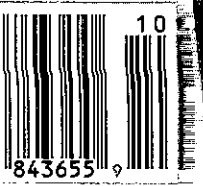
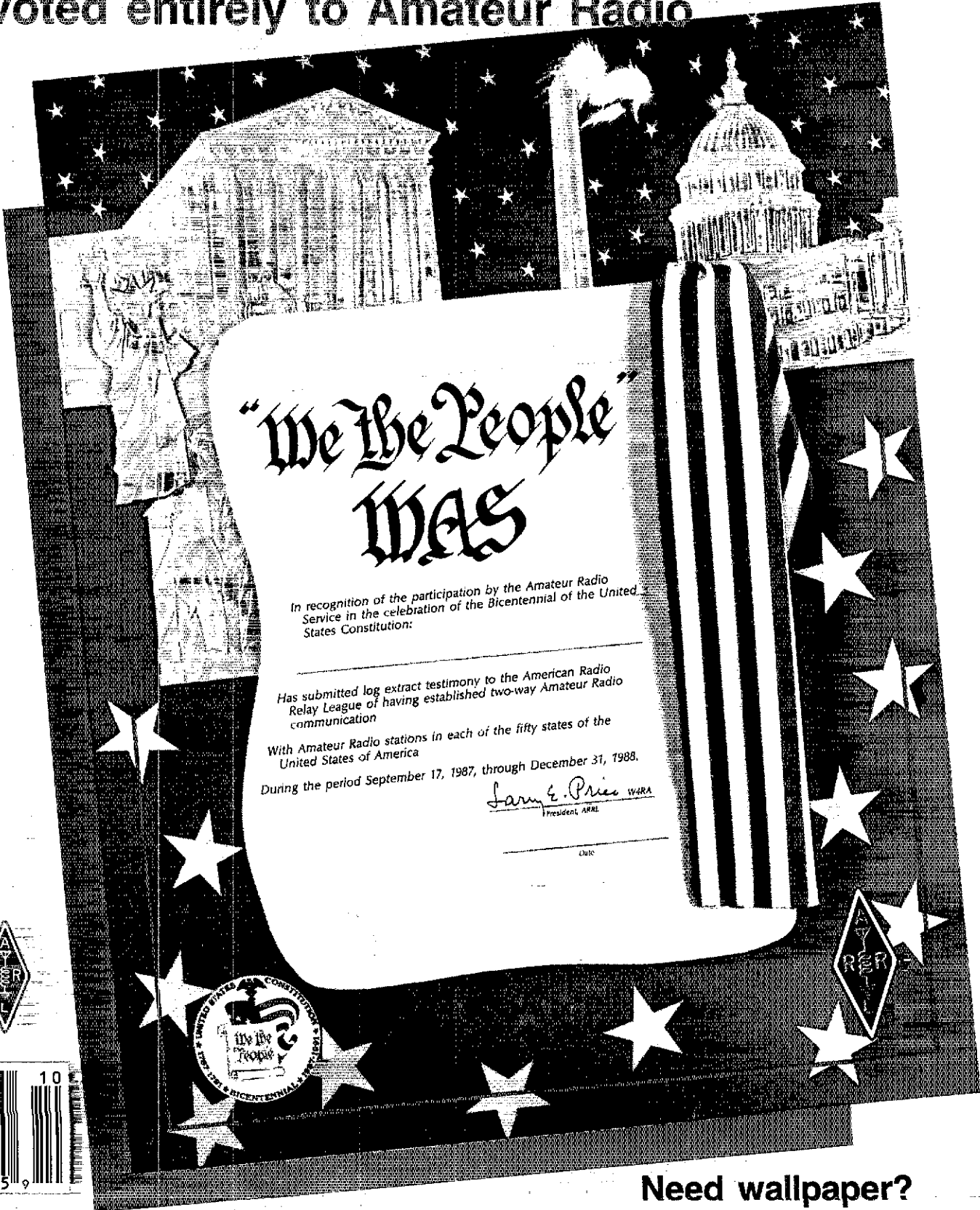


