print Shop, Box 9848, Austin, TX 78766.

FREE samples—stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065

QSLs—1) Famous K&AAB custom collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple call signs. 5) Ham "business cards." State your sample wants. 39c self addressed business size envelope required. Mary Mahre, W0MGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs Samples 40c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

BE SURPRISED - get a variety of cards - 100 for \$8 or 200 for \$13. Samples \$1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FINEST CUSTOM QSLs AND RUBBER STAMPS: Large cut catalog and samples \$1 refundable on first order. Ritz Print Shop, P.O. Box 45018, Westlake, OH 44145.

QSL's—since 1956, free samples, Husprint, Box 7575, Kansas City, MO 64116.

Free, 100 QSLs with first order. Samples 50c. Gazebo Press, Rt. 4, Box 4148, LaPlata, MD 20646.

ENGRAVING. CALLSIGN/name badges by W0LOV, SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples \$1. (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

QSLs, QUALITY and Fast Service for 26 Years. Include Call for Decal. Samples 50c. Ray, K7HLR, Box 331, Clearfield, UT 84015.

BROWNIE QSLs since 1939. Catalog & Samples \$1 (refundable with order) 3035 Lehigh Street, Allentown, PA 18103.

QUALITY QSLs, Samples 50c. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

FIRST CLASS, Full Color QSL from your prints or slides. Confirming report and address printed on back, \$199/2,500. Smith Printing, 20420 Calhaveren Dr., Saugus, CA 91350. 805-251-7211.

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 QSL's, 310 Commercial, Emporia, KS 66801.

QSL samples—25c Samcards—48 Monte Carlo Dr., Pittsburgh, PA 15239.

FREE QSL Card Samples—Quality cards at low prices. wide selection available. Send for free samples: KE7GY, INSTACOPY, Rt. #1, Box 1486, Poosevefelt, UT 84066.

RUBBER STAMPS and Ultragraved Business Cards. QSL card brings Free Literature! J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604.

QSL CARDS, Free Samples. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072.

**ANTIQUÉ-VINTAGE-CLASSIC**

CANADIANS WANT Mint Collins KWM-2 and 75S-3C, VE5VX 306-652-6328.

WANTED: old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.

MANUALS FOR most Hamgear made 1937/1972, plus Kenwood. No quotes. Our current catalog "F" at \$1 required to order. Over 2,000 models listed. Hi-Manuals, P.O. Box F802, Council Bluffs, IA 51502-0802.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Arco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: radios, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201. 818-242-8361.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid; trade items available. Write: James Steele, 80 Central Park West, New York, NY 10023-5205.

WANTED: QST VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, R.I. 02895-0001.

# hy-gain<sup>®</sup>

## Tower of Strength

Rugged, all steel Hy-Gain antenna crank-up towers are galvanized after welding. Precision welding fixtures assure straight and true alignment of tower sections for close tolerance crank-up guide systems. Diamond web bracing, 2.5 times the strength of ordinary "W" bracing, adds strength where tower sections meet. Open-end tubular steel legs are galvanized inside and out and permit unrestricted moisture drainage. It all adds up to long lasting, massive tower strength for antenna loads of up to 16 sq. ft. at 60 mph.

	Height Extended	Height Retracted	Antenna Square Foot Windload Limit
HG-37SS	37 ft.	20.5 ft.	9.5 @ 50 mph
HG-52SS	52 ft.	21 ft.	9.5 @ 50 mph
HG-54HD	54 ft.	21.5 ft.	16 @ 60 mph
HG-70HD	70 ft.	21.5 ft.	16 @ 60 mph

Towers come complete with hinged base, installation steelwork, predrilled rotator plate and a manual winch.

Hy-Gain crank-up towers require no guying and conform to EIA, to the Uniform Building Code, and are approved by Los Angeles (license 1095). UBC documents for building permits are available on request (specify tower model) **before** you buy the tower.

**OPTIONAL TOWER ACCESSORIES**

- Mast • Thrust Bearing • Coax Arms • Rotators • Tower Gin Pole

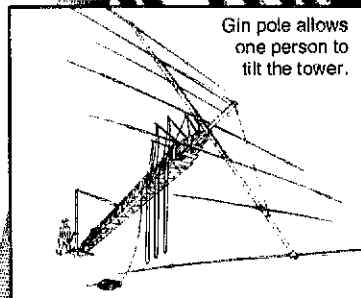
**FREE FREIGHT**

Order any Hy-Gain tower from your dealer for factory shipment direct to you. Hy-Gain will pay the freight on the tower and any of our antennas, rotators and accessories ordered for shipment at the same time. This offer is limited to within the 48 contiguous United States.

For detailed information call toll free

**1-800-328-3771**

In Minnesota call 612-887-5528



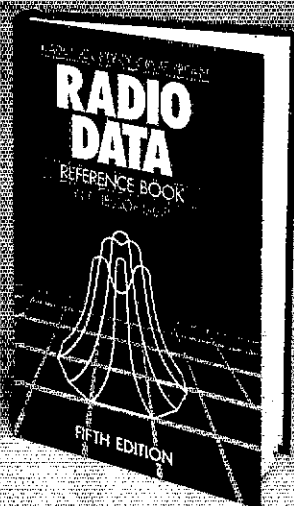
**TELEX**

**hy-gain<sup>®</sup>**

TELEX COMMUNICATIONS, INC.

9600 Aldrich Avenue South  
Minneapolis, Minnesota 55420

# THE LATEST FROM RSCGB



**AMATEUR RADIO SOFTWARE** by John Morris, GM4ANB. Designed to be a sourcebook for the radio amateur program. Contains 86 programs written in BASIC and 6 in assembly language. The introductory chapter describes the differences between various versions of BASIC so that the programs presented can be modified slightly in order to be used on as many types of computers as possible. The remaining 8 chapters cover: CW, sending and receiving; RTTY and Data including Amtor and packet; Antennas and Propagation, predicting path loss, propagation predictions; Distances, Bearings and Locators; Satellites, predicting elliptical and geostationary orbits; Sun and Moon; Circuit Design Aids, filters and matching networks; Miscellany, a simple data base system and network analysis package. Copyright 1985, 328 pages, \$15.00 hardbound. First Edition.

**RADIO DATA REFERENCE BOOK** by G.R. Jessop, G6JP. This handy publication is divided into 9 chapters: Units and symbols, Basic calculations, Resonant circuits and filters, Circuit design, Antennas and transmission lines, Radio and TV services, Geographical and meteorological data, Materials and engineering data, and Mathematical tables. You'll find hundreds of useful tables, charts, and formulas. Fifth Edition, Copyright 1985, 244 pages, \$15.00 hardbound.

**AMATEUR RADIO OPERATING MANUAL** by R. J. Eckersley, G4FTJ. The latest edition just off the press. Get the British side of operating. Besides such chapters as Setting up a station, and Mobile, Portable and Repeater Operation, the reader will find information in the Appendices most useful. There are continental and regional maps which show the prefixes assigned to each area and listing of countries showing ITU call-sign allocations, callsign systems for each country, notes on foreign amateur operation, addresses of licensing administrations and the names and addresses of National Amateur Radio Societies. Third Edition, Copyright 1985, 204 pages. Softbound \$10.00



THE AMERICAN RADIO RELAY LEAGUE, INC.  
245 MAIN STREET  
NEWINGTON, CT 06111

RECAPTURE EARLY DAYS of Ham radio, professional radio and broadcasting! Our book *Vintage Radio* (263 pages) takes you from the earliest days up through spark to early phone days. A *Flick Of The Switch* (312 Pages) covers Ham, commercial, wartime and broadcast radio from 1930 to 1950. Rekindle that excitement of early ham days! Discover the pleasures of collecting old radio gear! Just send \$10.95 for each book to N6VY, Box 2045, Palos Verdes Pnsla., CA 90274.

EARLY ELECTRONIC and Mechanical Television Sets, parts, literature wanted for substantial cash. Finder's fee paid for successful leads. Arnold Chase, 9 Rusleigh Road, West Hartford, CT 06117 203-521-5280.

BUY, sell, collect and restore early tube equipment? Early receivers, tubes and telegraph gear? Join AWA which sponsors old time "meets," flea markets, museum and journal with free want ads. Annual dues only \$8. Write: Bruce Kelley, W2ICE, Rte. 3, Holcomb, NY 14469.

WANTED: CRYSTAL SET Parts: Variometers, Variocouplers, Condensers, Detector Holders, Detectors, Catwhiskers, Dial Knobs, Tap Switches, Tap Points, Binding Posts, Headphones. MIDCO, 660 N Dixie Highway, Hollywood, FL 33020.

TELEGRAPH BUGS WANTED. Collector needs all models and variations of Vibroplex, Martin, Bunnell, McElroy, Melehan, etc. including military and modified. Donators of parts or damaged keys appreciated. Literature needed. Write John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

NEW FOR Antique Radio Collectors! A comprehensive directory to radio broadcast receivers, 1921-1941, an up-to-date price guide to their current values, and a fascinating history of radio broadcasting and manufacturing. *The Radio Collector's Directory and Price Guide* by Grinder (K7AK) and Fathauer (300 pp.) identifies thousands of models, will help you make informed decisions at swap meets, flea markets, auctions. An invaluable guide for appraisals. Send \$15.95 plus \$2 postage to Ironwood Press, Dept. M, Box 8464, Scottsdale, AZ 85252.

TRANSMITTER TUBES wanted, Amateur and Commercial for museum. Help preserve the old bottles. A.C. Jones, K6DIA, P.O. Box 97, Crescent City, CA 95531.

WANTED: SPEEDX BUG. ONLY, 819 Henrietta, Sunnyvale, CA 94086

WANTED: McIntosh Tube-type Audio Equipment, Accessories, and literature for personal collection. All inquiries answered; Information and appraisals gladly given. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385, 414-545-5237.

\$100 for 6ACB or W6ACB QSL card prior to 1940. W6KU 303-371-6159.

HALLICRAFTERS KILOWATT Station, excellent; HT-32A HT33. SX115 SX101A S108 with speakers, Dentron SWR meter, Drake dummy load, Turner mike, Dow Key relays, 12V power supply. \$700 for all. K0ZCX, 2911 Aurora, Des Moines, IA 50310 515-277-2911

WANTED WW2 JAPANESE Military Radios like Chi-Hi Receiver in original unmodified condition also HRO5, BC312, etc. Tajima JA1DNO/K2HB, care Toshiba, 111 Business Park Drive, Armonk, NY 10504.

HALLICRAFTER RECEIVER SX111 \$100 Heath Apache Transmitter \$100 Heath Mauderer Transmitter, needs power transformer - \$75 Antique Broadcast Radiola 16 Battery Radio. Reinartz Three-Tube battery radio in console with speaker and storage. Russ Olmsted K4UJZ, 608 West Thompson Lane, Murfreesboro, TN 37130. 615-893-5344

QST July 1916 - March 1917 with covers best offer. April 1920 - July 1920 same. N7HDB - Gini - 3732 E. Flamingo, Las Vegas, NV 89121

BUY/SELL/SWAP - Tom Swift/Radio Boys/Girls. General radio related juvenile fiction. Also want 50/60's books on Hi-Fi and pre-recorded reel-to-reel tapes. Charles King, 120 Miner St., Middletown, CT 06457

HALLICRAFTERS SX115 and SX122A, Kenwood 7730 Two Meter Transceiver with KP37 power supply, Vibroplex Bug, all mint. Best offer. QST 1963 through 1985. W9MZP 312-967-7525

FOR SALE: Communications Receiver \$250 Technical Material Corp. GPR-90, SSA GSB-1, Speaker, Books. Excellent condition K1RNT 203-635-6156

TELEGRAPH KEYS. Collector seeking pre-1935 bugs. Vibroplex, Martin, United Electric, DeLaney, Boulter, etc. Also need spark keys and pre-1915 telegraph (keys, sounders, books, catalogues) Visitors welcome. K5RW Neal McEwen, 1128 Midway, Richardson, TX 75081. 214-234-1653

SELL OUT OLDIES: Hallicrafters SX-43: \$75. SX110: \$85. S99: \$45. SR160: \$95. Sky Buddy II: \$45. S20: \$75. CB19: \$45. SR46 6 meter AM with HA26: \$65. S40: \$65. Sky Courier: \$75. Knight T60: \$45. EICO 720: \$55. HQ110: \$95. HQ150: \$150. CE10B: \$60. Misner Signal EX: \$95. Q Multiplier: \$36. RCA WA 44C Audio Gen. WO33A Scope: \$55. Precision Sig Gen E200: \$75. Tube Tester 912: \$45. VOM, wood box: \$48. Supreme Tube Tester 912: \$45. General Radio 740: \$95. 546B: \$48. VIKING ONE: \$95. Viking Mobile: \$95. Zenith Transoceanic: \$95. Duobander WFL 80-40: \$95. N4LX, 251 Collier Ave., Nashville, TN 37211. 615-633-2724

WANTED HALLICRAFTERS SX-115 SX-88 for top dollar. Will pickup West Coast. Vern Gray, 1922 N.E. 86th, Portland, OR 97220.

NATIONAL RADIO COMPANY NCL-2000, 2KW table top 10-80 meter Linear Amplifier, spare matched 8122 finals, manual, good condition, \$450. NCX-5 10-80 meter transceiver, Heath HP-23 AC supply, mike, speaker, manual, good condition, \$100. Both for \$500. Heathkit HD-10 Electronic Keyer, \$15. Hustler Newtronics complete mobile antenna, RM 10, 15, 20, 40, 80 meter coils, ball spring mount, all \$75. Norb Piotrowski, K9SS, 1323 S. Dunton Avenue, Arlington Heights, IL 60005. 312-364-4421



# National Tower Company

P.O. Box 12286 Shawnee Mission, KS. 66212

Hours 8:30-5:00 M-F 913-888-8864



## ROHN

25G	10' section	\$49.00
25AG2 & 3	model 2 or 3 top section	\$60.00
25AG4	model 4 top section	\$65.00
45G	10' section	\$109.00
45AG3 & 4	model 3 or 4 top section	\$123.90
55G	10' section	\$133.50
T83	thrust bearing	\$56.25
M200	10' mast, 2" o.d.	\$22.00
BX-40	40' self supporting [6 sq. ft.]	\$170.00
BX-48	48' self supporting [6 sq. ft.]	\$216.00
BX-56	56' self supporting [6 sq. ft.]	\$290.00
BX-64	64' self supporting [6 sq. ft.]	\$375.00
BX-40	40' self supporting [10 sq. ft.]	\$187.00
HXB-48	48' self supporting [10 sq. ft.]	\$255.00
HXB-56	56' self supporting [10 sq. ft.]	\$339.00
HDXB-40	40' self supporting [18 sq. ft.]	\$249.00
HDXB-48	48' self supporting [18 sq. ft.]	\$319.00

WE STOCK A COMPLETE LINE OF "ROHN" ACCESSORIES  
ALL OF OUR ACCESSORIES ARE MANUFACTURED BY "ROHN"  
★ ★ CALL FOR PRICES ★ ★

### HYGAIN/TELEX ANTENNAS

HF ANTENNAS		
Tribands		
TH3JRS	3 element 'Junior Thunderbird'	\$209.00
IH5MK2S	5 element 'Thunderbird'	\$439.00
TH2MKRS	2 element 'Thunderbird'	\$189.00
TH7DXS	7 element 'Thunderbird'	\$509.00
TH6DXX	conversion kit to TH7DXS	\$169.00
EXP 14	Explorer 14 triband beam	\$349.00
QK710	30/40 M conv. Exp 14	\$78.00
Monoband		
105BAS	'Long John' 5 element 10 mtr.	\$149.00
155BAS	'Long John' 5 element 15 mtr.	\$229.00
205BAS	'Long John' 5 element 20 mtr.	\$389.00
304BAS	4 element 20 meter	\$285.00
7-1S	'Discoverer' rotary dipole 30/40mtr.	\$159.00
7-2S	'Discoverer' 2 elem. 40 meter beam.	\$359.00
7-3S	converts 7-2S to 3 elem beam	\$225.00
Multiband Verticals		
18HTS	'Hy-Tower' 10 thru 80 meters	\$499.00
14RMQ	roof mt kit for 12 AVQ, 14AVQ, and 18ATV/WB.	\$36.00
18VS	base loaded, 10 thru 80 meters	\$33.00
12AVQS	trap vertical 10 thru 20 meters	\$53.00
14AVQ/WBS	trap vertical 10 thru 40 meters	\$72.00
18AVT/WBS	trap vertical 10 thru 80 meters	\$117.00
Multiband Doubliers		
18TD	portable tape dipole 10-80 meters	\$134.00
28DDQ	trap doubler 40 and 80 meters	\$58.00
58DDQ	trap doubler 10 thru 80 meters	\$139.00

VHF ANTENNAS		
23BS	2 meter 3 element beam	\$23.00
25BS	2 meter 5 element beam	\$28.00
28BS	2 meter 8 element beam	\$40.00
214BS	2 meter 14 element beam	\$48.00
54BS	4 element 6 meter beam	\$73.00
V-2S	collinear gain vertical 138-174 MHz.	\$49.00
V-3S	collinear gain vertical 220 MHz	\$49.00
V-4S	collinear gain vertical 430-470 MHz.	\$58.00
GP2A	base, 2 mtr. ground plane	\$26.00
VHF & UHF Mobiles		
HR144GRI	fingerless 2 mtr. 3/8-24 mt	\$69.00
HR144GRI	HyBander 2mtr. 3/8-24 mt.	\$56.00
HR144MAG	HyBander 2 meter.	\$19.00
BN86	terrace ballun for 10-80 meters	\$23.00

CUSHCRAFT ANTENNAS		
A3	3 element triband beam	\$216.00
A743	7 & 10 MHz add on kit for A3	\$74.50
A744	7 & 10 MHz add on kit for A4	\$74.50
A4218	18 element 2 mtr. 28.8' boomer	\$1100.00
A4	4 element triband beam	\$290.50
AV4	40-10 mtr. vertical	\$94.50
AV5	80-10 mtr. vertical	\$101.00
ARX28	2 mtr. 'Ringo Ranger'	\$35.00
ARX450B	450 MHz. 'Ringo Ranger'	\$35.00
A144-11	144 MHz. 11 ele. VHF/UHF	\$47.50
A147-11	11 element 146-148 MHz. beam	\$47.50
A147-22	22 element 'Power Packer'	\$128.50
A144-10T	10 element 2 mtr. 'Oscar'	\$50.50
A144-20T	20 element 2 mtr. 'Oscar'	\$74.50
215WB	15 element 2 mtr. 'Boomer'	\$79.00
220B	17 element FM 'Boomer'	\$93.50
228FB	28 element 2 mtr. 'Boomer'	\$149.00
32-19	19 element 2 mtr. 'Boomer'	\$93.50
424B	24 element 'Boomer'	\$80.00
R3	20-15-10 mtr. vertical	\$267.00
10-4CD	4 element 10 mtr. 'Skywalker'	\$108.00
15-4CD	4 element 15 mtr. 'Skywalker'	\$121.50
20-4CD	4 element 14 mhz 'Skywalker'	\$270.00

HUSTLER ANTENNAS		
48TV	40-10 mtr. vertical	\$79.00
58TV	80-10 mtr. vertical	\$105.00
68TV	6 band trap vertical	\$124.00

ROTORS		
Alliance	HD73 [10 7 sq. ft.]	\$104.00
Alliance	U110	\$47.00
CDE	CD45-II [8.5 sq. ft.]	\$155.00
CDE	HAM IV [15 sq. ft.]	\$249.00
CDE	T2X [20 sq. ft.]	\$299.00
HYGAIN	HDR300 [25 sq. ft.]	\$569.00

ROTOR CABLE		
12-18 & 6-22	4080 - per foot	\$0 18
12-16 & 6-20	4090 - per foot	\$0 35
R88U Mini 8	low loss foam per foot	\$0 17
500'	roll	\$79.00
R88U Columbia	superflex \$29/100' or 500' for	\$125.00

## J.I.L. SCANNER/RADIO



**SX400** - scanner/radio..... **\$359.00**  
Multi band, programmable, synthesized scanner/radio. 20 channels with 12 block chan. space switches, 26-520 MHz. frequency range, AM/FM change mode, momentary memory recall, birdie free seek, DC or optional AC power, priority, muting circuit, dual squelch control, auto noise limiter/FM IF filter.

**SX200** - scanner/radio..... **\$149.00**  
Covers aircraft, military, FBI, satellites, police, fire, defense, aero navigation, amateur radio plus AM/FM radio on 16 channels, seek and scan, digital readout, AC/DC.

## Uniden Bearcat



**BC180XL**..... **\$179.00**  
16 ch. 9 band, w/aircraft, priority control, keyboard lock, lighted LCD, track tuning, auto search & squelch, scan delay, battery low indicator, ch. lockout, direct chan. access. Includes, 2 antennas, AC adaptor/charger, ear-phone, carrying case, & nicad batteries.

**BC145XL**..... **\$99.00**  
16 channel 10 band, 2 digit LED, priority, memory backup, Ch. lockout, weather search, AC/DC (DC cord optional) external speaker & antenna jack.

**BC50XL** 10 chan. 10 band, hand held..... \$114.90  
**BC175XL** 16 ch. 11 band aircraft..... \$159.00  
**BC210XL** 18 chan. 6 band, AC/DC..... \$159.00  
**BC210XW** 20 chan. 8 band(2 ham), programmable..... \$179.00  
**BC800XLT** 40 chan. 12 band, aircraft & 800 MHz..... \$299.00



**XL155**..... **\$119.90**  
10 chan 6 band, programmable, freq. search/scan, priority control, dual level display, lockout, scan delay, ext. speaker jack, AC/DC.

C403 4 chan. 3 band, crystal, AC only..... \$67.90  
R106 10 chan. 6 band, crystal, AC/DC..... \$96.90  
HX750 6 chan. aircraft, hand held..... \$89.90  
HX1200 45 ch. 8 band hand held, aircraft..... \$219.00  
MX3000 30 chan. 6 band, AC/DC..... \$219.00  
MX4000 multi band, 20 ch. AC/DC..... \$299.90  
MX5500 20 Ch. 25-550 MHz. aircraft..... \$359.90  
MX7000 20 Ch. 25-550MHz, 800-1.3GHz..... \$399.90

### SUPER HET RADAR DETECTORS

Uniden RD9	dash/visor or hidden superhet	\$199.90
Uniden RD35	dash/visor superhet	\$69.90
Uniden RD55	dash/visor, audio alert	\$99.95
Uniden RD95	remote mounting superhet	\$129.95
Fox Super XK	LED dash/visor mt.	\$79.95
Fox Vixen II	Superhet, dash/visor	\$154.90
Fox Super Remote	Superhet detector	\$184.90
BEL 861	dash/visor, audio & LED's	\$89.90
BEL 860	small dash/visor	\$119.00
BEL 834	sensitive dash/visor. LED & audio	\$149.00
BEL 837	smallest remote. auto for X & K band.	\$159.00
BEL 870	super small with GaAs diodes	\$134.90
Whistler SPECTRUM	superhet dash/visor	\$179.90
Whistler Q2000	dash/visor, filter	\$114.90

## ASTATIC

**D104 SILVER EAGLE**..... **\$59.90**  
Chrome plated base station amateur microphone. Factory wired to be easily converted to electronic or relay operation. Adjustable gain for optimum modulation.



## MAXON .....\$26.95



**model 49S**  
49 MHz. FM 2-WAY RADIO  
hands free operation, voice activated transmit up to 1/2 mile. Batteries optional

**model 49B**..... **\$34.95**  
same as 49S except uses "AA" nicad batteries and comes with battery charger

### TENNA PHASE III POWER SUPPLIES

**PS3**..... **\$13.90**  
Output: 13.8V DC - 3 amp regulated low ripple, electronic overload protection w/ instant auto reset, fuse protected.

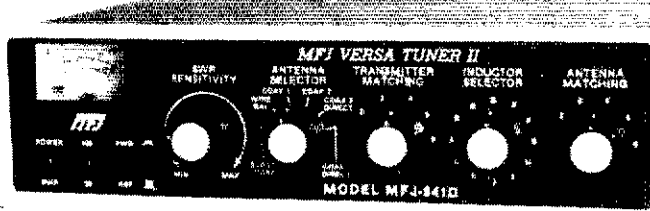
**PS7**..... **\$19.95**  
Fully regulated, 7 amp constant, 10 amp surge capacity

**PS20**..... **\$59.95**  
Fully regulated, 20 amp surge capacity, 13.8 VDC, 17 amp constant



# MFJ ACCESSORIES

**300 WATT ANTENNA TUNER HAS SWR/WATTMETER, ANTENNA SWITCH, BALUN. MATCHES VIRTUALLY EVERYTHING FROM 1.8 TO 30 MHz.**



**\$99.95** MFJ-941D

**NEW FEATURES**

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 watts 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. 1000V capacitor spacing. Black. 11x3x7 inches. Works with all solid state or tube rigs. Easy to use, anywhere.

## RTTY/ASCII/CW COMPUTER INTERFACE

MFJ-1224  
**\$99.95**



Free MFJ RTTY/ASCII/CW software on tape and cable for VIC-20 or C-64. Send and receive computerized RTTY/ASCII/CW with nearly any personal computer (VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64, etc.). Use Kantronics or most other RTTY/CW software. Copies both mark and space, any shift (including 170, 425, 850 Hz) and any speed (5-100 WPM RTTY/CW, 300 baud ASCII). Sharp 8 pole active filter for CW and 170 Hz shift. Sends 170, 850 Hz shift. Normal/reverse switch eliminates retuning. Automatic noise limiter. Kantronics compatible socket plus exclusive general purpose socket. 8x1 1/4x6 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, \$9.95.

## RX NOISE BRIDGE

Maximize your antenna performance!



**\$59.95** MFJ-202B

Tells whether to shorten or lengthen antenna for minimum SWR. Measure resonant frequency, radiation resistance and reactance.

**New Features:** individually calibrated resistance scale, expanded capacitance range ( $\pm 150$  pf). Built-in range extender for measurements beyond scale readings. 1-100 MHz. Comprehensive manual. Use 9 V battery. 2x4x4 in.

## INDOOR TUNED ACTIVE

**NEW! IMPROVED! ANTENNA** with higher gain "World Grabber" rivals or exceeds reception

of outside long wires! Unique tuned Active Antenna minimizes intermode, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antenna. Covers 0.3-30 MHz. Tele scoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, \$9.95. **MFJ-1020A \$79.95**



## POLICE/FIRE/WEATHER 2 M HANDHELD CONVERTER

Turn your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner!

144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA maritime coastal plus more on 160-164 MHz. Converter mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Crystal controlled. Bypass/Off switch allows transmitting (up to 5 watts). Use AAA battery. 2 1/4x1 1/2x1 1/2 in. BNC connectors.

**\$39.95** MFJ-313



## MFJ/BENCHER KEYS COMBO

MFJ-422  
**\$119.95**

The best of all CW worlds—a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044-B IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305, \$9.95.



## VHF SWR/WATTMETER

Low cost VHF SWR/Wattmeter! Read SWR (14 to 170 MHz) and forward/reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.

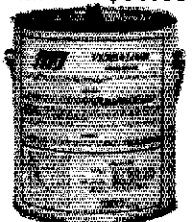
MFJ-812 **\$29.95**



## 1 KW DUMMY LOAD

MFJ-250 **\$39.95**

Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP. VSWR under 1.2 to 30 MHz, 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7 1/2x6 1/4 in.



## 24/12 HOUR CLOCK/ID TIMER

MFJ-106  
**\$19.95 NEW**

Switch to 24 hour UTC or 12 hour format!

Battery backup maintains time during power outage. ID timer alerts every 9 minutes after reset. Red LED .6 inch digits. Synchronizable with WWV. Alarm with snooze function. Minute set, hour set switches. Time set switch prevents mis-setting. Power out, alarm on indicators. Gray and black cabinet. 5x2x3 inches. 110 VAC, 60 Hz.



## DUAL TUNABLE SSB/CW/RTTY FILTER

MFJ-752B **\$99.95**



**Dual filters give unmatched performance!** The primary filter lets you peak, notch, low pass or high pass with extra steep skirts. Auxiliary filter gives 70 db notch, 40 Hz peak. Both filters tune from 300 to 3000 Hz with variable bandwidth from 40 Hz to nearly flat. Constant output as bandwidth is varied; linear frequency control. Switchable noise limiter for impulse noise. Simulated stereo sound for CW lets ears and mind reject QRM. Inputs for 2 rigs. Plugs into phone jack. Two watts for speaker. Off bypasses filter. 9-18 VDC or 110 VAC with optional adapter, MFJ-1312, \$9.95.

**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





# 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 3/4" W x 4 1/2" H x 14 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.



MFJ-989 **\$329.95**

Accurate meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter, MFJ-1312 is available for \$9.95.

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 2.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:2 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-962 **\$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.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. 6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 in.

## 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

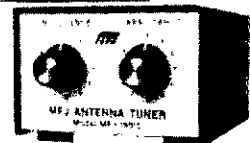
MFJ-901B **\$59.95**



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-1601D **\$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



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

(In Tennessee, call 901-683-9125)

**For The Deal You Want—On The Brands You Know!**

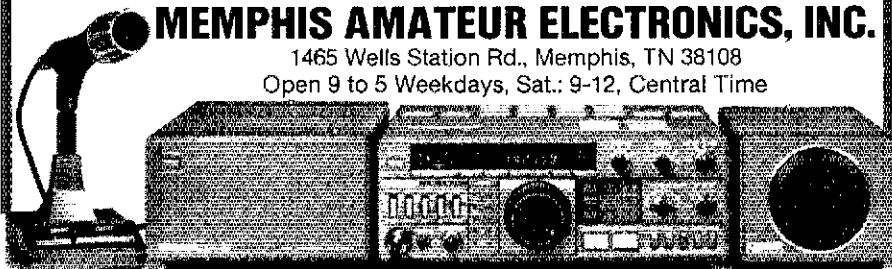
Authorized dealer for:  
KENWOOD, ICOM, NYE-VIKING, TEN-TEC,  
BUTTERNUT, HUSTLER, MIRAGE, MFJ, AEA,  
B&W, ASTRON, CUSHCRAFT, LARSEN, HI-  
GAIN & MORE! Also many fine used rigs, too!  
CALL FOR DETAILS.

**WE TRADE!**  
CALL FOR A FREE  
APPRAISAL!

Send us your name &  
address. We will put  
you on our catalog  
mailing list!

**MEMPHIS AMATEUR ELECTRONICS, INC.**

1465 Wells Station Rd., Memphis, TN 38108  
Open 9 to 5 Weekdays, Sat.: 9-12, Central Time



- REALLY cramped for space?
- Want a 10, 15 or 20M concealable or portable antenna?
- Want a "bird dog" for your beam?
- Want 40M in a small space?
- Try the new WARC bands?

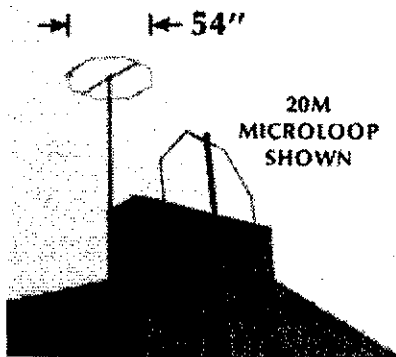
**MICROLOOP**

These compact monoband loops provide omnidirectional (no rotator) horizontally-polarized (low-noise) coverage when parallel to ground, or performance approaching a full-size dipole when vertical. Tunable (SWR < 1.5:1) to your favorite band segment via built-in adjustable coaxial capacitor capable of continuous 200 watts CW or PEP. Cover other band segments via antenna tuner. Rugged low-loss copper with stainless steel hardware. 2" PVC mast required (not provided), or suspend from tree or ceiling with nylon rope. Prices include US shipping (except HI, AK). Florida add 5% sales tax. Send check with your order or call us with your VISA or MasterCard.

10, 12, 15, 16 or 20M MICROLOOP (20M is 54" across, others smaller) ... \$83.50  
30M or 40M MICROLOOP (108" across for 40M, 30M smaller) ..... \$93.50

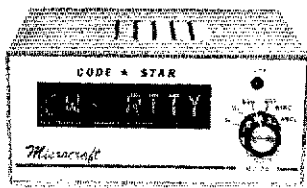
ADN Advanced Design Networks, Inc.  
8601 66th Street North • Pinellas Park, FL 33565

CALL TODAY  
(813) 544-2596



**CODE ★ STAR--PRICED FROM \$129.00**

- ★ Ideal for Novices, SWL's and seasoned amateurs
- ★ Built-in code practice oscillator & speaker
- ★ 12 VDC Operation or 120 VAC with adapter provided
- ★ Optional serial/parallel ASCII output port



- ★ Copies Morse, Baudot & ASCII codes
- ★ Two optimized Morse ranges
- ★ Digital & Analog filtering with 16 db AGC
- ★ Automatic speed tracking 3 - 70 WPM

More Features Per Dollar Than Anything Else! Copies code from your receiver! Improves your code speed too! Large LEDs. Easy to connect and operate. Compact. 2lbs. Connect computer (like VIC-20)/printer with optional ASCII output port.

CODE ★ STAR™ Kit . . . CS-K \$129.00

CODE ★ STAR Wired . . . CSF \$169.00

ASCII Port Kit . . . CS-IK \$49.95

ASCII Port Wired . . . CSIF \$69.95

Add \$5.00 shipping and handling for continental U.S. Send check or money order. Use VISA or MasterCard.

Call or write for FREE brochure. Factory Direct — WE'RE AS NEAR AS YOUR PHONE!

*Microcraft*

Corporation Telephone: (414) 241-8144  
P. O. Box 513Q, Thiensville, Wisconsin 53092

WANTED: Pre-1950 TV sets and old TV GUIDE magazines. W3GRH, Box 20-Q, Macomb, IL 61455.

WANTED: EARLY 1930s equipment operating above 30 MHz: National early Superhet, TRM/TRW, HFC, 510, HEL 296, 297, 300, 301, Radio Transceiver Laboratories, Hags, others. Nagle 12330 Lawyers, Herndon, VA 22071, 703-620-3065

WANTED: MATCHING Speakers for Hammarlund HQ-180 (\$200) and Heath SB-102 (SB-600). Consider other 3.2 Ohm speakers for HQ-180. Western Electric 701A Tubes. 1931, 1941, 1951 Handbooks. NTCOM, 1490 Stratfield Rd., Fairfield, CT 06430. 203-371-4139

**General**

WANTED: Squire - Sanders SS-1R Receiver and/or documents make offers. Broutin, 3 Rue Craque, 40600 Biscarrosse FRANCE.

AMIGA TU SOFTWARE for Kantronics UTU or equiv - \$75 on disk - Allan Ebert VE3AKV, 924 Westbury Court, Sarnia, ONTARIO N7T 7R7.

TELETYPEWRITER parts, supplies, gears. Toroids, S.A.S.E. 1st. Typetronics, Box 8873, Ft. Lauderdale, FL 33310. Buy unused parts, cash or trade.

HAM TRADER Yellow Sheets, in our 23rd year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate - no long wait for results! SASE for sample copy, \$10 for one year (24 issues), P.O. Box 2057, Glen Ellyn, IL 60138-2057.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

HOSS-TRADER ED says, "Shop around for the best price then telephone the HOSS last for the best deal." Mosley CL-33 Beam Regular \$388/Cash \$275. New Icom IC-2AT \$189.95. New Display Axden PCS-5000 \$269. New Display ICOM-735 Transceiver Regular \$849/Cash \$689. New ICOM-751 Transceiver Regular \$1379/Cash \$889. New ICOM-745 Transceiver Regular \$999/Cash \$699. New ICOM 02AT \$274. New Nye MB-VA 3KW Antenna Tuner Regular \$565/Cash \$469. New Display LK-500ZB 2500 Watt Amp Supply Linear/Tubes/Hypersil Transformer, Regular \$1119/Cash \$979. New Display KENWOOD 430-S \$619. New Display 940-S/With Tuner \$1679. Visa/Master Card Accepted!!!! MOORY ELECTRONICS CO., P.O. Box 506, Dewitt, AR 72042. 501-946-2820

We Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, P.O. Box 707, Linden, NJ 07036. Call toll-free 800-526-4052.

FAST, ACCURATE, readable, nonsensational—The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send \$19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

KEYER KITS, \$15. SASE for information MSC, 1304 Toney Drive, Huntsville, AL 35802.

EIMAC-3-5002's New-very limited quantity! \$85 each, cash, COD, MO. Add \$3.50 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 3740 Randolph, Oakland, CA 94602 415-530-8840.

SOLAR ELECTRIC panels, components, inverters, \$3 catalogs, technical information, price lists. SPECS Inc. P.O. Box 155, Montrose, CA 91020.

MAGICOM RF Speech Processors for selected Kenwood, Drake and Yaesu equipment. Excellent speech quality—6dB added average output. Affordable prices! SASE for date and cost. MAGICOM, P.O. Box 6552, Bellevue, WA 98007.

T189/4A Ham Computer Programs. 39c Stamp for Brochure to Sam Moore, AC5D, Box 368, Stigler, OK 74462. SALE - 1/2 Price on all AC5D Programs. Any five programs for \$32.00.

RTTY HEADQUARTERS: Authorized Dealers for "Hal" and "Info-Tech" products. You can't beat our prices! Call or write Dialta Amateur Radio Supply, 212-48th Street, Rapid City, SD 57702. 605-343-6127.

RIGID PLEXIGLAS Key Cover. Bencher \$9.95; MFJ-422 \$9.95; Mercury \$16. George Chambers, K0BEJ, 302 S. Glendale Avenue, Coffeyville, KS 67337.

QRPerS/BUIL DERs: New-parts bargains! S.A.S.E. for flyer. KAIBUQ, Box 249, Luther, MI 49656.

CHASSIS & CABINET Kits. 5120 Harmony Grove Rd., Dover, PA 17315 SASE K3IWK.

23 CM "READY-TO-GO" 100+ watt linears and 2C39 amplifier cavities. Hi-Spec, Box 387, Jupiter, FL 33468.

FANTASYLAND SALE. New Units: Ten-Tec Corsair II, \$1117, Argosy II, \$560. Cent. 22, \$345. Drake R7 \$1099. W9ADN, 915-838-1580, Box 117, Lockport, IL 60441.

HAM RADIO REPAIR, tube through solid state. Robert Hall Electronics, P.O. Box 8363, San Francisco, CA 94128; 408-729-8200.

FREE RECORDINGS of exciting Mexico City and Columbia emergency nets. Send two C-90 cassette/ies and return postage to K1MAN, Belgrade Lakes, Maine 04918. Join International Amateur Radio Network on odd Saturdays of month: SSB 14.160 at 14:30Z, RTTY 14.090 at 15:30Z. Listen for QSY to our 14.275 emergency frequency during the net. Attend I A R N World Conference every second weekend of July.

SPY RADIOS And "Bugging" Equipment Wanted! Buying radios beginning with letters "SS" or "SRR" (Example, SSB-6, SRR-5, etc.), military radios in civilian suitcases, bugging devices! MUSEUM, Box 18521, Wichita, KS 67218. call 316-684-6254.

CLIMBING BELTS & Accessories. Illustrated brochure. W9JVF, 1147 N. Emerson, Indianapolis, IN 46219.