QST

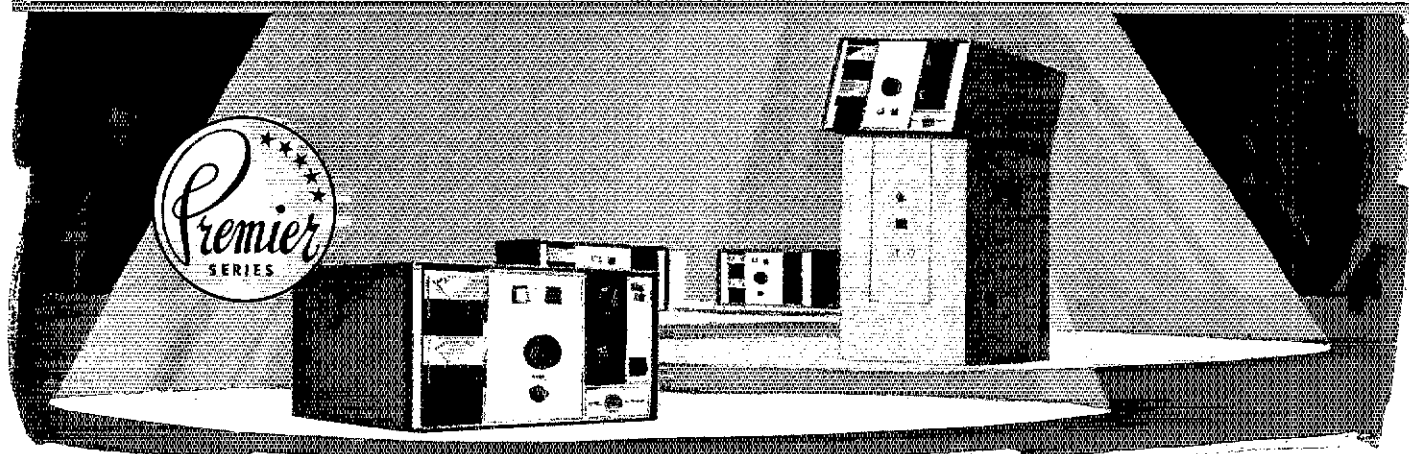
October 1987 \$3.00

devoted entirely to Amateur Radio



Need wallpaper?

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



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

THE PREMIER SERIES

- ★ **The 3K Premier Console** --- all the rugged reliability of the 3K Console plus QSK and the 160 meter band.
- ★ **The 3KD Premier Desk Model** --- the same RF deck in a smaller and lighter configuration.
- ★ **The 3002-A Console** --- maximum legal power in a two meter block buster.
- ★ **The 3004-A Console** --- a unique new approach to high power UHF amplification at 440 MHz.

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

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

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

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

THE CLASSIC LINE

(Still available as before)

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

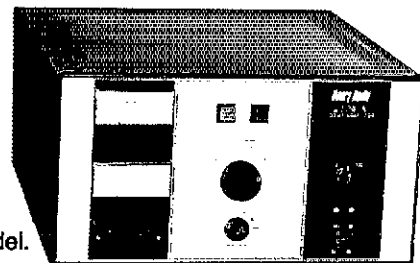
2K Classic Console --- the original and still the standard workhorse.

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

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

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

2004-A UHF desk model.



Henry Radio

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

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

KENWOOD

...pacesetter in Amateur Radio

New
220 MHz

220: FM for All!



Kenwood brings you a wide range of 220 MHz gear designed for every need. Choose from two types of mobile and two types of HT. The TH-315A is a

full-featured HT covering 220-225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 V DC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability," choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

The TM-321A is the 25 W, 220 MHz, 14-channel version of the super popular, super compact TM-221A. The 25-watt TM-3530A has 23 channels, a 15 telephone number memory and auto dialer. Direct keyboard frequency entry and front panel DTMF pad enhances operating convenience. Novice to Amateur Extra, these transceivers will put everyone on the air "Kenwood Style"!