# SUMMER IDEAS

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

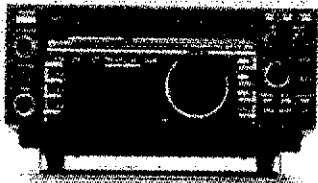
3621 FANNIN ST.  
HOUSTON, TX 77004-3913  
CALL FOR ORDERS  
1-713-520-7300 OR  
1-713-520-0550



ALL ITEMS ARE GUARANTEED OR SALES PRICE REFUNDED

## EQUIPMENT

Kenwood ..... Call for prices on all Kenwood  
Kenwood TS940S, contesters's delight ..... Call  
Kenwood TS 440 ..... Call for trade  
Icom R7000 25-2000 MHz ..... \$49.00  
Icom IC3200 ..... 489.95  
Santec ST20T Handi Talkie ..... 289.00  
Icom IC735 ..... 799.00  
Ten-Tec 2510 (Easy OSCAR) ..... 489.00



## ACCESSORIES

B&W VIEWSTAR ANTENNA TUNER ..... 89.95  
Heil HC3/HC4/HC5 ..... Stock  
Heil BM10 Boom Mike headset ..... 59.95  
CSI Private Patch III ..... 469.95  
FLUKE 77 auto-ranging digital multimeter ..... 125.00  
Daiwa CN620B, 20-200, 2000W ..... 109.95  
Alnico ELH 230D- Excellent buy ..... 79.00  
Nye MB5-A (for the big boys!) ..... 529.00  
Shure 444D ..... 54.95  
Wahl 7470 Soldering Station ..... 49.00  
Kenwood IF 10A, B, C ..... Stock  
Kenwood IF 232C Level translator ..... 49.00  
Miller C514T Low pass filter ..... 43.50  
B & K Test Equipment VOM, oscilloscopes, generators, etc. .... CALL

## ANTENNAS

Isopole 144 MHz ..... 44.95  
A4 ..... 269.00  
402CD ..... 279.95  
424B ..... 84.00  
215WB New, 15 El, 2M beam ..... 79.95  
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  
Ham4 Rotator, T2X, CD45-2 ..... Call  
KLM HF World Class Series Antennas ..... Call Don  
Alpha Delta Twin Sloper ..... 49.00  
Coax Seal ..... 2.00/roll  
B&W Dipoles ..... Less 10%  
Hy-Gain TH7DXS ..... 489.00  
Explorer 14 ..... 349.00  
Discoverer 1 element 40M ..... 169.00  
2 element 40M ..... 369.00  
3 element only ..... 249.00  
CD 45-2 Great Tribander Rotor ..... 169.00  
V2S (2meter) ..... 59.00  
HG2SS 52 ft. crankup tower ..... 1199.00  
Prepaid freight when you order other Hy-Gain items with tower  
KLM KT-34A ..... 339.00  
40M-2 ..... 299.00  
New Tele-HyGain 2-18s Complete  
HD OSCAR system ..... List 365.00 ..... Your Cost 269.00

## OTHER ANTENNAS

Larsen Kulduck ..... 17.00  
Larsen 440 HW 1/2 wave Kulduck ..... 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 ..... 34.00  
Vaior AB-5 Mobile ..... 79.95  
Stoner DA100 D Active Rx Antenna ..... 190.00  
DC Tenna Hitch 3/8-24 Thread  
Fits 3/4"-1" trailer hitches ..... 29.95

## "NEW" ALPHA DELTA 4 HEAVY DUTY COAX SWITCH

with ground pos. & lightning protection ..... 69.00  
Collins KWM2/S line xtals ..... 10.00 each



751A ..... List 1499.00 ..... Your Cost 1299.00

## KEYS

Bencher & Vibroplex ..... Less 10%  
Bencher is now improved. Screws & springs, all stainless steel and extra hand polishing.  
Trade in your old hand key on new Vibroplex/Bencher 5.00  
Nye ESK-001 Keyer ..... 58.00

## TUBES

Collins & Drake Replacement tubes ..... stock  
GE 6146B ..... 11.95  
Eimac 3-500Z ..... 109.95  
GE Industrial Tubes ..... Call  
GE 12B7A ..... 7.00  
GE 6JS6C ..... 12.95  
Cetron 572B ..... 69.00  
GE 8950 ..... 14.00

## BOOKS

We stock SAMS, TAB, ARRL, RSGB, Arneco Radio  
Pubs ..... Call  
PASSED Your code yet? Try Gordon West's Code Tapes.

Philmore Field Strength/SWR Meter ..... 19.95  
3-150MHz, KW +

## SURPLUS

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  
Close out on rigs & accessories. All the time. Call  
We may have what you're looking for.

## 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 rotor cable ..... 33c/ft.  
9405 Heavy duty 2-16 Ga 6-18 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" lined copper braid ..... 1.00/ft.  
International Wire RG214, non-mil. good cable ..... 70c/ft.  
International Wire 9086 exact replacement for Belden 9913 ..... 36c/ft.  
International 16 Ga stranded antenna wire ..... 6c/ft.  
International 4063 RG-213 ..... 28c/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  
31-2 BNC-RG58 ..... 1.50  
34025 N Male, RG58 ..... 3.00  
34125 N Female-UHF male ..... 9.00  
3128 BNC Female-PC259 ..... 3.00

## TOWER ACCESSORIES

1/4" E.H.S. Guy cable, Rohm US, 1000 ft. .... 250.00  
3/16" E.H.S. cable, Rohm US, 1000 ft. .... 210.00  
1/4" Guy Cable, 6100 #7 x 7 strand, import ..... 15c/ft.  
3/16" Guy Cable, 3700 #7 x 7 strand, import ..... 12c/ft.  
3/8 x 6 E&J Turnbuckle ..... 7.95  
3/16" Wire Rope Clips ..... 40  
1/4" wire clips ..... 50  
1/4 Thimbles ..... 45  
Porcelain 500D Guy Insulator (3/16) ..... 1.99  
Porcelain 502 Guy insulators (1/4) ..... 3.39

## COMPUTER STUFF

Kantronics UTU-XT ..... 319.00  
Fits any computer (even yours!)  
Morse University (Great CW program for C-64) ..... 39.00

## PACKET POWER

AEA PK-64, does RTTY, ASCII, AMTOR also ..... 199.00  
AEA PK-80 TAPR II ..... 199.00  
NEW Kantronics Packet II ..... 199.00  
MFJ 1270 ..... 115.00  
AEA PM-1 ..... 149.00

## 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.

## POLICIES

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

# BIRD

## STOCK ITEMS CALL

Power Range	Frequency Bands (MHz)					
	3-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	8A	8B	3C	3D	3E
10 watts	—	10A	10B	10C	10D	10E
15 watts	—	15A	15B	15C	15D	15E
30 watts	30A	30B	30C	30D	30E	30F
100 watts	100A	100B	100C	100D	100E	100F
250 watts	250A	250B	250C	250D	250E	250F
500 watts	500A	500B	500C	500D	500E	500F
1000 watts	1000A	1000B	1000C	1000D	1000E	1000F
2500 watts	2500A	2500B	2500C	2500D	2500E	2500F
5000 watts	5000A	5000B	5000C	5000D	5000E	5000F

# MADISON

## Electronics Supply

3621 FANNIN  
HOUSTON, TEXAS 77004

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

# KENWOOD



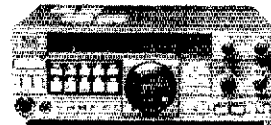
**TS-940S LIST \$2099**  
 NEW Top-of-the-Line  
 HF Transceiver  
 • 100% Duty Cycle  
 • 40 Memory Channels  
**CALL FOR SPECIAL PRICES!!**



**TS-440S NEW! NEW! NEW!**  
**CALL FOR SPECIAL SALE PRICE**



**TS-430S LIST PRICE \$779.95**  
**CALL FOR SPECIAL SALE PRICE!**



**TS-711A LIST \$839.95**  
**TS-811A LIST \$949.95**  
**CALL FOR SPECIAL PRICE!**



**TW-4000A LIST \$599.95**  
**CALL FOR SPECIAL PRICE!**



**TR-751A List \$599.95**  
**All Mode 2m Mobile**



**COMPACT 2M FM MOBILE**  
**TM 2570A (70W) LIST \$549.95**  
**TM 2550A (45W) LIST \$459.95**  
**TM 2530A (25W) LIST \$399.95**  
**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 \$889**  
**CALL FOR SPECIAL PRICE!**



**IC-751A New Full Featured HF Transceiver, Top of The Line. List Price \$1499**  
**CALL TODAY FOR LOW TEXAS TOWERS/ICOM PRICE!**



**IC271A List \$735 IC271H List \$944**  
**IC471A List \$839 IC471H List \$1149**  
**CALL TODAY FOR SPECIAL LOW ICOM PRICES!!**



**IC-28A List \$419 IC-28H List \$449**  
**IC-37A List \$449 IC-47A List \$469**  
**CALL TODAY FOR SPECIAL ICOM PRICES!**



**IC3200 NEW 2m/70cm Dual Band Xcvr List \$569**  
**CALL FOR SPECIAL PRICE!**

**IC02AT - 2mtr**  
**IC04AT - 70cm**  
**High Tech HT XCVRS**

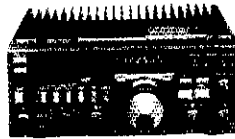
**IC2AT - 2mtr**  
**IC3AT 220 MHz**  
**IC4AT 440 MHz**  
**ALL IN STOCK—CALL FOR SPECIAL PRICES!**

## ASTRON POWER SUPPLIES

**Heavy Duty - High Quality - Rugged - Reliable**  
 • Input Voltage: 105-125 VAC Output 13 & VDC ± 1%  
 • Fully Electronically 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

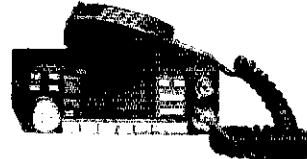
# YAESU



**FT-757GX LIST PRICE \$899**  
**CALL FOR SPECIAL SALE PRICE!**



**FT-726R LIST PRICE \$925**  
**CALL FOR SPECIAL SALE PRICE!**



**FT2700RH NEW 2m/70cm Dual Band Transceiver Full Duplex — Cross Band Operation! List \$599**  
**CALL FOR PRICE—SAVE \$\$!**



**FT-209RH NEW High Tech 2mtr HT 5 Watt Output NOW IN STOCK**

**CALL FOR YOUR SPECIAL PRICE!**

**NEW PACKRATT Model PK-64 Packet Controller \$219.95**



**PK-80 Packet Controller \$219.95**  
**CP-1 Computer Patch \$189.95**  
**CP-1/B4 Computer Patch W/C84 MBATEST \$219.95**  
**CP-100 Deluxe Computer Patch \$299.95**  
**PK64 C64 Packet System \$219.95**  
**NBATOR Software C64 or VIC20 (Specify) \$89.95**  
**Doctor DX CW Band Simulator Software \$99.95**  
**Doctor QSO Morse Code Trainer Software \$79.95**  
**Isopole 144MHz, 220MHz & 440MHz Antennas In Stock — CALL FOR SPECIAL PRICES!**

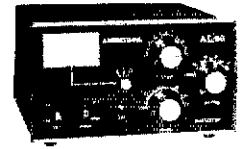
## MIRAGE AMPLIFIER SALE!



**B3016 ONLY \$199!**

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	\$249
B23S	2M	No	2W	30W	\$ 79
B23A	2M	Yes	2W	30W	\$ 89
B215	2M	Yes	2W	150W	\$259
B108	2M	Yes	10W	80W	\$159
B1016	2M	Yes	10W	160W	\$249
B3016	2M	Yes	30W	160W	\$199
D24	440	No	3W	40W	\$179
D1010N	440	No	10W	100W	\$289

# AMERITRON



**AL80A NEW 1000W 3-500Z Amplifier \$699**  
**Al-84 600W PEP Output (4-6MJ6 Tubes) \$399**  
**RCS-4 4 Pos Remote Antenna Switch \$119.95**  
**RCS-8V 5 Pos Remote Antenna Switch \$119.95**

## TEN-TEC SALE!



**NEW CORSAIR II**  
**CALL FOR PRICE AND DELIVERY INFORMATION**



**425 Titan New 3KW amplifier in stock - Call For Special Price**

## ALINCO

**ELH-230D LIST \$89.95**  
**30 Watt 2M Amp w/Preamp Special \$79.00**  
**Other Alinco Amps in Stock Call For Special Price**

**POWER SUPPLIES**  
**EP-3030 LIST \$208.00 SPECIAL \$189.00**

## KDK

**FM-240 NEW COMPACT 2M-25W FM Transceiver**  
 • 16 memory channels  
 • 3 VFOs  
 • Programmable sub-audible tone unit included no extra charge  
 • Optional voice synthesizer available  
**Call For Special Price**

## THL CORP.

**Power amps and receive preamps in stock CALL FOR SPECIAL PRICES!**

## Kantronics

**NEW KPC-2 Packet Controller List \$219.00 ONLY \$199.95**  
**The Interface... List \$169.95... SALE \$129.95**  
**Interface II... List \$269.95... SALE \$239.95**  
**Universal Term Unit. List \$199.95. SALE \$189.95**  
**UTU Terminal Software (IBM/CPM/TRS80)\$19.95**

**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)

**COMPREHENSIVE APPLE SOFTWARE** Transmit/receive CW/RTTY with/without TU. Variable speed code practice. Calculate/display beam headings on world map. More \$49.95 and call sign brings disk and good manual for IUI+fe. Send now for free brochure W1EO 39 Longridge Road, Carlisle, MA 01741.

**NICAD BATTERY PACKS** - Exact replacement FNB-2 NiCad packs for Yaesu FT-207/FT-208 with case. \$24 + \$2 shipping. Kenwood, ICOM and other inserts and cells also available, send SASE for list. Periphex, 149 Palmer Road, Southbury, CT 06488, 203-264-3985.

**FREE STANDING Towers** manufactured by Trylon Manufacturing of Canada, we have the height and wind load to suit your needs. Up to 96', also guyed towers complete with guys and anchors up to 160'. Write to BJX Supply Co., P.O. Box 388, Cortu, NY 14036 or call 716-599-3791 after 6 PM east. FOB Buffalo, NY.

**ICOM, KENWOOD & Yaesu Separate Newsletters:** 5 years of back issues for ICOM & Kenwood. Cumulative Index available on each. TS930S & 430S Users Modifications Supplement now available. Send SASE for Free Brochure to: International Radio, Inc., 747 S.W. South Macedo Blvd., Port St. Lucie, FL 33452.

**TENNA TEST** - Antenna noise bridge out-performs others, accurate, costs less, satisfaction guaranteed. 1-150 MHz. Send stamp for details. 1025 Wildwood Rd., Quincy, MI 49082.

**ELECTRON TUBES** - Radio & TV types 75% off List Price - Huge Inventory! Also industrial types. Send for Free Catalog today or call Toll Free 800-221-5802, Box QC, Transieronics, Inc., 1365 39th St., Brooklyn, NY 11218.

**C-12B LOGGING and QSL Program.** 80 Column. \$12.95. R.W. Cook, W6SBW, 87 Shirley Lane, Oroville, CA 95966.

**VACUUM TUBES** - 20,000 in stock. Business SASE for list. W83GND, PO Box 750, Clinton, MD 20735. 301-248-7302.

**WANTED: DRAKE ACCESSORIES** for TR-7, TR-5, MN2700 Ant Tuner, RV 75 etc., MN2000 Kenwood HC-10 Clock, SP-520, etc. Various models of Antenna Tuners 200 Wts to 3 kW. Call: 215-271-8898. K3UKW, Tony Musero, 1609 S. Iseminger St., Philadelphia, PA 19148.

**WANTED: 8874 K4NBN** "No Bad News".

**INTERESTED IN SELLING** your Ham Radio-Related business? Call or write SVS Inc. With complete confidentiality. 14615 NE 190th St., Woodinville, WA 98072. 206-485-0745.

**WANTED: AEA KT-2, CK-2 or MM-2** and Bencher Iambic Paddle J Waskowitz, 580-83rd Street, Brooklyn, NY 11209.

**ARCOS VHF/UHF amplifier parts and kits.** Harold "Connie" Bramstedt, 6104 Egg Lake Rd., Hugo, MN 55038, 612-429-9397.

**BELDEN 9913 Coax** 39¢/ft. to 100 feet. 38¢/ft. 100 feet & up; **BELDEN 8214 RG-8** 35¢/ft. to 100 feet. 33¢/ft. 100 feet & up; **BELDEN 9258 RG-8X** 17¢/ft. AMPHENOL N-type fitted for 9913 \$4.50. Other connectors and adapters in stock. 8 gauge hook-up wire 28¢/foot. Same day shipping. Visa & Master Charge accepted. Call Bill KA2QEP or Jim KA2RVQ at 201-887-6424 or write QEP's 110-4, Route 10, East Hanover, NJ 07936.

**DISCOUNT TOWER ACCESSORIES:** 1/4" EHS Guy Wire 15¢/ft - Preformed end grips \$1.90 - 8" Ground Rods \$10.50 - Strain insulators \$2.25 - Galvanized Anchors \$12 - Professional Climbing Belts. More! KME Enterprises (ABBY) Box 25, Richland, MI 49083

**COMMODORE 64/128 "COMKEY"** Program turns computer into sophisticated memory keyer. Send characters as you type them or load 16 message areas (256 characters each) with Call, Name, QTH, Rig, Contest Exchange, etc. to be sent later with a single keystroke. More. Write for free details. \$15 for program and instructions for building simple interface or \$28 postpaid for program and homemade interface (nothing else needed to make your computer key your transmitter). Specify tape or diskette. Fritz Reuning, K4OAO, 120 Elk Rd., Bristol, TN 37620.

**SHORT DIPOLES** for 160/75, 180/40, 160/30 ... coax-fed, no tuning, \$59.50 postpaid. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06707.

**THE DX BULLETIN** - America's Oldest Weekly Amateur Radio publication contains complete DX information. SASE or call for sample Box 4233, Santa Rosa, CA 95402. 707-523-1001.

**EXPERT REPAIR** on all types of ham gear by WA6SRX. P.O. Box 2064, Iylylwd, CA 92349, 714-659-4018.

**HAM ACCESSORY CATALOG** - Send legal size SASE to H.A.M. Sales, P.O. Box 497, Finksburg, MD 21048.

**WANTED: MOTOROLA or GE UHF Repeater,** leave model and price on machine. 718-783-3188. N2HA.

**HAM RADIO SOFTWARE** for C64 or V20. 12 programs on disk. Includes Morse Code, WAS, WAZ, DXCC and more. Send \$14.95 check or M.O. to H.A.M. Sales, P.O. Box 497, Finksburg, MD 21048.

**CODECOPY** program for IBM-PC and compatibles. Copies CW using simple interface through RS232 DSR line. \$15 postpaid includes interface plans and software. SASE for information. OPS SOFTWARE, POB 866414, Plano, TX 75086.

**KENWOOD AMATEUR REPAIR,** Experienced Professional Service, Visa/MC accepted, Mon-Fri 10:00 to 4:00 PM. Pacific Rim Communications, 23332 58th Ave. West, Mountlake Terrace, WA 98043, 206-776-8993.

**GET YOUR "F.C.C. Commercial General Radiotelephone License"** Electronics Home Study. Fast, inexpensive! "Free" details. Command, D-215, Box 2223, San Francisco, CA 94126.

**8877 VHF AMP KITS.** HV power supplies, CX600N relays, MuTek LTD front end boards for IC251/IC271, EME newsletter and QRO parts. SASE for new catalog. KB7Q "O" Products, 417 Staudaher Street, Bozeman, MT 59715.

**NOW FACTORY DIRECT!!!**

**STEP UP TO  
TELREX  
ANTENNAS  
ANTENNA SYSTEMS**

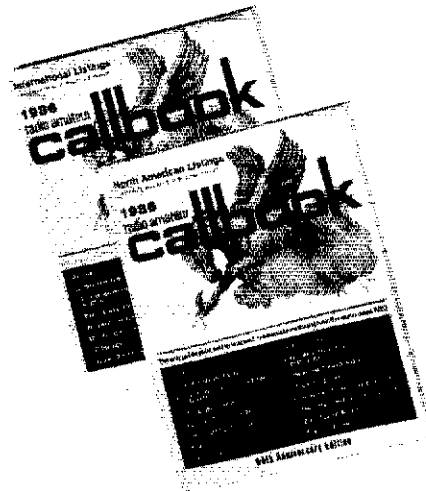


**Some of the WORLD'S finest.**

TB4EC 10, 15, 20 Mtr.	\$310.00
TB5ES 10, 15, 20 Mtr.	\$425.00
TB5EM 10, 15, 20 Mtr.	\$530.00
TB6EM 10, 15, 20 Mtr.	\$640.00
20M326 3 elem. 20 Mtr.	\$385.00
20M536 5 elem. 20 Mtr.	\$635.00
20M646 6 elem. 20 Mtr.	\$1075.00
15M532 5 elem. 15 Mtr.	\$510.00
15M845 8 elem. 15 Mtr.	\$1010.00
10M523 5 elem. 10 Mtr.	\$340.00
10M636 6 elem. 10 Mtr.	\$705.00
2MVS814, 2 Mtr. phased	\$269.00

Prices subject to change.

**1986  
CALLBOOKS**



**The "Flying Horse" has a great new look!**

It's the biggest change in Callbook history! Now there are 3 new Callbooks for 1986.

The North American Callbook lists the amateurs in all countries in North America plus those in Hawaii and the U.S. possessions.