TH-315A
Full-featured HT

TM-321A
Compact mobile transceiver

TH-31BT/31A
Pocket-held HT

New

New

TM-3530A
Full-featured mobile transceiver

KENWOOD

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

A complete line of accessories is available for all models.
Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

NEW

ICOM IC-900

Six Bands in One Mobile!

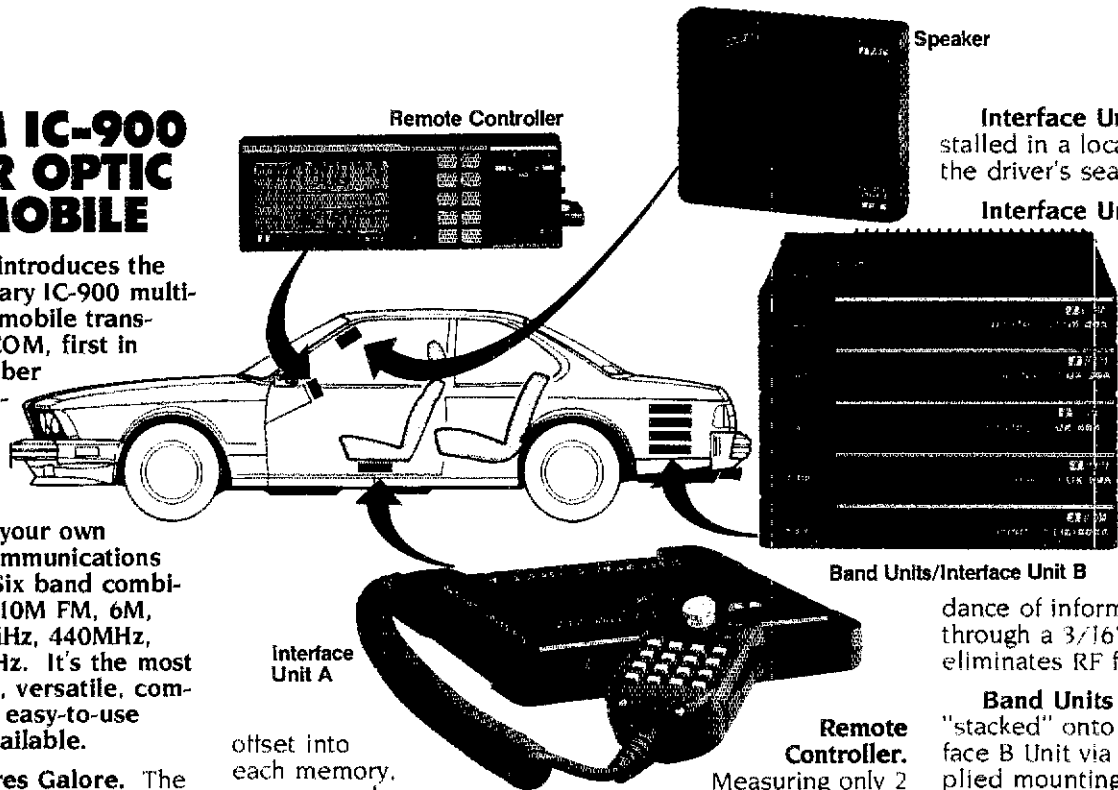
ICOM IC-900 FIBER OPTIC FM MOBILE

ICOM introduces the revolutionary IC-900 multi-band FM mobile transceiver. ICOM, first in utilizing fiber optic technology in amateur radio, enables you to create your own mobile communications system. Six band combinations... 10M FM, 6M, 2M, 220MHz, 440MHz, and 1.2GHz. It's the most advanced, versatile, compact, and easy-to-use mobile available.