The International Callbook lists the calls, names, and address information for licensed amateurs in all countries outside North America. Coverage includes Europe, Asia, Africa, South America, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The Callbook Supplement is a whole new idea in Callbook updates. Published June 1, 1986, this Supplement will include all the activity for both the North American and International Callbooks for the preceding 6 months.

Publication date for the 1986 Callbooks is December 1, 1985. See your dealer or order now directly from the publisher.

- North American Callbook  
incl. shipping within USA \$25.00  
incl. shipping to foreign countries 27.60
- International Callbook  
incl. shipping within USA \$24.00  
incl. shipping to foreign countries 26.60
- Callbook Supplement, published June 1st  
incl. shipping within USA \$13.00  
incl. shipping to foreign countries 14.00

**SPECIAL OFFER**

- Both N.A. & International Callbooks  
incl. shipping within USA \$45.00  
incl. shipping to foreign countries 53.50

\*\*\*\*\*

Illinois residents please add 6 1/4% sales tax. All payments must be in U.S. funds.

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

Tel: (312) 234-6600





# ICOM

# KENWOOD

# YAESU

### ICOM



IC-751 9 Band Xcvr, I-30 MHz

HF Equipment	List	Juns
IC-751 Xcvr	1399.00	Call \$
IC-751A Xcvr	1499.00	Call \$
IC735 Xcvr	889.00	Call \$
PS-55 Power Supply	169.00	Call \$
PS-35 Power Supply	169.00	Call \$

Receivers	List	Juns
IC-R-7000	969.00	Call \$
IC-R71A	849.00	Call \$

VHF/UHF	List	Juns
IC-02AT 2m, HT	369.00	Call \$
IC-2AT	269.00	Call \$
IC-271A 2m, Base	735.00	Call \$
IC-27A Compact	389.00	Call \$
IC-3AT, HT	299.00	Call \$
IC-37A Compact Mobile	449.00	Call \$
IC-04AT 440 MHz, HT	399.00	Call \$
IC-4AT	299.00	Call \$
IC-471H 75w, 440 MHz	1149.00	Call \$
IC-47A	489.00	Call \$
IC-3200 25W, Dual Bander	569.00	Call \$
IC-290H 25W, 2M, SSB/FM	\$549	Call \$
IC-490A, 10W, 440, SSB/FM	\$649	Call \$
RP-3010 UHF, Repeater	1049.00	Call \$
IC-1271A 1.2 GHz Base	1049.00	Call \$
IC-120 Mobile	499.00	Call \$

### KENWOOD

HF Equipment	List	Juns
TS-940S w/AT	2099.95	Call \$
wo/AT	1899.95	Call \$
TS-430S	899.95	Call \$
TS-830S	999.95	Call \$
TS-530S	799.95	Call \$
TS-670 Quad Bander	749.95	Call \$

Receivers	List	Juns
R-2000	629.95	Call \$
R-1000	519.95	Call \$



TS-440S All New Compact HF Xcvr	List	Juns
<b>VHF/UHF</b>		
TR 2600A 2m, FM, HT	349.95	Call \$
TR 3600 440, HT	359.95	Call \$
TH 21AT Compact 2m	239.95	Call \$
TH 31AT Compact 2m	249.95	Call \$
TH 41AT Compact 440	249.95	Call \$
TM 4000A 2m/70cm	599.95	Call \$
TM 2570A 70w, 2m	549.95	Call \$
TM 2550A 45w, 2m	459.95	Call \$
TM 2530A 25w, 2m	399.95	Call \$
TM 211A 2m, Mobile	369.95	Call \$
TM 411A 70 cm	449.95	Call \$

	List	Juns
TM-201B 2m, FM Mobile	339.95	Call \$
TM-401B 70 cm Mobile	369.95	Call \$
TS-711A 2m, All Mode	799.95	Call \$
TS-811A 440, Base	899.95	Call \$
TS-711A 2m, All Mode	839.95	Call \$
TS-811A 440, Base	949.95	Call \$
TL-922A HF Amp	1399.95	Call \$
SM-220 Monitor	379.95	Call \$
TS-440s w/AT	1099.95	Call \$
TS-440s wo/AT	949.95	Call \$

### YAESU



FRG-9600 60-905 MHz Receiver

HF Equipment	List	Juns
HT ONE Xcvr	2859.00	Call \$
FT 757GX Xcvr	879.95	Call \$
FT 980 CAT System	1659.00	Call \$

Receivers	List	Juns
FRG 8800 150kHz-30 MHz	569.00	Call \$
FRG 9600 60 - 905 MHz	649.00	Call \$

VHF/UHF	List	Juns
FT-203R/TT 2m, HT	259.95	Call \$
FT-209RH w/FTS-6	359.95	Call \$
FT-103R/TT 220 MHz	279.95	Call \$
FT-703R/TT 440 MHz	299.95	Call \$
FT-709 RH 440 MHz, HT		
NC-15 Quick Charger	79.00	Call \$
FT-270 RH w/FTS-8 2m	439.00	Call \$
FT-2700RH w/FTS-8	599.95	Call \$
FT-726R All Mode		
OSCAR	925.00	Call \$
6m Module	215.95	Call \$
SU-726	109.95	Call \$
430/726	299.95	Call \$
440/726	299.95	Call \$
HF/726	225.95	Call \$
FTR-2410 2m Repeaters	1075.00	Call \$
FTR-5410 70cm Repeaters	1249.00	Call \$

TE Systems	List	Juns
Mirage		Call \$
Ameritron		Call \$
Amp Supply Co.		Call \$
Bird Products In Stock		Call \$
KLM Antennas		Call \$
Hustler Antennas In Stock		Call \$
Larsen Antennas In Stock		Call \$
AEA Products in Stock		
Kantronics Products in Stock		
Astron Products in Stock		
Bencher Products in Stock		

ENCOMM	List	Juns
Santec		
ST-20T 2m HT	349.95	Call \$
Welz Power Meters, Acces.		Call \$
Tokyo Hy-Power		
VHF/UHF Amps/Tuners		Call \$

- AMATEUR • TWO WAY • MARINE
- CELLULAR MOBILE PHONE
- SCANNER
- ★ Free U.P.S. Cash Order
- (Most Item, Most Place)
- ★ SE HABLA ESPANOL

**JUN'S**  
**ELECTRONICS**  
800-882-1343

## AMATEUR TELEVISION



## P.C. ELECTRONICS

Maryann  
WB6YSS

2522 PAXSON  
ARCADIA, CA 91006

Tom  
WGORG



### NEW 70 CM ATV TRANSCEIVER



**\$299 delivered**  
**TC70-1**

SEE US AT DAYTON  
BOOTH 359

\* **FULL COLOR, SOUND & LIVE ACTION** just like broadcast TV. Get on this exciting amateur video mode at our affordable ready to go price.

\* **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 . . . 10 pin color camera jack & RCA phone jacks. Xmit video monitor output. Over 1 watt pep RF output on one or two (add \$15) selected crystal controlled freq. 439.25, 434.0, or 426.25 MHz.

**ATV APPLICATIONS:** you can show the shack, projects, home video tapes, computer graphics & listings, repeat SSTV, or even Space Shuttle video & audio if you have a home satellite receiver. Do public service events such as marathons, races, parades, search & rescue, major fires, repeat weather radar, etc. DX depends on terrain and antennas, typ. 1 to 40 miles. For greater DX we have 20 watt amp for \$109 and 50 watts for \$185.

**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 camera, VCR, computer, etc. or any composite video source. Plug in 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!

**CALL (818) 447-4565 OR WRITE FOR OUR CATALOG,** more info, or who is on in your area. Downconverters start at \$49 to receive. We stock antennas, modules and everything you need for ATV. Prices include UPS surface in cont. US. Transmitting equipment sold only to licensed Tech class or higher amateurs verifiable in 85 callbook or copy of new license.

1986 CALLBOOK SUPPLEMENT, \$9. Both Callbooks & Supplement, \$44. Callbooks only; either, \$20; any two or more, \$18 each. Postpaid U.S. Elsewhere, add \$3/item. Century Print, 6059 Essex, Riverside, CA 92504-1566. 714-687-5910.

**DX ANTENNAS FOR 160 - 10 METERS!** Small size, broad-band, high performance. Also many antenna parts, Beverage insulators, wire and cable for do-it-yourself amateurs. Low prices, fast service. SASE for catalog. W1FB, Oak Hills Research, POB 250, Luther, MI 49655.

**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 Comprehensive Index. Only \$4 postpaid with Rebate Certificate creditable toward Newsletters purchases. Includes famous Fox-Tango Greensheet and Filter information for your rig (if specified). N4ML, FTC, Box 15944, W. Palm Beach, FL 33416. Telephone: 305-683-9587.

**NEEDED: DRAKE 4-NB Noise Blanker**, Gordon Moss, 1221 Formosa Ave., Los Angeles, CA 90046. 213-851-2262.

**MADISON-BELDEN 8214** lowloss foam coax \$31/100 ft; only 100' multiples at this price; 9913 lowloss, solidcenter, foil/braid shield 504/ft; 8267 RG213 654/ft; 9258 RG8X 206/ft. Belden specs available. Amphenol PL259 silverplate \$1.25; adapters stock; Prices FOB Houston, TX 77004. 1-713-520-7300 Mastercard/VISA/COD.

**WANTED: BC1000A/SCR300A, BC610**, also schematic copy, for Air Champ one-tube & 2 tube receivers. Buddy Herring, 1310 Andover Rd., Charlotte, NC 28211. 704-366-6500 evenings.

**CANADIANS - Want Mint Collins KWM-2 and 75S-3C.** VE5VX 306-652-6328.

**WANTED: KWM-2A, 30S and 30L Linears.** Any Condition. Send information to: M. Gonzales, 3737 Red Cedar, Harvey, LA 70058.

**WANTED: REMOTE VFO, Drake RV7 or RV7S.** K8SL, Rolf, POB 51174, Raleigh, NC 27609.

**IBM COMPUTER program "Hamlog"** 15 modules; logs, auto-sorts 7-band WAS/DXCC. Full feature editing. Much more. \$24.95. KA1AWH, PB 2015, Peabody, MA 01960.

**WANTED: ASTATIC Microphone Model 10DA-500.** Call collect, 904-249-0483, K4PPY.

**TRADE OR SELL:** Have two Alpha 77 Amplifiers in fine condition with fresh 8877 in each. Trade both on Alpha 778X (two tube) or sell for \$2500, each. Chris NQ6Q 408-372-4348 collect.

**CQ CONTEST: VHF'ers and contesters everywhere** are invited to join in the fun of the 2nd annual CQ World-Wide VHF WPX Contest, scheduled for July 19-20. 8 categories of competition, including QRP, portable/hilltop and FM only! If you're equipped for the bands above 50 MHz, get out in the sun and have fun in this international operating event. Logs/entry sheets available for free (S.A.S.E. appreciated) from SCORE, P.O. Box 1161, Denville, NJ 07834 or from CQ Magazine. Rules in QST "Contest Corral" and other leading journals.

**COLLINS 180S-1 1 Kw Antenna Tuner** with Shockmount. New/never-used (Round) \$300. DL-1 Dummy Load (Round) \$60. Directional Coupler and SWR meter for 312-B4/B5 (new) \$40. N.Y.C. area. Dengel 212-884-7084.

**TEMPO ONE, AC/One, mic, fan, new finals, manuals.** \$225. You ship. N0EFG, Independence, IA 319-334-2182 evenings.

**WANTED: The following equipment on VHF-High, UHF or 800 MHz:** Repeaters: MSF-5000, MX3000, MICOR, MASTR-II, "MSY". Portables: STX, MX, MX300T, MX300S, Expo. Mobiles: Syntor-X, Syntor, Mitroc, Privacy-Plus 1000. Pagers: PC-50-TVD, Spirit. Misc: Dyna-Tac 8000, Dyna-Tac 6000, 1/4 kW Micor or MASTR-II Repeater. Call Chuck, N8CAM, 303-632-8413.

**APPLE COMPUTER program, "Hamlog"** 15 modules; logs, auto-sorts 7-band WAS/DXCC. Full feature editing. Also CP/M. \$14.95. KA1AWH, PB 2015, Peabody, MA 01960.

**ATTENTION AMATEURS!** Send for Free Discount Catalog. Amateur Communications, 2917 Vance Jackson, San Antonio, TX 78213. 513-734-7793

**WANTED: VFO - Matching VFO for Knight T-60 transmitter** with manual. Chuck WB8THK, 616-846-4052, 15150 Leonard Rd., Spring Lake, MI 49456

**BEAM HEADING CHART, 10 page report** in binder with 9 data fields calculated from your exact QTH to over 540 DX locations. \$9.95 from John Daley, KB6JGH, P.O. Box 4794, San Jose, CA 95150.

**WANTED: Drake R4C, T4XC AC4, MS4 - Must be MINT - Absolute Perfect Original Condition - No Modifications.** (Brand new) Very late serial numbers - Chuck, WB8THK 616-846-4062; 15150 Leonard Rd., Spring Lake, MI 49456

**CALIF. HIGH SIERRA Mountain Retreat** For Rent in Arnold, with Antennas, 2-30 Meters. Day or weekly rates. Send SASE for details. Don, N6KGE, 4690 N. Clubhouse Drive, Camarillo, CA 93010 or call 805-485-2718.

**COLLINS KWM-2, round emblem, very late serial number** with PM-2 AC Supply, MM-1 microphone and CC-2 case. Very good condition, unused since tune up. \$350. WA1CPU, 203-774-5005 evenings.

**SWAN 270, 10-80 meters \$150.** SB-610 Monitor Scope, factory calibrated \$90. Palomar Preamp - P310X \$65. TENTEC 227 Ant. Tuner \$35. DX-160 Receiver \$70. Bill Orris, 4821 Edgewood Hills, Rockford, IL 61108 815-398-9921

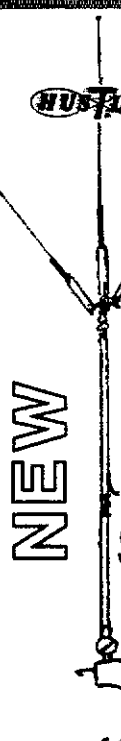
**CODE SKILLS can be learned or improved** using AI4J's two courses: Novice (0-10 w.p.m.) or Upgrade (10-22 w.p.m.). Upgrade course includes 10 V.E.-style exams. Used by individuals and clubs with proven results. Booklet and two c-120 cassettes provide nearly 4 hours of systematic practice. Send \$16.50 plus \$1.50 P.&H. (N.C. residents add .81 sales tax) to Gary J. Ambert, 209 Lewis St., Greenville, NC 27834. SASE for full details.

**MUST SELL Kenwood TS-940S/AT w/CW filters, absolutely mint.** \$1450. Daiwa CN-520 wattmeter, \$45. Heath 5-position remote coax switch, unbuil, \$75. N6OP, 1486 20th Avenue #1, San Francisco, CA 94122

# antennas

**H. C. Van Valzah Co.**  
Downers Grove, IL 612/852-0472

NEW



## System 400

**\$119.95**

Power Rating 400W SSB

RM-10	11.25
RM-15	11.25
RM-20	14.95
RM-40	17.50
BM-75	18.50

BM-1 Bumper Mount 14.95  
R22-2 Res. Spring 7.95  
3 Res. Adapter 5.95  
MO-1 or MO-2 Mast 20.95

System prices include  
5 resonators + 4 Access

## System 1000

1KW SSB	\$159.95
RM-10S	16.50
RM-15S	16.75
RM-20S	20.95
RM-40S	24.50
RM-75S	35.95

System components are available individually at prices shown. We stock Hustler parts. Call us.

## HF MOBILE ANTENNAS

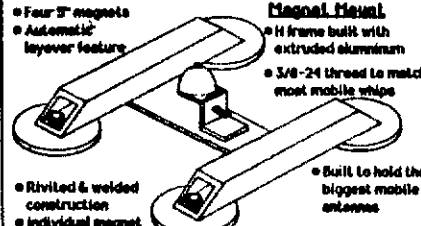
- Four 3" magnets
- Automatic layover feature
- Riveted & welded construction
- Individual magnet level adjustments

**The "Four Footer"**


**Magnal Hexal**

- H frame built with extruded aluminum
- 3/8"-24 thread to match most mobile whips
- Built to hold the biggest mobile antennas

**\$89.95** Add \$3 for shipping



The best antenna mount made! 3/8"-24, 50-239, 5/8 Hole



HWM-1

15.00

## WELZ METERS

SP350 1.8-500MHz 200W	104.95
SP600 1.6-500MHz 2000W	179.95
SP220 1.8-200MHz 200W	59.95
SP10X 1.8-150MHz 200W	43.95
SP380 1.8-150MHz 500W	92.95

TO ORDER CALL

## 1-800-HAM 0073

**H. C. Van Valzah Co.**  
1140 Hickory Trail  
Downers Grove, IL 60515

*Satisfaction Guaranteed*

Radio School

## VOLUNTEER EXAMINATION TAPES N BOOKS

---

**THE COMPLETE NOVICE**  
2 TAPES & 2 BOOKS FOR THEORY PLUS 4 TAPES FOR LEARNING CODE PLUS A PRACTICE CW OSCILLATOR SET AND ALL EXAM PAPERWORK INCLUDING A TEST PACKAGE FOR YOUR EXAMINER. THE WORKS!  
**49.95**

---

**NOVICE CODE COURSE**  
4 TAPES, STEREO CODE COURSE FOR LEARNING THE CODES FROM SCRATCH PLUS A DELUXE CW OSCILLATOR SET.  
**39.95**

---

**NOVICE THEORY CLASS**  
2 STEREO TAPES 2 BOOKS FOR THEORY COURSE INCLUDING 5WPM CW PRACTICE EXAM & EXAMINER'S PACKET FOR THE TEST, INCLUDES FCC RULEBOOK TOO!  
**19.95**

---

**THE COMPLETE GENERAL**  
4 TAPES & 2 BOOKS FOR THEORY PLUS 6 TAPES STEREO CODE SET FOR CW SPEED BUILDING 5 WPM TO 13 WPM + 1 PLUS ALL FCC PAPERWORK THE WORKS!  
**49.95**

---

**GENERAL CODE COURSE**  
6 TAPE STEREO CODE COURSE FOR CW SPEED BUILDING FROM 5 WPM TO 13 WPM  
**39.95**

---

**TECHNICIAN THEORY CLASS**  
4 TAPE STEREO THEORY PLUS FULLY ILLUSTRATED THEORY BOOK AND FCC RULEBOOK.  
**19.95**

---

**THE COMPLETE ADVANCED**  
4 TAPES & 2 BOOKS FOR THEORY PLUS 6 TAPES STEREO GENERAL CODE EXTRA CLASS CODE COURSE SPECIFY WHICH 2 TAPES YOU WANT.  
**49.95**

---

**ADVANCED THEORY CLASS**  
4 TAPE STEREO THEORY PLUS FULLY ILLUSTRATED THEORY BOOK & FCC RULEBOOK.  
**19.95**

---

**THE COMPLETE EXTRA**  
4 TAPES & 2 BOOKS FOR THEORY PLUS 6 TAPES STEREO CODE SET FOR CW SPEED BUILDING 13 WPM TO 20 WPM + 1 INCLUDES ALL VEC AND FCC PAPERWORK!  
**49.95**

---

**EXTRA CODE COURSE**  
6 TAPE STEREO CODE COURSE FOR CW SPEED BUILDING FROM 13 WPM TO 20 WPM + 1  
**39.95**

---

**EXTRA THEORY CLASS**  
4 TAPE STEREO THEORY PLUS FULLY ILLUSTRATED THEORY BOOK AND FCC RULEBOOK.  
**19.95**

---

**INDIVIDUAL CODE TAPES**

• 5 WPM NOVICE QSO TEST PREP. TAPE	3.95
• 5-7 WPM SPEED BUILDER	9.95
• 7-10 WPM SPEED BUILDER	9.95
• 10 WPM PLATON BREAKER QSO'S	9.95
• 10-12 WPM SPEED BUILDER	9.95
• 12-15 WPM CALLS & NUMBERS SPEED BLD.	9.95
• 15-15 WPM RANDOM CODE PRACTICE	9.95
• 13 WPM GENERAL QSO TEST PREP. TAPE	9.95
• 13-15 WPM SPEED BUILDER	9.95
• 15-17 WPM SPEED BUILDER	9.95
• 17-19 WPM SPEED BUILDER	9.95
• 20-22 WPM RANDOM CODE PRACTICE	9.95
• 20- WPM EXTRA QSO TEST PREP. TAPE	9.95

SLOW CODE TAPES USE 13 WPM CHARACTER SPEED. WE SHIP FIRST CLASS MAIL SAME DAY. ADD 4.00 POSTAGE & HANDLING ON TIRE SETS. ADD 1.00 POSTAGE & HANDLING ON AGILE TAPES. 100% SATISFACTION OR YOUR MONEY BACK.