Features Galore. The IC-900 is an operator's dream... Listen on two bands simultaneously or transmit on one band and receive on a different band when using a second speaker (true full duplex crossband operation). 10 memories per band, independent PL tones and

offset into each memory, memory and programmable band scan, and all subaudible tones in actual Hz readout.

The IC-900 includes an ultra compact remote controller, an Interface A unit, Interface B unit, SP-8 speaker, HM-14 up/down DTMF mic, fiber optic and controller cables.



Speaker

Interface Unit A is installed in a location near the driver's seat.

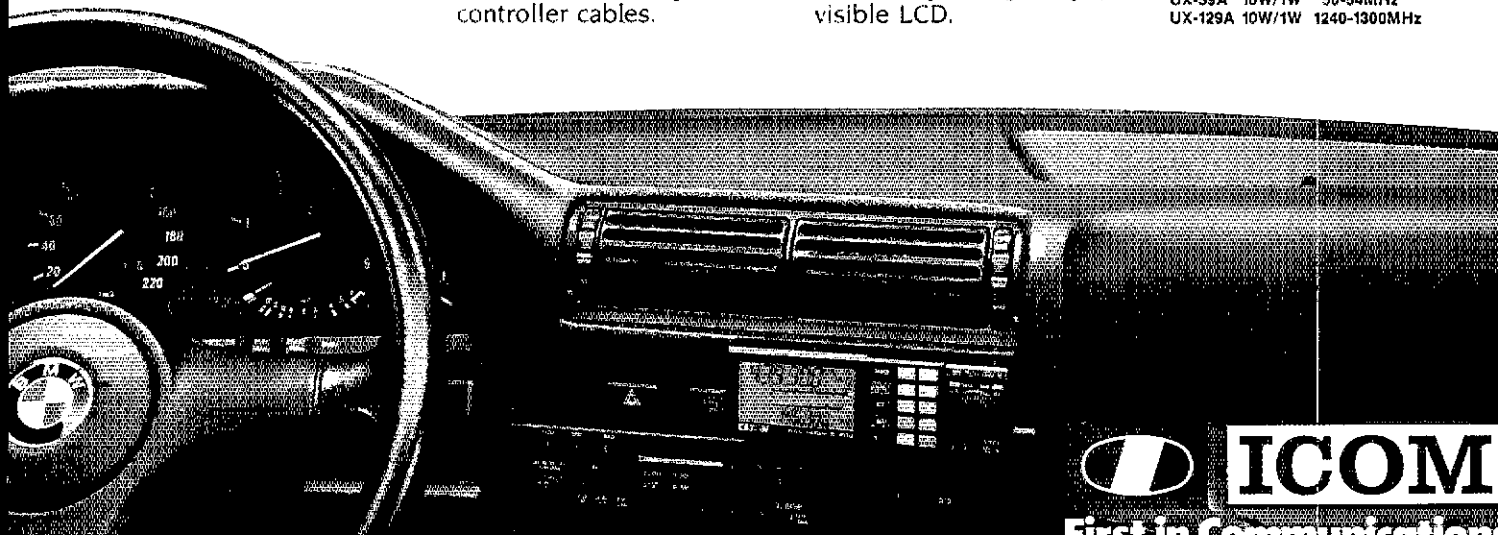
Interface Unit B controls the six band units and can be installed in your car's trunk. A fiber optic cable runs from Interface A to Interface B, which transports an abundance of information through a 3/16" cable and eliminates RF feedback.

Band Units are "stacked" onto the Interface B Unit via the supplied mounting bracket. Optional band units available are:

Remote Controller.

Measuring only 2 inches high by 5.7 inches wide by 1 inch deep, the remote controller can be installed on your car's dash or sun visor with the supplied velcro. And, if you want, take the controller with you when you leave your car. The controller features a super large, highly visible LCD.