---

**GORDON WEST RADIO SCHOOL**  
2414 COLLEGE DR., COSTA MESA, CA 92626

**Mon.-Fri. 10-4pm (714) 549-5000**

CALL TOLL FREE FOR QUOTES

# TNT RADIO SALES INC.

1-800-328-0250

1-612-535-5050

(IN MINNESOTA-COLLECT)

## EXPLOSION OF NEW EQUIPMENT VALUES!

ICOM KENWOOD  
 KANTRONICS  
 MIRAGE  
 AEA  
 SANTEC  
 KDK  
 NYE VIKING  
 WELZ  
 LARSEN BUTTERNUT  
 TELEX HY-GAIN  
 HUSTLER  
 KLM  
 ROHN  
 MFJ  
 AMERITRON  
 BENCHER

**CALL NOW!**  
**1-800-328-0250**  
 FOR ABSOLUTE  
**LOWEST PRICE BUSTERS!**

**BEFORE YOU BUY FROM A WAREHOUSE**

## CHECK US OUT FIRST!

(WE HAVE THE BEST SERVICE IN THE INDUSTRY)

**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)

**ANTENNA And TOWER ACCESSORIES HOT DIPPED GALVANIZED**

**MAST ADAPTERS**

- MA-2 \$22.50
- MA-3 \$29.50

**BEAM MOUNT**

- BM-1 \$29.50

**STANDOFFS**

- SO-1 \$34.50

- PO-1 Pully Kit \$8.50

- SO-2 \$64.50

- SO-3 Commercial Antenna Standoff \$99.50

- Ginpole Kits GP-81 \$129.50
- GP-51S \$139.50
- BG-18 Ladder Mast \$249.50



Request our **FREE Y-3 Catalog** for new springtime accessories. See you at Dayton 86 Booth #53.

**IIX EQUIPMENT LTD.**  
 P.O. Box 9 Oaklawn, IL 60454  
 (312) 423-0605

Only the genuine has these trademarks

## Spider Antenna

U.S. Patents 4349825, 4460896

They are your assurance of quality and performance

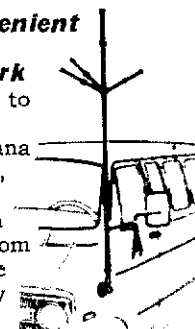
**Is Factory Pre-Tuning Good? No—it Just Does Not Work!**

Every HF mobile installation has its own characteristics, and the antenna must be tuned to fit them. Only the Spider™ Antenna with its *patented tuning sleeves* can be tailored by the user to fit his own requirements. If the antenna is later moved to a different installation, the Spider™ can always be re-tuned as needed.

**Beware of Cheap Imitations!**

**The Most Convenient Antenna for Mobile Work**

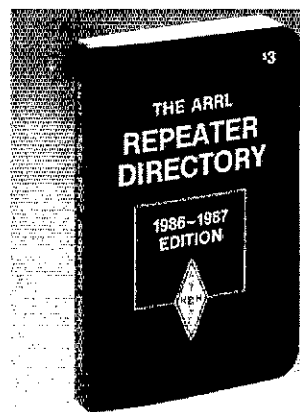
No more stopping to change coils. Once the Spider™ Antenna is tuned for 10, 15, 20 and 40 (or 75) meters, just switch your transceiver from band to band—the antenna will follow by itself.



We Have No Dealers—Order Direct

**MULTI-BAND ANTENNAS**

7131 OWENSMOUTH AVENUE, SUITE 363C  
 CANOGA PARK, CALIF., 91303  
 TELEPHONE: (818) 341-5460



**THE HOT ONE!**

Acceptance of our new pocket-sized 1986-87 Repeater Directory has been phenomenal! There are 10,321 listings in the same size type as in previous editions. The 15th edition, copyright 1986 is \$3. Please add \$2.50 for shipping by parcel post or \$3.50 for UPS or available from ARRL dealers.

THE AMERICAN RADIO RELAY LEAGUE  
 225 MAIN ST.  
 NEWINGTON, CT 06111



CALL TOLL FREE FOR QUOTES

# TNT RADIO SALES INC.

1-800-328-0250

1-612-535-5050

(IN MINNESOTA - COLLECT)

## USED GEAR EXPLOSION! Dynamite Values To Make Room For Your Trade-Ins!

### HAND HELDS:

Accel  
Pcs-300 \$179  
Icom  
IC-44t w/PL tones \$199  
Kenwood  
TR-2500 \$199  
TR-5600 \$249  
Santec  
HT-1200 \$110  
Tempe  
S-4 \$185  
Yaesu  
FT-200R \$199  
FT-700R \$199  
FT-802R \$99  
Accessories for all  
HT's—Call!  
**METERS**  
Icom  
IC-47A \$335  
Azden  
PCS-4000 \$199  
Icom  
IC-745 \$645  
IC-730 \$475  
Kenwood  
TR-7950 \$279  
TR-7625 \$189  
Standard  
Horizon/2 Crystal \$99

### HF RIGS

Collins  
312-84 \$169  
755-1 \$325  
R-388 \$299  
Drake  
R4A w/H54 \$179  
TR-4 \$289  
9NT \$75  
Z-C w/Q multiplier  
(90Q) \$149  
Heathkit  
DX50B w/HG108  
VFO \$75  
HW-8 w/PS and  
RIT \$149  
HR-1680  
w/speaker \$149  
SB10A w/PS \$225  
SB430 \$69  
SB630 \$99  
Icom  
IC-740 \$695  
IC-745 \$645  
IC-730 \$475  
IC-701 \$399  
Kenwood  
TS-1305E \$469  
TS-430 \$375  
TS-1805 \$499

### TS-830 New Finals Fox

Tango Filters \$749  
TS-820 \$499  
TS-1205 \$369  
TS-320 \$369  
TS-320SE \$429  
R-1000 \$299  
Ten-Tec  
Omni-D Series B \$499  
w/SSB filter, CW filter/  
NB & WARC w/Triton  
ICS/PS \$299  
Corsair PS \$949  
Omni-D w/PS \$499  
Yaesu  
FT-901 DM \$599  
FRG-7700 w/mem \$399  
FT-201D w/spkr PS \$499  
FT-101E \$389  
FT-101F w/YO  
\$44A \$439  
FTY-250 \$199  
**ANTENNA TUNERS**  
NVE-MB-II \$300  
Kenwood  
AT 120 \$89  
AT 200 \$129  
Heath  
SA 2640 \$169

### VFOs

DPC-230 \$89  
Kenwood  
VFO-120 \$109  
VFO-240 \$105  
VFO-230 \$229  
Yaesu  
FV-101Z \$199  
FV101B Con Special \$89  
Ten-Tec  
Omni VFO \$99

### SPEAKERS

Yaesu  
101 \$29  
**MICROPHONES**  
Astatic  
D104 w/Gooseneck \$49  
Collins  
SM-280 \$69  
Icom  
SM-6 \$29  
Kenwood  
MC-60 \$49  
Realistic  
33-914 \$25  
Ten-Tec  
215P \$29

### MISCELLANEOUS

NVE 2 meter SWR \$99  
AEA RT-2 \$99  
AEA MM-2 \$129  
Datong  
FL-1 Filter \$89  
HAL  
ST-6 \$149  
Heathkit  
HD-18 Phone patch \$25  
Kenwood  
PC-1 \$45  
2KW mobile gen. \$209  
Nantronics  
LITU-XT \$365  
Interface \$79  
M&M Elec. MSB-1 \$69  
Mr. RTTY \$100  
Swan FP-1 Phone  
Patch \$29

### POWER SUPPLIES

Astron  
RS-12A \$50  
Icom  
IC-PS-20 \$109  
IC-PS-30 \$179  
Heathkit  
HWA-2036-3 \$25

### Micronta

3 Amp \$29  
Vista III  
3 Amp Reg \$25  
Yaesu  
FP-4 4 Amp Reg \$39  
**SOFTWARE**  
AEA  
CFI-20  
MBA Text C-44 \$35  
Nantronics  
Ham Soft TI-99 \$45  
Ham Soft VIC/20 \$25  
AMIOsoft \$45  
Apple Hamtext \$45  
C-64 Hamtext \$45  
MicroLog  
AIR ROM \$35  
Contact  
80 \$100

### LINEAR AMPS

HF Homebrew  
40-80-160 (813) \$249  
KLM AA30-140 no  
preamp \$119

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)

here is the next generation Repeater

## MARK 4CR

The only repeaters and controllers  
with REAL SPEECH!

No other repeaters or controllers match Mark 4 in capability and features. That's why Mark 4 is the performance leader at amateur and commercial repeater sites around the world. Only Mark 4 gives you Message Master™ real speech • voice readout of received signal strength, deviation, and frequency error • 4-channel receiver voting • clock time announcements and function control • 7-helical filter receiver • extensive phone patch functions. Unlike others, Mark 4 even includes power supply and a handsome cabinet.

Call or write for specifications on the repeater, controller, and receiver winners.

Create messages just by talking. Speak any phrases or words in any languages or dialect and *your own voice* is stored instantly in solid-state memory. Perfect for emergency warnings, club news bulletins, and DX alerts. Create unique ID and tail messages, and the ultimate in a real speech user mailbox — only with a Mark 4.



**MICRO CONTROL SPECIALTIES**

Division of Kendecom Inc.

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

# RADIO & TELECOMMUNICATIONS ENGINEERS AND TECHNICIANS

# GRANDFATHER DEADLINE

\*Grandfather period expires December 31, 1985.



The National Association of Radio and Telecommunications Engineers, Inc.  
A Non-Profit Organization

- The Federal Communications Commission has discontinued certain testing and licensing of Commercial Radio Technicians and Engineers, and "Encourages its licensees to have their equipment serviced by industry certified Technicians" (FCC PN 85-133).
- The Federal Communications Commission has authorized organizations such as NARTE to institute testing and certification programs. (Docket No. 83-322, 49 Fed. Reg. 20658 (1984).

NARTE has:

- Reinstated and expanded certification classifications . . . 1st, 2nd, 3rd and 4th.
- Persons presently licensed by the FCC may be grandfathered, **by application**, without examination.
- Certain persons never licensed by the FCC may be certified by NARTE, without examination, by meeting specific requirements during the Grandfather Period.
- NARTE offers **an ideal** Certification Program which provides the certification vehicle for Technicians and Engineers to move across all areas of Radio and Telecommunications.
- NARTE's certification is recognized by THE AMERICAN SOCIETY OF CERTIFIED ENGINEERING TECHNICIANS (ASCET).

## ENDORSEMENT SUBCATEGORIES

**NEW!**

### NON RF RADIATION ENDORSEMENTS

- Telephone Inside Plant
- Telephone Local Outside Plant
- Telephone Toll Outside Plant
- Switching Systems
- Traffic Engineering
- Multiplex Systems
- Wire Transmission Systems
- Lightwave Systems
- Administrative/Regulatory
- Computer Telecommunications
- ... and many more!

### RF RADIATION ENDORSEMENTS

- Radar Systems
- Satellite Systems
- Microwave Systems
- Millimeter Wave Systems
- Land Mobile Systems
- Scatter Systems
- Interference Analysis/Suppression
- Control Systems (Incl SCADA)
- Cellular Radio Systems
- LF, MF & HF Radio (Non Broadcast)
- Broadcast AM, FM & TV
- ... and many more!

CONTACT: NARTE - P.O. BOX 15029 - SALEM, OREGON 97309 - 503-584-3336

**NEW UPDATED PACKET PROGRAM Pak-Comm!** For your IBM PC and controller. Split and Scrolling Screens, AutoLineFeed, PopUp windows, ASCII, Binary, X-Modem file transfers, Macros, Disk/Printer logging, DOS shell. Lots of goodies. Write for information. Works any controller. \$49.95 + \$3 shipping. Kall & Associates, 2440 E. Tudor Rd., Suite # 138, Anchorage, AK 99507, 907-243-0133.

**SPRING CREEK, Nevada.** 2.3 Acres - Roads - Water - Electricity. Addendum to deed for Amateur Radio Tower and Antenna. \$9250. M. Stone - 408-443-1237

**CLIMBING BELTS.** Padded nylon web belt with adjustable length lanyard. Meets OSHA and ANSI specs. \$54.95 plus \$3 UPS. John Limbach, K8NN, Box 2263, Englewood, CO 80150.

**WANTED: KENWOOD VFO900** (External VFO for TS900) - Need in good condition. WB7RK, 1962 Pawnee, Okemos, MI 48864.

**APPLE SOFTWARE:** RTTY, AMTOR, CW, ASCII, Database for DXCC, WAZ, WAS, Logbook, QSL, Morse Practice, AMTOR for Apple IIC, SASE. K5HI, 2215 Goldsmith, Houston, TX 77030.

**FREE ADVERTISING** in our swap sheet! Sent First Class twice a month. Only \$6/year (24 issues). Blue Bargain Sheets, Box 69, Wilmar, MN 56201.

**COLLINS 30S-1** with pair spare 4CX1000A. Needs some work. KVM-2 with RF compressor \$1000 for pair. Joe Johnson, K3RF, Gettysburg, PA 717-334-2880

**SIGNAL-ONE Model CX7A.** Mint condition but receiver needs minor repair. \$800. Felix Puccio, W1VMM, 138 East Avenue, North Adams, MA 01247. 413-664-4835 between 6-7PM

**W6AM ESTATE Sale:** 75S3C (R) 2 filters + 32S3A (R), Perfect, \$1000. Telrex Rotator, 1,000 Ft-Lbs rot. torque, with 200 ft. control cable, \$1200. Nye MB-V Antenna Tuner, \$350. Asst. Meters, coils, etc. Jan D. Perkins, N6AW, 11942 Bos St., Cerritos, CA 90701.

**86-87 ARRL Repeater Directory.** SAVE \$1.50 shipping. Send \$4 total. Marshall Hill Enterprises, Bradford, NH 03221

**SELL - HEATH HR-1880 Receiver \$120.** Filters: crystal 3395KHz, 250 Hz & 2.1 KHz; Collins F45Z5 & F455FA21 \$30 each. Polaroid "R" Microwave RCVR (Pick up), TS-186D Frequency Meter: \$50. General Electronics 13C1 VHF Receiver: \$50. SB-34: \$125. Swap 75A4 SSB filter for CW filter. Charles King, 120 Miner St., Middletown, CT 06457.

**HI-MOUNT KEYING MECHANISM.** Finest most extensive line of hand keys, mobile keys, lmbic paddles. Write for free catalogue of all our communications products. SKYWAVE RADIO, Box Q-1, 943 Boblett, Blaine, WA 98230.

**MONTERRAT DXpedition** Low off-season rates. Details: VP2ML, Box 4881, Santa Rosa, CA 95402.

**REPLACE RUSTED antenna bolts** with Stainless Steel. Small quantities. Catalog \$1. Refundable. ELWICK, Dept. 598, 230 Woods Lane, Somerdale, NJ 08085.

**YAESU FT-902DM,** Keyer, FM, Mic, CW filter, excellent \$650. KK8B. 216-676-0910.

**KENWOOD R599A/T599A "TWINs",** 2 meter receiver converter, manuals \$300; AEA CP-1 interface, software for C-64, \$125 WQ4B, 404-931-2785.

**DRAKE 7077 Desk Mic,** Matches TR7, LIKE NEW, \$29. John Houser, P.O. Box 33, Casanova, VA 22017. 703-788-9529

**SELL: FT-102 YAESU Transceiver** and Yaesu YO-301 Monitorscope. Both excellent condition. Original cartons and immaculate manuals. Has 1.8 KHz SSB Filter. rig has three 6146 tubes in final. WARC Bands are standard, \$700/Pickup, \$750. I ship. Also, Heath SB-220 Amplifier Spare 3-500 tube and Ultimate Transmatch Antenna Tuner. Instruction books included. \$475 pickup only. Otis Freeman W2VSC, 518-368-3885 after 6 p.m. est.

**WANT HALLICRAFTER Receivers** SX-28-32-88 working or not, need parts. Also want antique shortwave receivers National, Grebe, etc. Russ Olmsted, K4UJZ, 608 West Thompson Lane, Murfreesboro, TN 37130. 615-893-5344

**IBM-PC RTTY/CW ComPrtty II** is the complete RTTY/CW program for the IBM-PC and compatibles. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in screen editor! 10,000 character transmit/receive buffers! Adjustable split screen display. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages. Now with WRU (simple mailbox). Ideal for MARS and traffic handling. Requires 128K PC, XT, AT, PCjr, PC-DOS, serial port, RS-232C T.U. \$65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 7373 Jessica Drive, North Syracuse, NY 13212.

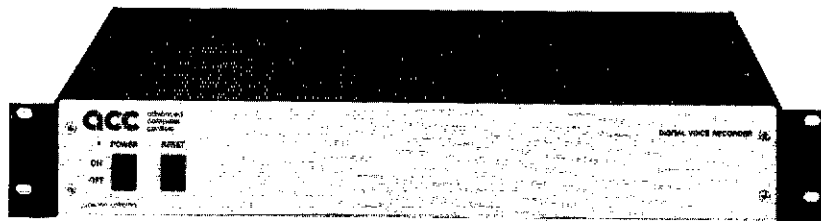
**PCIMS-DOS HAM SOFTWARE.** \$6.50 for Sample Disk and new catalog. Rockford Systems, 7474 Hessler, Rockford, MI 49341.

**ROSS'S NEW SPECIALS (July only):** Robot 450C \$669.90, 800H \$349.90, HY-GAIN HG-52SS (125-1) Tower \$1198.90. ICOM IC-02AT \$298.90, IC-490A \$509.90, IC-751 \$997.90. KENWOOD TS-940S \$1609.90, R-1000 \$399.90, TR-3500A \$249.90, TM-2650A \$379.90, TS-430S \$677.70, TS-780 \$759.90, VFO-120 \$139.90, YAESU FT-720RVH \$249.90, FT-757GX \$phone, FIG-7700 \$369.90, FRG-8800 \$479.90, FV-101DM \$269.90, SC-1 \$149.90, FT-720RH \$249.90, Over 7500 ham-related items, all major lines. Phone or send SASE for personal price quote. Mention ad. PRICES CASH, FOB PRESTON. We close at 2:00 Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263. 208-852-0830

**WANTED - SPAULDING (Rohn) AX series tower sections** (straight sections only). Need any two of sections AXS-7, AXS-6, AXS-5, AXS-4 or AXS-3. Bill, WYDB, Route 3, Box 267-H, Annandale, MN 55302. 612-274-5684

**KANTRONICS INTERFACE II** and Hamtext for VIC20. Excellent condition. Both for \$175. K2TSB: 609-693-0376

**INTERNATIONAL RADIO TS-430 Cascading Kit** including B pole 2.1 KHz filter and full instructions: \$47. WB7VOC. 602-298-4820



## The Digital Voice Recorder ... lets your repeater speak your mind.

ACC's Digital Voice Recorder allows you to remotely record your voice over the air, with digital storage in its huge memory array. PCM voice recording results in the highest possible fidelity, so that *you* sound like *you*.

The voice mailbox gives your repeater users computer bulletin-board like capability, from any radio with mic and Touch-Tone pad. With messages stored in voice, your users don't need special gear to enjoy the latest in communications technology, from anywhere.

Your repeater's IDs and other messages can consist of remotely recorded DVR audio tracks. Which can provide information to your users - about your system, club meetings, special events. And you can make your repeater the friendliest around, with holiday, birthday, and anniversary greetings. With its no compromise high quality PCM digital audio processing, even famous celebrities can sound like they're at your repeater site!

The DVR connects easily to your RC-850 or RC-85 controller. Or to your standalone repeater. And one DVR can support up to *three* repeaters, for a cost effective installation.

The Digital Voice Recorder is the neatest thing to happen to repeaters since ACC's repeater controllers. Request our audio demonstration tape, so you can hear for yourself.



advanced  
computer  
controls, inc.

10816 Northridge Square  
Cupertino, California 95014  
(408) 727-3330

## DURA-FLEX™ shock mounts silence spring-generated RF noise.



- **DURA-FLEX neoprene elastomer** significantly advances antenna shock absorption technology.
- **Eliminates RF noise** in duplex radio systems from metal-to-metal contact in conventional steel springs.
- **Drastically cuts whip vibration** which can damage or break antennas with steel springs on high-vibration vehicles.
- **Solid brass adaptors** molded into neoprene; braided totally isolated through center cavity.
- **Field-proven** against heat, cold, humidity and abrasion extremes.
- **Models** for roof, trunk or magnetic mounting. 2 meter, 220 MHz or UHF.

the antenna specialists co.



a member of **The Allen Group Inc.**  
12435 Euclid Avenue, Cleveland, Ohio 44106  
Canada: A. C. Simmonds & Sons, Ltd.

we design solutions.



# MIRAGE/KLM

REPEATER AMPLIFIERS

WANTED: SPEAKER-MIC for TR2400. K7FL 503-632-7140 (evenings)

ROSS' \$ USED JULY SPECIALS: Kenwood TS-520S \$389.90, TS-830S \$579.90, TS-180S/WDFC \$389.90, VFO-520 \$119.90, TS-520S \$359.90, YAESU FT-101E \$399.90, FT-620B/WCAL \$285.90, FR-101S & FL-101 \$399.90, ICOM IC-DV21 \$89.90, IC-DV21 \$89.90, IC-730FL30 \$469.90, IC-400A \$495.90. Phone or send SASE for used list. Over 200 used, 7,500 NEW ham items in stock. MENTION AD. PRICES CASH, FOB PRESTON. We close at 2:00 Saturdays & Mondays. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, ID 83263. 208-852-0830

WANTED: MOBILE AMP: 2 in 20 watt out 220 MHz - clean & reasonable. "T" Bruno, WA2AET, 48 Sheridan Avenue, Metuchen, NJ 08840. 201-548-9520

FOR SALE: Swan-250 6-meter with power supply, speaker and manual. \$150. 8 CMC radios VHF FM \$10 each. WD9FHY, 503 Linden Street, Leesport, PA 19633.

WANTED: COMPLETE STATION - Estate Sale - within 200 miles of NYC. Highest price paid and fast. Call or write listing equipment and condition. John Korona, 1117 Dewitt Terrace, Linden, NJ 07036. 201-486-0099

FOR SALE: HEATHKIT EE-3401 Microprocessor Course, EE-3402 Microprocessor Interfacing Course, ET-3400A Microprocessor Trainer, ETA-3400 Microprocessor Trainer Accessory with 3K Chip Set (unassembled). Cost \$700/Sell \$200. K5HVM, 512-435-2476

SB-102, CW FILTER, HP23B, Extra tubes \$175. Includes shipping. WB0GFY, 701-642-4278 evenings.

MONTANA QTH for sale. Lovely energy efficient Timberpeg home. 3 log barns, fences, 12 wooded acres, underground utilities. Finished radio room with separate power, coax entries. Very sheltered for antennas. House shielded for HF, HF, EME equipment and antennas optional. WA1JXN, Box 73, Frenchtown, MT 59934.

KWM-2, 18F-2: \$350. 75A4: \$300. SB-34: \$150. SB-2LA: \$300. TR-4: \$175. EIC0753: \$50. HF-200A Dentrone Transceiver: \$300. K8TFD, Ken: 313-543-4350

FOR SALE: C.W. Filter, new org. \$55 - only \$15. All FT-101 YAESU Series. "T" Bruno, WA2AET, 48 Sheridan Avenue, Metuchen, NJ 08840. 201-548-9520

KENWOOD TS-520E, MC-50, SP-230 \$450. Wilson Tri-band beam and Alliance rotor \$150. Everything in excellent condition. Tom, KCBMW, 4921 Broadway S.E., Cedar Rapids, IA 52403. 319-362-3357

MUST SELL. Everything as new - moving into Hi-Rise. ARGOSY 525D, CW Filter, Power Supply, Telex 460 Phones, 700C Mike, Bench Key, Macro-2 Keyer, Radio Shack 12V Regulated PS, JSR Antenna Tuner, MFJ 496 Keyboard (never used) - Doug Frick, Agent for WA3MXE, 6 West 9th, Pottstown, PA 19464. 215-323-1520

NEED CABINET for SB-200 Linear. Any reasonable condition. W3LRE, 49262 South Meadowbrook, East Liverpool, OH 43920. 216-386-4539

FOR SALE: R-392 Receiver - \$160, Standard Signal Model 80 RF Generator - \$160, VHF 5-Watt HT-220 - \$185, Kenwood FR-599D Hamband receiver - \$180, Teletype ASR-33 - \$75, KSR-33 - \$50, Midland 13-503 220 MHz Transceiver - \$160, Kantronics UTU - \$150 (new), Sony TCV2110A 1/2" reel-to-reel VCR less monitor - \$65, 73 Magazines 1976 to 1982 - \$125, QST 1976 to 1982 - \$125. Buyer pays shipping. WB4MYA Charles Wall, 533 Stratford Way, Clarksville, TN 37043. 615-552-2199

ICOM 745 Xcvr. List \$999, sell at \$585. External power supply \$85. Little used, new condition. W2FZR, 305-968-0803

HEATH SB300/400, Filters \$300. CDE antenna rotor TR-44 \$10. CDE direction control II/CD44 \$25. WB4ADM, 703-552-9257

ESTATE SALE: Ten-Tec 580 Delta HF Transceiver \$600. WAC-280, Heathkit IC-4550 Dual Trace Oscilloscope needs minor repair \$500, Drake UV-3 Tri-bander FM Transceiver 144-220-440 w/Regency Power Supply \$500, Bearcat 220 Scanner \$165 and many other items. From the estate of WBCVX, Telephone: 402-564-0334 after 4:30 p.m. cst or write to Louis Wielgus, 1415 Fifth Street, Columbus, NE 68601

FOR SALE: Kenwood TS-830S \$548.88, AT-230 \$98.88, TS700A \$248.88, TS700S \$348.88, YAESU FT-102 \$468.88. All mint with Manuals. F0B WSHE, 3035 Wilmette, Wilmette, IL 60091. 312-251-6364

HEATH SA-2060A Tuner, \$225, MFJ-406 Keyer, \$45, Bench Keyer, \$20. All mint. BVD, N7BFN. 206-939-6899

SELL CENTURY/21 Mint Manual DC Breaker, Calibrator, Keyer: \$250. Will UPS original carton. N0EMF 417-273-4487

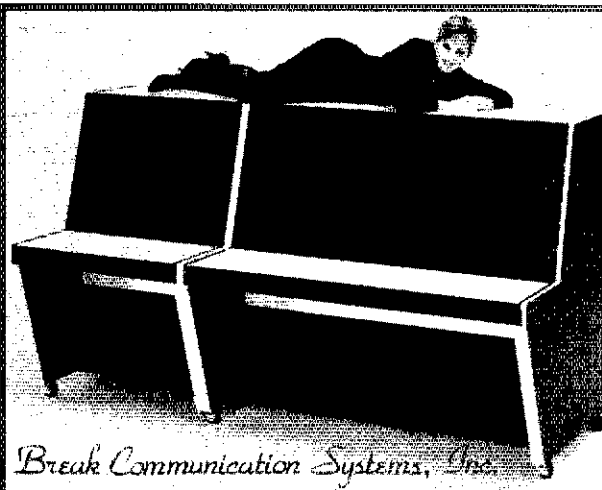
HEATHKIT HW-101, CW Filter, HP23B: clean, aligned, manuals. \$200. You ship. John, WB3ELI, 814-466-8025

WANTED: Meter for Gonsset GSB-100 transmitter. Gary Embler, 732 College Ave., Palo Alto, CA 94306. 415-424-1483

YAESU FT-301-D 500/200 CW Filters, FP-301 Power Supply, FV-301 VFO, YO-301 Monitor Scope, SP-301 Speaker (2 each), matching Power Meter, Mobile Mount, 2 Mics, Relay Box, TV-3300 LP filter, all cables/manuals package only. \$650 postpaid. KH6DX, 95-302 Kahikiniu Court #207, Mililani Town, HI 96789. 808-625-0438.

DRAKE TR-7 Transceiver s/voc. manual, PS-7 Power Supply, MN2700 Matching Network, MS-7 aux. speaker, 7077 mic. NYE SSK-1-K Keyer, HEATH Centenna, HM-102 SWR Meter, TRIONYX TR100 frequency counter. SANTEC ST-144 2 meter FM Handheld w/case, YAESU FT-207R 2 meter FM handheld w/case & PAZ Power Adapter, ICOM IC-255A 2 meter FM mobile w/Encoder Mic, TEMPO S-80 80 Watt, 2 Meter Amp. Submit bids to: Larry Madison, NADIE, Route 3, Box 3554, Smithbridge Rd., Blairsville, GA 30512.

KENWOOD VFO520S \$100, Kenwood transceiver 520SE \$400, Dentrone Clipperton-L Amplifier \$400, and Dentrone MT-3000A Antenna Tuner \$150. All for \$900. You pay shipping Fort Worth. 817-338-2953 W5SXW.



Break Communication Systems, Inc.

Custom Consoles Applications

- Personal
- Commercial
- Industrial
- Governmental

Available as Complete Systems ready to install your equipment or in "Do-It-Yourself" kit forms.

To learn more about the BCS Console system call Today for our FREE information package!

(305) 989-2371

5817 S.W. 21 Street Hollywood FL 33023

**\*QUALITY PARTS \*DISCOUNT PRICES**

**\*FAST SHIPPING!**

**ALL ELECTRONICS CORP.**  
905 S. VERMONT • P.O. BOX 20406 • LOS ANGELES, CA 90006

**SEND FOR FREE CATALOG... 48 PAGES!**

**10 AMP SOLID STATE RELAY**  
CONTROL: 3 - 32 vdc  
LOAD: 140 vac 10 amp  
SIZE: 2 1/2" x 3" x 1/2"

**\$9.50 EACH 10 FOR \$90.00**

**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

**COMPUTER GRADE CAPACITORS**

2,000 mfd. 200 Vdc 1 3/4" x 5" high \$2.00  
6,400 mfd. 60 Vdc 1 3/8" x 3 3/4" high \$2.50  
9,700 mfd. 50 Vdc 1 3/8" x 4 1/2" high \$3.00  
31,000 mfd. 15 Vdc 1 3/4" x 4" high \$2.50  
50,000 mfd. 40 Vdc 3" x 5 3/4" high \$4.50  
66,000 mfd. 15 Vdc 3" x 3 3/4" high \$3.00  
60,000 mfd. 40 Vdc 3" x 5" high \$9.50  
66,000 mfd. 15 Vdc 3" x 3 3/4" high \$3.00

**48 KEY ASSEMBLY**

NEW! 1 KEYBOARDS Originally used on computers, these keyboards contain 48 S.P.S.T. mechanical switches. Terminates to 15 pin connector. Frame 4" x 9" CAT # KP-48 \$5.50 each

**RECHARGEABLE NI-CAD BATTERIES**

AAA SIZE 1.25V 500MAH \$1.85  
AA SIZE 1.25V 900MAH \$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

**EDGE CONNECTORS**

**ALL ARE 1.56" SPACING.**

22/44 EDGE CONNECTOR PC style \$2.00 each  
22/44 EDGE CONNECTOR solder lug style \$2.50 each  
28/56 EDGE CONNECTOR PC style \$2.50 each

**D.P.S.T. LIGHTED ROCKER SWITCH**

115 vac lighted rocker snap mounts in 3/4" x 1 1/2" hole. Orange lens. 16 amp contact. \$1.50

**PHOTO-FLASH CAPACITORS**

170 mf 330v Three sizes available:  
75" ea. CAT# PPC-170  
400 mf 330v 1.00 ea. CAT# PPC-400  
800 mf 330v 1.35 ea. CAT# PPC-800

**MINIATURE TOGGLE SWITCHES**

S.R.D.T. (on-on) Solder lug terminals. \$1.00 each 10 for \$9.00  
S.R.D.T. (on-off-on) Solder lug terminals. \$1.00 each 10 for \$9.00

**ULTRA-MINIATURE 5 VDC RELAY**

Fujitsu # FR211NED005M20 High sensitivity COIL: 120 ohms \$1.25 each CONTACTS: 1 amp 10 for \$10.00 Mounts in 14 pin DIP socket

**TOLL FREE ORDERS • 1-800-826-5432**  
(IN CA: 1-800-258-6666)

INFO • (213) 380-8000  
TWX • 5101010163 ALL ELECTRONIC

Your Choice

**\$299.00**

Plus FREE UPS Brown Shipping. For Phone CODs add only \$1.90 NO CREDIT CARDS.

**SANTEC**

**The ST-20T**

For 2-Meters

**KDK**

**FM-240(NT)**

For 2-Meters

- Has a 24-hour clock
- Has two 7-digit autodialer memories
- A simple mod enables you to receive the 162 mhz weather channels

In addition - The ST-20T Has these other outstanding features:

- Memory channels
- Automatic standard or "Odball" offset and sub-audible tone program/mute per channel.
- Battery cover on squelch receiver
- Four modes of scan, including "Scanlock"
- A powerful 5-watts when operating on direct DC
- 5 and 3-1/2 watts with slide-on nicad battery pack
- Analog lighted "S" meter
- Lighted alpha-numeric LCD readout
- Simplified keyboard operation (No crib cards needed)
- 142-150.995 mhz

All handhelds are born with identical specifications. What are they capable of doing, and how easy it is to get them to do it. It's where Santec beats them all. Names mean nothing - what your HT will do - means something. The Santec ST-20T is something!

**Our Smallest, Most Versatile KDK Ever! You get all the Features at a much Smaller Price!**

It's Small - With Big Features

- 25-watts of power (5-watts in Low power)
- 16 memory channels plus one priority channel

FM-240 (With Sub-Audible Tones) . . . . \$329  
Voice Synth. Option . . . . . \$39  
FM-740 (440-Mhz Version) . . . . . \$349

See ENCOMM Ads in National Magazines for Details

**BATTERY PAKS** We have the new ST-600/83 nicad paks (400 mah) for your "ST" series Santec, also for HT-1200. Add \$1.00 UPS shipping

**\$29.00**

**FINAL 440 MHZ EQUIPMENT CLOSEOUTS!**  
These units are new factory sealed boxes, with full warranty.

KDK FM-7033 10 memories, icon, 10-watts, LCD readout 11 mile. more	Lim \$376 Closeout Priced <b>\$269.00</b>	SANTEC ST-442 10 Mem. scan, 20 program, 3 1/2 watts LCD readout, more.	Lim \$389 Closeout Priced <b>249.00</b>
---	---	---	---

Please add \$2.00 UPS Brown shipping Add \$1.90 for C.O.D. Calls

The Nation's Premier KDK & Santec Dealer!

**WILLIAMS RADIO SALES**

600 LAKEDALE ROAD, DEPT. S  
COLFAX, N.C. 27235

**(919) 993-5881**  
Noon to 10 P.M. EST

# NEW! Lower Price Scanners

Communications Electronics™, the world's largest distributor of radio scanners, introduces new lower prices to celebrate our 15th anniversary.

## Regency® MX7000-EA

List price \$699.95/CE price \$399.95/SPECIAL  
**10-Band, 20 Channel • Crystalless • AC/DC**  
Frequency range: 25-550 MHz, continuous coverage and 800 MHz, to 1.3 GHz, continuous coverage. The Regency MX7000 scanner lets you monitor Military, Space Satellites, Government, Railroad, Justice Department, State Department, Fish & Game, Immigration, Marine, Police and Fire Departments, Broadcast Studio Transmitter Links, Aeronautical AM band, Aero Navigation, Paramedics, Amateur Radio, plus thousands of other radio frequencies most scanners can't pick up. The Regency MX7000 is the perfect scanner to receive the exciting 1.3 GHz, amateur radio band.

## Regency® Z60-EA

List price \$299.95/CE price \$179.95/SPECIAL  
**8-Band, 60 Channel • No-crystal scanner**  
Bands: 30-60, 88-108, 118-136, 144-174, 440-512 MHz. The Regency Z60 covers all the public service bands plus aircraft and FM music for a total of eight bands. The Z60 also features an alarm clock and priority control as well as AC/DC operation. Order today.

## Regency® Z45-EA

List price \$259.95/CE price \$159.95/SPECIAL  
**7-Band, 45 Channel • No-crystal scanner**  
Bands: 30-50, 118-136, 144-174, 440-512 MHz. The Regency Z45 is very similar to the Z60 model listed above however it does not have the commercial FM broadcast band. The Z45, now at a special price from Communications Electronics.

## Regency® RH250B-EA

List price \$674.30/CE price \$329.95/SPECIAL  
**10 Channel • 25 Watt Transceiver • Priority**  
The Regency RH250B is a ten-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to ten frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH250 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A 60 Watt VHF 150-162 MHz, version called the RH600B is available for \$454.95. A UHF 15 watt version of this radio called the RU150B is also available and covers 450-482 MHz, but the cost is \$449.95.

## NEW! Bearcat® 50XL-EA

List price \$199.95/CE price \$114.95/SPECIAL  
**10-Band, 10 Channel • Handheld scanner**  
Bands: 29.7-54, 136-174, 406-512 MHz. The Uniden Bearcat 50XL is an economical, hand-held scanner with 10 channels covering ten frequency bands. It features a keyboard lock switch to prevent accidental entry and more. Also order part # BP50 which is a rechargeable battery pack for \$14.95, a plug-in wall charger, part # AD100 for \$14.95, a carrying case part # VC001 for \$14.95 and also order optional cigarette lighter cable part # PS001 for \$14.95.

## NEW! Scanner Frequency Listings

The new Fox scanner frequency directories will help you find all the action your scanner can listen to. These new listings include police, fire, ambulances & rescue squads, local government, private police agencies, hospitals, emergency medical channels, news media, forestry radio service, railroads, weather stations, radio common carriers. AT&T mobile telephone, utility companies, general mobile radio service, marine radio service, taxi cab companies, tow truck companies, trucking companies, business repeaters, business radio (simplex) federal government, funeral directors, veterinarians, buses, aircraft, space satellites, amateur radio, broadcasters and more. Fox frequency listings feature call letter cross reference as well as alphabetical listing by licensee name, police codes and signals. All Fox directories are \$14.95 each plus \$3.00 shipping. State of Alaska-RL021-1; State of Arizona-RL025-1; Baltimore, MD/Washington, DC-RL024-1; Buffalo, NY/Erie, PA-RL009-2; Chicago, IL-RL014-1; Cincinnati/Dayton, OH-RL006-2; Cleveland, OH-RL017-1; Columbus, OH-RL003-2; Dallas/Ft. Worth, TX-RL013-1; Denver/Colorado Springs, CO-RL027-1; Detroit, MI/Windsor, ON-RL008-3; Fort Wayne, IN/Lima, OH-RL001-1; Hawaii/Guam-RL015-1; Houston, TX-RL023-1; Indianapolis, IN-RL022-1; Kansas City, MO/KS-RL011-2; Long Island, NY-RL026-1; Los Angeles, CA-RL016-1; Louisville/Lexington, KY-RL007-1; Milwaukee, WI/Waukegan, IL-RL021-1; Minneapolis/St. Paul, MN-RL010-2; Nevada/E. Central CA-RL028-1; Oklahoma City/Lawton, OK-RL005-2; Orlando/Daytona Beach, FL-RL012-1; Pittsburgh, PA/Wheeling, WV-RL029-1; Rochester/Syracuse, NY-RL020-1; San Diego, CA-RL018-1; Tampa/St. Petersburg, FL-RL004-2; Toledo, OH-RL002-3. New editions are being added monthly. For an area not shown above call Fox at 800-543-7892. In Ohio call 800-621-2513.

## NEW! Regency® HX1200-EA

List price \$369.95/CE price \$214.95/SPECIAL  
**8-Band, 45 Channel • No Crystal scanner**  
Search • Lockout • Priority • Scan delay  
Sidelit liquid crystal display • EAROM Memory  
New Direct Channel Access Feature  
Bands: 30-50, 118-136, 144-174, 406-420, 440-512 MHz. The new handheld Regency HX1200 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 45 channels at the same time including the AM aircraft band. The LCD display is even sidelit for night use. Order MA-256-EA rapid charge drop-in battery charger for \$84.95 plus \$3.00 shipping/handling. Includes wall charger, carrying case, belt clip, flexible antenna and nicad battery.

## NEW! Bearcat® 100XL-EA

List price \$349.95/CE price \$203.95/SPECIAL  
**9-Band, 16 Channel • Priority • Scan Delay**  
Search • Limit • Hold • Lockout • AC/DC  
Frequency range: 30-50, 118-174, 406-512 MHz. The world's first no-crystal handheld scanner now has a LCD channel display with backlight for low light use and aircraft band coverage at the same low price. Size is 1 1/4" x 7 1/2" x 2 1/4". The Bearcat 100XL has wide frequency coverage that includes all public service bands (Low, High, UHF and "T" bands), the AM aircraft band, the 2-meter and 70 cm, amateur bands, plus military and federal government frequencies. Wow...what a scanner! Included in our low CE price is a sturdy carrying case, earphone, battery charger/AC adapter, six AA ni-cad batteries and flexible antenna. Order your scanner now.

## Bearcat® 210XW-EA

List price \$339.95/CE price \$209.95/SPECIAL  
**8-Band, 20 Channel • No-crystal scanner**  
Automatic Weather • Search/Scan • AC/DC  
Frequency range: 30-50, 136-174, 406-512 MHz. The new Bearcat 210XW is an advanced third generation scanner with great performance at a low CE price.

## NEW! Bearcat® 145XL-EA

List price \$179.95/CE price \$102.95/SPECIAL  
**10 Band, 16 channel • AC/DC • Instant Weather**  
Frequency range: 29-64, 136-174, 420-512 MHz. The Bearcat 145XL makes a great first scanner. Its low cost and high performance lets you hear all the action with the touch of a key. Order your scanner from CE today.

## TEST ANY SCANNER

Test any scanner purchased from Communications Electronics™ for 31 days before you decide to keep it. If for any reason you are not completely satisfied, return it in original condition with all parts in 31 days, for a prompt refund (less shipping/handling charges and rebale credits).

## NEW! Bearcat® 800XL-EA

List price \$499.95/CE price \$317.95  
**12-Band, 40 Channel • No-crystal scanner**  
Priority control • Search/Scan • AC/DC  
Bands: 29-54, 118-174, 406-512, 806-912 MHz. The Uniden 800XL receives 40 channels in two banks. Scans 15 channels per second. Size 9 1/4" x 4 1/4" x 1 1/2".

## OTHER RADIOS AND ACCESSORIES

Panasonic RF-2600-EA Shortwave receiver.....\$179.95  
RD95-EA Uniden Remote mount Radar Detector.....\$128.95  
RD55-EA Uniden Visor mount Radar Detector.....\$98.95  
RD8-EA Uniden "Passport" size Radar Detector.....\$239.95  
BC-WA-EA Bearcat Weather Alert.....\$49.95  
DX1000-EA Bearcat shortwave receiver SALE.....\$349.95  
PC22-EA Uniden remote mount CB transceiver.....\$99.95  
PC55-EA Uniden mobile mount CB transceiver.....\$59.95  
R1060-EA Regency 10 channel scanner SALE.....\$92.95  
MX3000-EA Regency 30 channel scanner.....\$198.95  
XL156-EA Regency 10 channel scanner SALE.....\$129.95  
UC102-EA Regency VHF 2 ch. 1 Watt transceiver.....\$124.95  
RH250B-EA Regency 10 ch. 25 Watt VHF trans.....\$329.95  
RH600B-EA Regency 10 ch. 60 Watt VHF trans.....\$454.95  
RU150B-EA Regency 10 channel UHF transceiver.....\$449.95  
P1405-EA Regency 5 amp regulated power supply.....\$69.95  
P1412-EA Regency 12 amp reg. power supply.....\$164.95  
MA256-EA Drop-in charger for HX1000 & HX1200.....\$84.95  
MA257-EA Cigarette lighter cord for HX1200.....\$19.95  
MA917-EA Ni-Cad battery pack for HX1200.....\$34.95  
SMMX7000-EA Svc. man. for MX7000 & MX5000.....\$19.95  
SMMX3000-EA Service man. for Regency MX3000.....\$19.95  
B-4-EA 1.2 V AAA Ni-Cad batteries (set of four).....\$9.95  
FB-EA Frequency Directory for Eastern U.S.A.....\$12.95  
FB-W-EA Frequency Directory for Western U.S.A.....\$12.95  
ASD-EA Air Scan Directory.....\$14.95  
SRF-EA Survival Radio Frequency Directory.....\$14.95  
TSG-EA "Top Secret" Registry of U.S. Govt. Freq.....\$14.95  
TIC-EA Techniques for Intercepting Comm.....\$14.95  
RRF-EA Railroad frequency directory.....\$10.95  
CIE-EA Covert Intelligence, Elect. Eavesdropping.....\$14.95  
A60-EA Magnet mount mobile scanner antenna.....\$35.00  
A70-EA Base station scanner antenna.....\$35.00  
USAMM-EA Mag mount VHF/UHF ant. w/ 12' cable.....\$39.95  
USAK-EA 1/4" hole mount VHF/UHF ant. w/ 17' cable.....\$35.00  
USATLM-EA Trunk lip mount VHF/UHF antenna.....\$35.00  
Add \$3.00 shipping for all accessories ordered at the same time.  
Add \$12.00 shipping per shortwave receiver.  
Add \$7.00 shipping per scanner and \$3.00 per antenna.

## BUY WITH CONFIDENCE

To get the fastest delivery from CE of any scanner, send or phone your order directly to our Scanner Distribution Center. Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically unless CE is instructed differently. A \$5.00 additional handling fee will be charged for all orders with a merchandise total under \$50.00. Shipments are F.O.B. Ann Arbor, Michigan. No COD's. Most products that we sell have a manufacturer's warranty. Free copies of warranties on these products are available prior to purchase by writing to CE. Non-certified checks require bank clearance. Not responsible for typographical errors.

Mail orders to: Communications Electronics™, Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add \$7.00 per scanner for U.P.S. ground shipping and handling in the continental U.S.A. For Canada, Puerto Rico, Hawaii, Alaska, or APO/FPO delivery, shipping charges are three times continental U.S. rates. If you have a Visa Master Card or Discover Card, you may call and place a credit card order. Order toll-free in the U.S. Dial 800-USA-SCAN. In Canada, order toll-free by calling 800-221-3475. WUI Telex anytime, dial 671-0155. If you are outside the U.S. or in Michigan dial 313-973-8888. Order today.

Scanner Distribution Center™ and CE logos are trademarks of Communications Electronics Inc.

† Bearcat is a registered trademark of Uniden Corporation.  
‡ Regency is a registered trademark of Regency Electronics Inc. AD #051586-EA/2

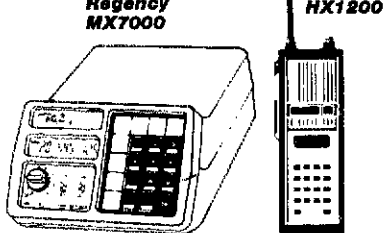
Copyright © 1988 Communications Electronics Inc.

For credit card orders call  
**1-800-USA-SCAN**

**COMMUNICATIONS ELECTRONICS INC.**

Consumer Products Division

P.O. Box 1045 □ Ann Arbor, Michigan 48106-1045 U.S.A.  
Call 800-USA-SCAN or outside U.S.A. 313-973-8888



COMMODORE VIC-20 - with 16K expander cartridge, Commodore Datasette tape drive, VIC FORTH cartridge, VIC Modem and terminal software, joy stick and miscellaneous games and ham programs \$60. Contact Bruce Hale, KB1MW, at ARRL Hq., 225 Main Street, Newington, CT 06111 or call 203-666-1541 ext 279 from 8 am to 4 pm EDT.

SALE: SB401 with Xtal Pack, New filters \$100. HW-7 mint \$25. 20A - \$25 Harper, Route 3, Box 283, Easton, MD 21601.

R390A Receiver. Cabinet, manual, no mods. Excellent. \$200 I'll pack, you pay freight. HP-230C. GF1840A power meters. Make offer. Many old Hider and Sams manuals. Send for list. NK5C, Box 1796, Pasadena, TX 77501.

COMPUTER PROGRAMS for the Commodore Antenna Design, Morse Instruction, logging, others. SASE for brochure. Uncle Bill's Software, Box 2403, Falls Church, VA 22042.

DATONG FL-1 Freq Agile Audio Filter \$100. Autek Research MK-1 Memory Keyer \$50. 4-400A \$20. VHF Engineers 140/10 2M Amplifier \$75. Drake TV-3300 LP filter, Postpaid. KH6DX 95-302 Kahukini Court #207, Milliani Town, HI 96789. 808-625-0438

SELL: HEATH SW-7800 Shortwave Synthesized Receiver \$200. W1GWA, Dennis Bird, 90 Brooklawn Ave., Bridgeport, CT 06604-2010 203-334-4837

POWER LINE Or Electrical Noise Problems? Learn causes and cures from former power company technician. \$3.50. John W. Spence AC5K, Dept. QST, 465 Creekwood Drive, Silsbee, TX 77656.

TEN-TEC ONM1D Xcwr w/500 Hz filter & 10 MHz mod. \$395.; Ten-Tec 243 VFO \$89. NG7Y, 503-389-5883

IC-751 with PS-35, First and second 500 Hz filters, \$900. WA9YNE, 4144 Virginia St. Fairfax, VA 22032, 703-352-2024

SELL IC-271A: 25 watt 140-150 MC FM, SSB, CW transceiver. Excellent condition, \$500. Bob Carter, 301-373-5183

WANTED - ANY 220MHz crystal transceiver. Tom Berne, W6TAG, 2057 Redcliff St., Los Angeles, CA 90039 313-665-6289

VFC CODE TESTS (26), plus random groups plus 1200 words, 5-35 WPM. C-64 Disk. \$5.95 postpaid. Bill Fisher, Barnard Road, Armonk, NY 10504.

KENWOOD R-1000 Gen. Coverage Rcvr. \$295. NG7Y, 503-389-5883

HOUSE HAMREADY - Beautiful hillside one family ranch Staten Island, NY 10314: \$149,900. KA2AAY, 718-273-6551

HY-GAIN TH3-MK3 TRIBANDER, CDR TR-44 Rotator, 30 foot tower, \$350. John Houser, P.O. Box 33, Casanova, VA 22017. 703-788-9529.

WANTED: HAM CAR Tags—Idaho, Missouri, Nevada, New Jersey, Oregon, Utah, DC, most Canadian. Buy or trade. Willard Prentice, W3VBM, 2419 Chetwood Circle, Timonium, MD 21093

DIGITAL EQUIPMENT CORPORATION - PDP-8/L Computer, Keyswitch front Panel, 4K Core Memory ? \$85. Dave, W1DWZ 617-378-3619

CRYSTALS: Build something! QRP, quick and easy with inexpensive FT-243 crystals. All bands FT-243's 160M to 2M made to order. See page 171 May classified. "Crystals Since 1933." Stamp or long SASE for 1700 - 60,000 kilocycles, listings-circuits. Special-Unused 203As - \$9.95 + \$2.40 postage. W4LPS, C-W Crystals, Marshfield, MO 65706.

SELL: IC-745, PS35, FL45, FL52A, FM, HM12, \$800; IC37, \$275; Clegg Venus (6m), \$85; Spare Venus chassis \$20; 4-125 new \$20; 4CX300 w/socket \$50, \$894 new \$25; TR2200, \$85. W3IY, 703-430-1968.

FOR SALE - Drake R4B & T4XB with matching power supply and speaker with enclosure and all manuals, Heath SB-220 Linear with ten meters built-in, a Murch UT-2000 tuner, Heath monitor scope, MFJ Grandmaster keyer, Bencher paddle, MFJ Delux Preselector, Heathkit Wattmeter and Homebrew Speech Processor. An entire station for \$1000. Will NOT ship. Call Phil Sydell - telephone: 201-379-6990 evenings after 7:30.

CONTENTS - SHACK - LIST - SASE - WB2EUF - Box 708 - East Hampton - NY - 11937.

EIMAC 4CX1000A/8168, brand new, guaranteed, with spec sheets, Postpaid, \$275. Dave, W1DWZ, 617-378-3619

PROP PITCH MOTOR, nearly new condition, used five gears. W5DHO, Box 83, Windham Center CT.

HEATH SB-102 Transceiver, SB-600 Power Supply, Frequency Display \$300. SB-200 Linear \$300. Kenwood HT TR-2400 \$200. Al, WA2TZH, 323 Commonwealth Avenue, Trenton, NJ 08629. 609-392-6203

MINT CORSAIR (560) Mic and HB supply \$600. Joe Magnan, KD0K, 3558 Third St. N.E. Minneapolis, MN 55418. 612-456-2525/612-781-0223.

HAM - ID'er - lets you quickly identify call vs. name and other info. Use for Repeaters, Nets, Schedules, Hamfests. For stock or mobile. 32-page spiral bound. Holds 2,240 entries. Satisfaction guaranteed. Send \$6.50 (includes postage) for each copy to K4LDI, 2920 Shillingford Court, Marietta, GA 30067

4 x 4 Chaverim EL-AL October 1986 Tour. W3QXT: 215-676-6769

DRAKE TR4-C, RV4-C, AC4. Very nice. \$300 plus shipping. WA7BYD, 503-476-2476

KENWOOD 922L Linear \$850. Viking MB IV 3K Ant tuner \$275. Viking memory keyer \$75. Call Chuck Waite, K4JTV: 904-757-8549 after 6:00 p.m.

HEATHKIT HW-8, HWA-7-1, Manuals Mint \$85. KA6PYZ 213-489-2504

WANTED IN GOOD CONDITION: E-Z-Way RBS-50 or 60 with ground post. WA3FIL, 412-264-3576

ROHN 64' FOLDCOVER, Ham II, controller, winch, guys, anchors. Buyer remove, \$1000. KA1ES, 617-369-5744

COMPLETE DRAKE 7-LINE, TR7 with PS7, R7 receiver, MS7 speaker, SP75 sp. proc., P75 ph. patch. WH7 Watt Mtr., All filters, books, service manuals, extender boards and more, \$1300. Hal, N6TJ, 805-484-4495.

KENWOOD TS-820S with CW Filter and MC-50 mike. Good condition except digital readout needs work. Asking \$450. N1DQJ, 207-943-7718

WANTED, MILITARY/COMMERCIAL Collins Radio Equipment. We need 618T, ARC-94, ARC-102, RT-712/ARC-105, ARC-114, ARC-115, ARC-116, ARC-159, ARC-164, ARC-186, ARN-118, RT-1159A, 718F - 1/2, 719A, MRC-95, MRC-108, Antenna Couplers 490T-1, 490T-2, 490T-9, 490S-1, CU-1658A/ARC, CU-1669/GRC. Top dollar paid or trade for new amateur gear. Write or phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28783. FREE SHIPPING - Continental USA, Mini-Quads \$139.95, Low prices on Bultermut products. Nye MBVA Tuners \$459.95, Dipole Kits, Etc. Stamp for flyer, Hart Eastern Communications, 1444 Darlington, Derby, NY 14047, 716-947-4840

TR4C, P.S., 500 Hz Filter \$325, RV4C \$50, MN4 \$60. All excellent. K8BYZ, 430 Pinehurst, Sidney, OH 45365. 513-492-4432

WANTED ICOM - IC25H. WA6NJR, Marc Robins, 8545 Capricorn Way, San Diego, CA 92126. 619-578-7324

FOR SALE: Drake R4C, MS4, Noise Blanker, CW and AM filters, 160-10 plus WARC, Shortwave xtals, serial 19686. T4XB, AC4, 160-10, extra set new finals, serial 18276. Original owner. Like new - great buy. Manuals, \$375. Call WB4VKW 205-383-1643.

IC-27A ORIGINAL Packing and accessories, plans Mobile Whip. I will ship. Looks perfect, works perfect. I just don't care for 2 meter FM. \$300. N7DM, 8 Key Road, Port Angeles, WA 98362 206-452-1684

KENWOOD TR-3500 UHF with P/L, Mobile Stand, Speaker Mic, two batteries, AC charger: \$225. Trilectric commercial grade 2m amp; 2.5w in 45w out; \$49. W6NBP, Mark. 303-691-2931

WANTED: HEATH HW-8 with manual. Hank Bruse, 548A Honeyuckle Lane, Madison, WI 53713.

4CX1000, factory sealed, \$300. 2 meter transverter, 6 meter IF by Panasonic, \$125. W7TZO, 503-267-6064

HEATH HW-101 with Remote VFO/External Spkr, HP-23B Supply, CW Filter \$225. D. Shire, AG1M, P.O. B. 4731, Ithaca, NY 14852, 607-257-2325

FOR SALE - DENTRON XV160, 160M Transverter - \$50 plus shipping. Write or call W3EYF. 301-265-1356

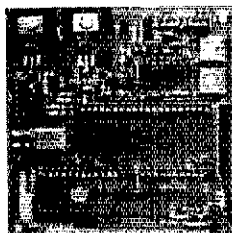
#### Jobs for Hams

FULL-TIME RADIOTELEGRAPH Operators wanted at WKM/West Haven, CT Marine Radio. Must have FCC + 3rd/2nd Class Radiotelegraph license. Phone: 203-937-5074.

## SWITCH TO SAFETY!



### MICROCOMPUTER REPEATER CONTROL



\$129

Introducing the MICRO REPEATER CONTROLLER RPT-2A, a new concept in LOW COST, EASY TO INTERFACE, microcomputer repeater control. Replace old logic boards with a state of the art microcomputer that adds NEW FEATURES, HIGH RELIABILITY, LOW POWER, SMALL SIZE, and FULL DOCUMENTATION to your system. Direct interface (drop in) with most repeaters. Detailed interface information included. Original MICRO REPEATER CONTROL article featured in QST Dec. 1983.

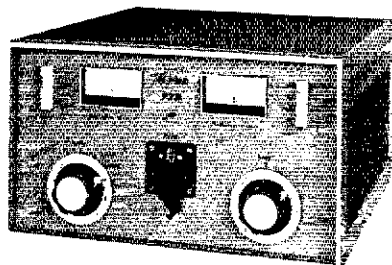
- \*TWO CW ID MESSAGES
- \*TIME OUT TIMER
- \*PRE-TIMEOUT
- \*WARNING MSG
- \*POST-TIMEOUT CW MSG
- \*COURTESY BEEP
- \*AUXILIARY INPUTS
- \*RECONFIGURABLE-COP INPUT
- \*HIGH CURRENT PTT INTERFACE
- \*SINEWAVE TONE GENERATOR
- \*LOW POWER 9-15 VDC @200ma
- \*SIZE 3.5" x 3.5"
- \*ALL CONNECTORS INCLUDED

RPT-2A KIT ONLY . . . \$129 plus \$3.00 shipping

**PROCESSOR CONCEPTS**  
P.O. BOX 32908  
MINNEAPOLIS, MN 55432-0908  
612-760-0472 7 PM - 10 PM WEEKDAYS  
CALL OR WRITE FOR FREE CATALOG AND SPECIFICATIONS

# ETD ALPHA 77DX

If you want the finest



### SPECIAL SALE — ALL ALPHAS

Model	List	Sale
77DX	\$5450	
78	\$3495	
374A	\$2595	
76A	\$1985	
76PA	\$2395	
76CA	\$2695	

**CALL FOR LATEST PRICE**

Phone Don Payne, K4ID, for Brochure  
Personal Phone — (615) 384-2224  
P.O. Box 100  
Springfield, Tenn. 37172

## PAYNE RADIO

148 PAGES  
100'S OF NEW  
PRODUCTS



More pages, more products and it's hot off the press! Get the new 1986/7 DICK SMITH ELECTRONICS Catalog and find anything for the electronics enthusiast. The data section alone is worth the price of admission. Send for your copy today.

Please reserve my copy of the 1986 Dick Smith Catalog. I enclose \$1 to cover shipping.

Name .....

Address .....

City .....

Zip .....



DICK SMITH ELECTRONICS INC.  
P.O. Box 2249 Redwood City CA 94063  
EVERYTHING FOR THE ELECTRONICS ENTHUSIAST

## 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.

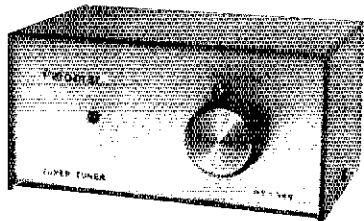


1.7-30 MHz. 1-Kw. 1:1 or 4:1 ratio. Model 1K \$39.95.



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-340 \$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

## ADVERTISING DEPARTMENT STAFF

Lee Aurick, W18E, Advertising Manager  
Sandy Gerli, AC1Y, Deputy Adv. Mgr.  
Lindy Messmer, Advertising Assistant  
203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

## Index of Advertisers

AEA: Advanced Electronic Applications, Inc.: 4  
ADN: Advanced Design Networks, Inc.: 144  
AVC Innovations: 106  
Advanced Computer Controls: 153  
Advanced Receiver Research: 98  
Alinco Electronics Corp.: 127  
All Electronics: 155  
Alpha Delta Communications: 122  
Amateur Electronic Supply: 105,  
Amateur Wholesale Electronics: 135,  
American Radio Relay League: 89, 93, 96, 97, 103, 109, 122, 126, 130, 132, 136, 137, 140, 150  
ARRL National Convention: 108  
Ameritron: 112  
Amp Supply Co.: 125  
Antenna Specialists: 153  
Associated Radio: 98  
Atlanta Hamfest: 120  
Autek Research: 100  
Autocode: 138  
BCS Inc.: 155  
Barker & Williamson: 124  
Barry Electronics: 102  
Bencher Inc.: 122  
Buckmaster Publishing: 101, 113  
Butternut Electronics Co.: 101  
C-Comm: 110, 111  
Certified Communications: 126  
Colorado Comm Center: 99  
Communication Concepts, Inc.: 112  
Communications Electronics: 156  
Cotec: 108  
Cubex: 99  
Curtis Electro Devices: 108  
Cushcraft Corp.: 5  
DC Sales: 118  
Daiwa USA Inc.: 107  
Delaware Amateur Supply: 120  
Dick Smith Electronics: 157  
EGE Inc.: 103, 114, 115  
EEB/Antenna Bank: 113  
Fox Tango Corp.: 100  
Gordon West Radio School: 149

Ham Radio Outler: 90, 91, 92, 134  
Ham Station, The: 132  
Heaster Inc., H.L.: 126  
Henry Radio Stores: Cov. II  
Hustler Inc.: 101  
ICOM America Inc.: 2, 128, 129, 131, 133  
IIX Equipment Ltd.: 150  
Jun's Electronics: 148  
K2AW's Silicon Alley: 109  
Kantronics: 94, 95  
La Cue Communications: 106  
Larsen Electronics Inc.: 93  
MFJ Enterprises Inc.: 142, 143  
Madison Electronics Supply: 145  
Memphis Amateur Electronics Inc.: 144  
Micro Control Specialties: 151  
Microcraft Corp.: 144  
Mirage/KLM: 154  
Missouri Radio Center: 160  
Mosley Electronics: 109  
NARTE: 152  
National Tower: 141  
Nemal Electronics Inc.: 138  
Nye Co., William M.: 124  
P.C. Electronics: 148  
Palomar Engineers: 108, 158  
Payne Radio: 157  
Precision Electronics: 99  
Processor Concepts: 157  
rf Enterprises: 116  
RF Parts Co.: 104  
Radio Amateur Callbook: 147  
Radio World: 100  
Ross Distributing: 101  
Space Electronics Corp.: 101  
Spi-ro Mfg. Inc.: 118  
Spider Antenna: 150  
TNT Radio Sales: 150, 151  
Telex Communications: 138, 139  
Telrex Labs: 147  
Texas Towers Inc.: 146, 159  
Trio-Kenwood Communications: Cov. IV, 1, 6, 7, 119, 121, 123  
U.P.I. Communications: 102  
U.S. Tower: 103  
Universal Amateur Radio: 109  
Universal Radio Co.: 100  
Van Gordon Engineering: 126  
Van Valzah Co., H.C.: 149  
Varian/Eimac Division: 10  
Vibroplex Co.: 109  
W9INN Antennas: 109  
Wacom Products: 113  
Western Electronics: 103  
Wheeler Applied Research: 102  
Williams Radio Sales: 155  
Wrightapes: 99  
Yaesu USA: Cov. III, 117



# ANTENNA/TOWER SALE!

## hy-gain CRANKUP SALE!

All Models Shipped Factory Direct— Freight Paid!

Check these features:

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

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

Models— Thrust Bearings— Other Accessories Available

All Prices Shown Are Our Total Delivered Price In Continental U.S.A.

## ROHN Self Supporting Towers On SALE! FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save \$
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	\$329
HBX48	48 ft	10 sq ft	303	\$429
HBX56	56 ft	10 sq ft	385	\$499
HDBX40	40 ft	18 sq ft	281	\$399
HDBX48	48 ft	18 sq ft	363	\$489

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

## ROHN Guyed Tower Packages

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

Packages shown below are rated for wind zone "B" (86 mph wind), Zone "C" (100 mph wind) design prices (slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

Model	25G	45G	55G
50'	\$ 579	1079	1439
60'	639	1209	1609
70'	689	1329	1759
80'	649	1479	1929
90'	919	1749	2089
100'	989	1899	2259
110'	1189	2019	2639
120'	1259	2179	2819

## ITS TOWER CORPORATION

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

Check these features:

- ✓ All steel construction
- ✓ Hot dipped galvanized
- ✓ Totally self-supporting—No guys needed

Coax arms, Thrustbearings, Masts, Motor drives, Remote controls, Hinged bases, rotor bases, & raising fixtures also in stock—

**CALL FOR SALE PRICES!**

Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	\$ 540
MA50 mast	22'	50'	18 sq ft	990
TX438	22'	38'	18 sq ft	825
TX458	22'	55'	18 sq ft	1340
TX472	23'	72'	18 sq ft	2050
HDX560	22'	55'	30 sq ft	1870
HDX572	23'	72'	30 sq ft	3220

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

\*Note—towers rated at 50 mph to EIA specifications

## RG-213U

\$ .29/ft \$279/1000 ft Up to 600 ft via UPS

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

## RG-8X

\$ .19/ft \$179/1000 ft

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

Central Cable Loss Characteristics (DB/100 Ft)

Cable Type	Imped.	10 MHz	30 MHz	150 MHz	450 MHz
HG-213/U	50	5	9	23	5.2
RG8X	52	1.4	1.2	3.5	5.8
RG-58U	52	1.4	1.9	6.0	12.5
1/2" Alum	50	3	5	1.2	2.2
1/2" Heliax	50	2	4	9	1.5
1/2" Heliax	50	1	2	5	1.9

## HARDLINE/HELIAXTM

Lowest Loss for VHF/UHF!

1/2" Alum. w/poly Jacket	\$ .79/ft
1/2" LDF4-50 Andrew Heliax TM	\$1.79/ft
1/2" LDF5-50 Andrew Heliax TM	\$3.99/ft

select connectors below.

## HARDLINE & HELIAXTM CONNECTORS

Cable Type	UHF FML	UHF MALEN	FML N	MALE
1/2" Alum	\$19	\$19	\$19	\$25
1/2" Heliax TM	\$25	\$25	\$25	\$25
1/2" Heliax TM	\$49	\$49	\$49	\$49

## AMPHENOL CONNECTORS

Silver PL25 \$1.25

UG21B N Male \$2.95 UG23D N Female \$2.95

## Antenna Wire & Accessories

Solid Copper Wire 12 ga. \$12/ft 14 ga. \$10/ft Stranded Copper 14 ga. \$10/ft 16 ga. \$0.97/ft

3/4 mile 18 ga copper-clad steel wire \$30 6 inch heavy-duty end insulator \$3.00/ea Dog-bone insulator \$.79 Coax seal \$2.50

## Van Garden

F-1 Balun \$11 Center Insulator \$6 Dipole Kits 080 \$31.95/D40 \$28.95 Short Dipole Kits S080 \$35.95/S040 \$33.95 All-band Dipole w/ladder line \$29.95 G5RV all band antenna \$49.95

## ALPHA DELTA

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

## CUSHCRAFT

A3 3-el Tribander Beam \$209  
A743 30/40 mtr Kit for the A3 \$75  
A4 4-el Tribander Beam \$269  
A744 30/40mtr Kit for the A4 \$75  
R3 20, 15, 10mtr Vertical \$259  
AV5 80-10mtr Vertical \$99  
D40 40mtr Dipole \$149  
40-2CD 2-el 40 mtr Beam \$273  
A50-5-5-el 6mtr Beam \$79  
215 WB NEW 15-el 2 mtr Beam \$75  
4218 XL 18-el 2 mtr Beam \$95  
3219 19-el 2mtr Beam \$89  
220B 17-el 220MHz Beam \$89  
424B 24-el 432MHz Beam \$75  
ARX2B 2mtr Vertical \$39

## hy-gain

Discoverer 2-el 40-mtr Beam  
Discoverer 3-el Conversion Kit  
EXPLORER-14 SUPER-SPECIAL  
DK710 30/40 mtr. Add-On-Kit  
V2S 2-mtr Base Vertical  
V4S 440MHz Base Vertical  
TH5M K2S Broad Band 5-el Triband Beam  
TH7DXS 7-el Triband Beam  
TH3JRS 3-el Triband Beam  
205BAS 5-el 20-mtr Beam  
155BAS 5-el 15-mtr Beam  
105BAS 5-el 10-mtr Beam  
204BAS 4-el 20-mtr Beam  
64BS 4-el 6-mtr Beam  
12 AVQ 20-10 mtr Vertical  
14 AVQ 40-10 mtr Vertical  
18 AVT 18-8 mtr Vertical  
18HTS 80-10 mtr Hy-Tower Vertical  
23BS 2-el 2 mtr Beam  
25BS 2-el 2 mtr Beam  
28BS 2-el 2 mtr Beam  
31BS 2-el 2 mtr Beam  
28D 30/40 mtr Trap Dipole  
K16 80-10 mtr Trap Dipole  
K16 80-10 mtr KW Balun W/Coax Seal

## HUSTLER

6BT 80-10 mtr Vert \$129 58TV 80-10 mtr Vert \$109  
4BT 40-10 mtr Vert \$89 G7-144 2-mtr Base \$119  
G6-144B 2-mtr Base \$89

Mobile Resonators 10m 15m 20m 40m 75m  
40W Standard \$16 \$17 \$19 \$22 \$26  
2KW Super \$20 \$22 \$25 \$29 \$39  
Bumper Mounts - Springs - Folding Masts in Stock!

## BUTTERNUT ELECTRONICS CO

HF6V 80-10 Mtr. Vertical Antenna \$129. Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II \$29
- Optional Roof Mounting Kit Model RMK II \$49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 \$49

HF2V 80/40 Meter Vertical Antenna \$129 Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 \$49

## HF4B "Butterfly"

\$189. (del. cont. USA)

- Covers 10, 12, 15, 20M
- Compact Beam Design
- Max. Element Length of 12.5'
- Light Weight, Only 17 lbs.
- Use with TV Rotor

Free Shipping On Butternut Accessories Also When Purchased With Antenna

## KLM

KT34A 4-el Broad Band Triband Beam \$339  
KT34XA 6-el Broad Band Triband Beam \$489  
2m-14C 14-el 2-mtr Satellite Antenna \$89  
2m-16L8X NEW-16-el 2-mtr Beam \$99  
2m 22C NEW-22-el 2-mtr Satellite Antenna \$119  
432-30L BX NEW-30-el-432 MHz Antenna \$99  
435-18C 435 MHz Satellite Antenna W/CS-2 \$119  
435-40CX 435 MHz Satellite Antenna W/CS-2 \$159

## ROTORS

Alliance HD73 (10.7 sq ft rating) \$119.95  
Alliance U110 (3 sq ft rating) \$49  
Telex CD 4511 (8.5 sq ft rating) \$Call  
Telex HAM 4 (15 sq ft rating) \$Call  
Telex Tailtwister (20 sq ft rating) \$Call  
Telex HDR3000 Heavy Duty (25 sq ft rating) \$Call  
Kenpro KR500 Heavy Duty Elevator Rotor \$189  
Kenpro KR5400 AZ/EL Rotor Package \$319

## ROTOR CABLE

Standard 8 cord cables \$19/ft  
(vinyl jacket 2-#18 & 6-#22 ga)  
Heavy Duty 8 cord cable \$36/ft  
(vinyl jacket 2-#16 & 6-#18 ga)

## ROHN GUYED TOWERS

10 ft Stack Sections  
20G \$39.50 45G \$112.50  
25G \$49.50 55G \$149.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	\$899
	FK2556	56 ft	13.3 sq ft	\$949
	FK2568	68 ft	11.7 sq ft	\$989
	FK4544	44 ft	34.8 sq ft	\$1199
	FK4554	54 ft	29.1 sq ft	\$1299
	FK4564	64 ft	28.4 sq ft	\$1399

25G Foldover Double Guy Kit \$249  
45G Foldover Double Guy Kit \$269

\*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex  
All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies

## TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	\$ 15/ft
1/4 EHS Guywire (16650 lb rating)	\$ 18/ft
5/16 EHS Guywire (11,200 lb rating)	\$ 22/ft
5/32 7 x 7 Aircraft Cable (700 lb rating)	\$ 15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	\$ 45
1/4 CCM Cable Clamp (1/4" Cable)	\$ 55
1/4 TH Thimble (fits all sizes)	\$ 45
3/8EE (3/8" Eye & Eye Turnbuckle)	\$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	\$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle)	\$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	\$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	\$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	\$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	\$16.95
3/16" Preformed Guy Grip	\$2.49
1/4" Preformed Guy Grip	\$2.99
6" Diam - 4 ft Long Earth Screw Anchor	\$14.95
500 D Guy Insulator (5/32" or 3/16" Cable)	\$1.69
502 Guy Insulator (1/4" Cable)	\$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	\$12.95

## PHILLYSTRAN GUY CABLE

HPT62100 Guy Cable (2100 lb rating)	\$ 29/ft
HPT64000 Guy Cable (4000 lb rating)	\$ 49/ft
HPT66700 Guy Cable (6700 lb rating)	\$ 69/ft
9901LD Cable End (for 2100/4000 cable)	\$8.95
9902LD Cable End (for 6700 cable)	\$9.95
Sockelized Potting Compound (does 6-8 ends)	\$14.95

## GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	\$29	\$49	\$69	\$89
18 in Wall	\$39	\$69	\$99	\$129
25 in Wall	\$69	\$129	\$189	\$249

**ORDER TOLL FREE 1-800-272-3467**  
Texas, Alaska & for information 1 (214) 422-7306

# TEXAS TOWERS

Div. of Texas RF Distributors Inc. 1108 Summit Ave., Suite 4 • Plano, Texas 75074  
(Prices & Availability Subject To Change Without Notice) (Antenna/tower product prices do not include shipping unless noted otherwise)

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



## High power to get you out. Battery saver to keep you there.

Where other HTs don't make it, Yaesu's 2-meter FT-209RH and 440-MHz FT-709R keep going strong. Here's why:

Our 2-meter model offers you 5 watts output. And our 440-MHz model offers 4½ watts.

Yet there's no excessive battery drain, thanks to a unique user-programmable Power Saver. When activated, it puts the rig "to sleep" while monitoring, and "wakes it up" when the squelch breaks. Thus, you can listen for hours while keeping plenty of power in reserve.

And despite the wealth of advanced features, operation is actually simple and intuitive. That's why our radios are so much easier to "learn" than any other advanced HT.

At the push of a button, you can recall the information you've independently stored in each of the ten memories: receive frequency, standard or non-standard offset, even tone encode/decode.

Monitoring your favorite repeaters or simplex frequencies is just as easy. Just touch a button to scan all memory channels, selected ones, or all frequencies between adjacent memories. And use the priority feature to return automatically to a special frequency.

Bring up controlled-access machines with the optional plug-in subaudible tone encoder/decoder, independently programmed from the keyboard for each channel. Then use the decode function to listen for tone-encoded signals on selected channels — without a lot of chatter.

Finally, both HTs cover 10 MHz, and come complete with a 500-mAh battery, charger and soft case. Options include a VOX headset and hard leather case.

So next time you visit your dealer, pick up Yaesu's 2-meter FT-209RH or 440-MHz FT-709R. Because they not only get you out, they keep you there too.

# 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

Prices and specifications subject to change without notice.



# 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. (500Hz 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-42S UP/DOWN mic. included**

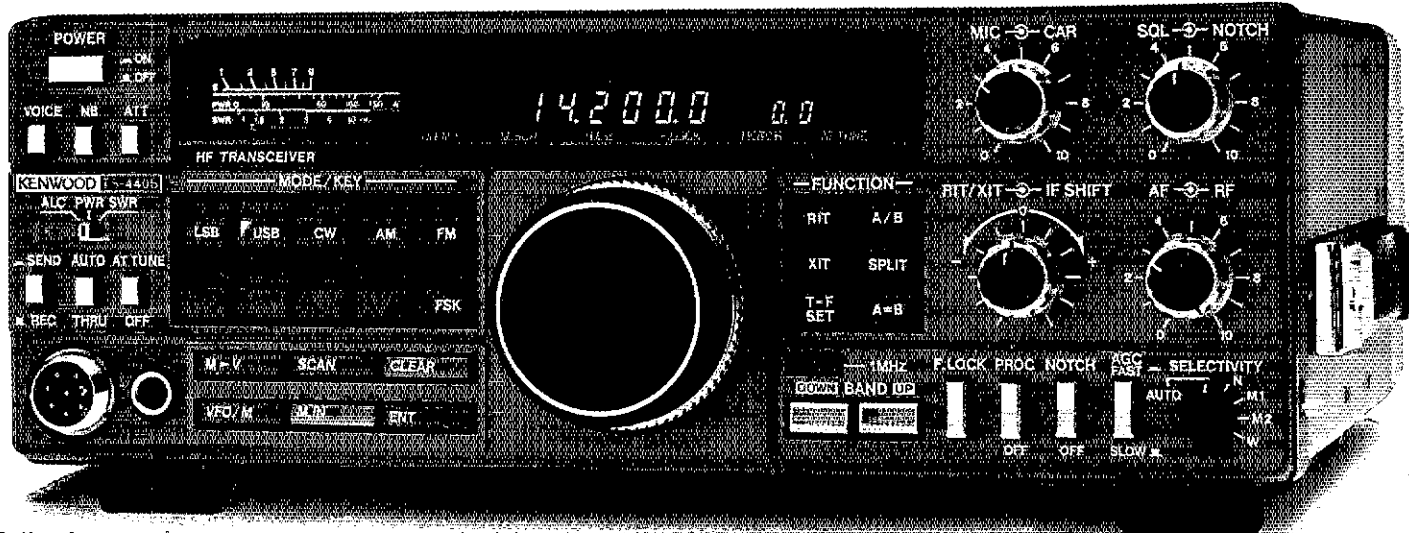
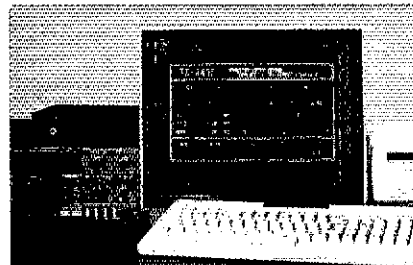
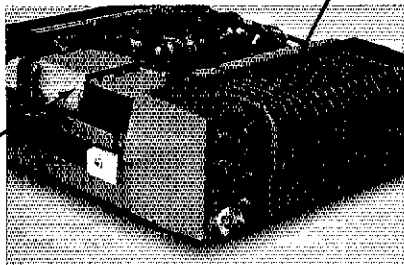
• **Computer interface port**

• **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.

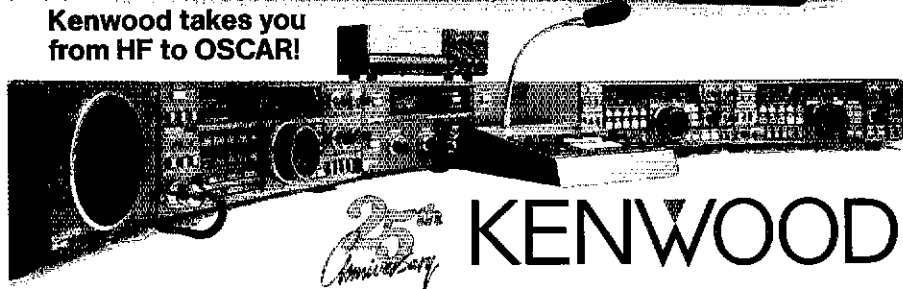
• **VOX, full or semi break-in CW: AMTOR compatible.**



**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-4/5/6/7 headphones
- SP-40/50 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-7C extra DC cable.

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



# 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.