Band Unit	Power Output	Frequency
UX-19A	10W/1W	28-30MHz
UX-29A	25W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-29H	45W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-39A	25W/5W	216-236MHz Rx; 220-225MHz Tx
UX-49A	25W/5W	440-450MHz
UX-59A	10W/1W	50-54MHz
UX-129A	10W/1W	1240-1300MHz



ICOM

First in Communications

ICOM America, Inc. 2380-116th Ave. N.E. Bellevue, WA 98004 Customer Service Phone: (206) 451-5753
3150 Premier Drive, Suite 126, Irving, TX 75063; 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30329
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC requirements and are 50% more reliable.

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

Vacant
Editorial Supervisor, Up Front in QST

Paula Place, N1DNB
Editorial Assistant, Strays

Charles L. Hutchinson, K8CH
Technical Editor

Gerald L. Hall, K1TD
Associate Technical Editor

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

Larry D. Wolfgang, WA3VIL, David Newkirk, AK7M,
Bruce S. Hale, KB1MW, James W. Healy, NJ2L
Assistant Technical Editors

Maureen Thompson, KA1DYZ
Technical Editorial Assistant

Phillip M. Sager, WB4FDT
Happenings, League Lines

John C. Hennessee, KJ4KB
Correspondence, Washington Mailbox

Vacant
Public Service

Billy Lunt, KR1R
Contests

Donald B. Search, W3AZD
DXCC

Lee Hayford, AH2W
Club Spectrum

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

Ed Tilton, W1HDQ, John Troster, W6ISQ,
William A. Tynan, W2XO, Stan Horzepa, WA1LOU,
Harry MacLean, VE3GFO, Bob Atkins, KA1GT,
Ellen White, W1YLA, Richard L. Baldwin, W1RU,
John Huntoon, W1RW, Doug DeMaw, W1FB8,
Scott Springate, N7DDM, Vern Riportella, WA2LQQ,
Joan Gibson, KG1F
Contributing Editors

Michelle Chrisjohn, WB1ENT, Production Supervisor
Jodi Morin KA1JPA, Assistant Production Supervisor

Sue Fagan, Graphic Design Supervisor
David Pingree, Senior Technical Illustrator

Leslie K. Bartoloth, KA1MJP, Layout Artist
Rose Cyr, Sandra L. Damato,

Carolyn R. McElravy, Typesetters
Production Staff

Steffie Nelson, KA1IFB
Proofreader

Bruce O. Williams, WA6IVC
Advertising Manager

Debra Jahneke
Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Debra Jahneke
Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

Beth A. Douglass
Deputy Circulation Manager

OUR COVER

The "We the People" Worked All States Award is a WAS certificate commemorating the bicentennial of the US Constitution. For details on how you can qualify, see September QST, pp 14-16.



CONTENTS

TECHNICAL

- 15 The Mystique Behind Miniaturization—Surface Mount Technology
David S. Hollander, N7RK
- 19 Alternative Energy—An Overview of Options and Requirements—Part 2
Michael Mideke, WB6EER
- 24 Stalking Those Fugitive Components *Doug DeMaw, W1FB*
- 27 Amateur Radio and the Blind—Part 1 *Butch Bussen, WA0VJR*
- 32 Product Review: ICOM IC-275A 2-Meter Multimode Transceiver
- 38 Technical Correspondence

NEWS AND FEATURES

- 9 *It Seems to Us: You Be the Judge*
- 11 Up Front in QST
- 40 A Camera's Eye View of *The New World of Amateur Radio* *Paula Place, N1DNB*
- 42 A Field Guide to the ARRL License Manuals *Bruce S. Hale, KB1MW*
- 43 Question Pools: A New Look for an Old Program *Jim Clary, WB9IHH*
- 45 Elmers—They're Essential *Curt Holsopple, K9CH*
- 47 *Happenings: ARRL Files Comments in Call Sign Inquiry, PRB 3*
- 69 *Public Service: Reventador Defines Disaster in Ecuador*

OPERATING

- 72 54th ARRL November Sweepstakes Announcement
- 74 Results, 1987 ARRL International DX Contest
Billy Lunt, KR1R and Mark Burke, KA1MIS

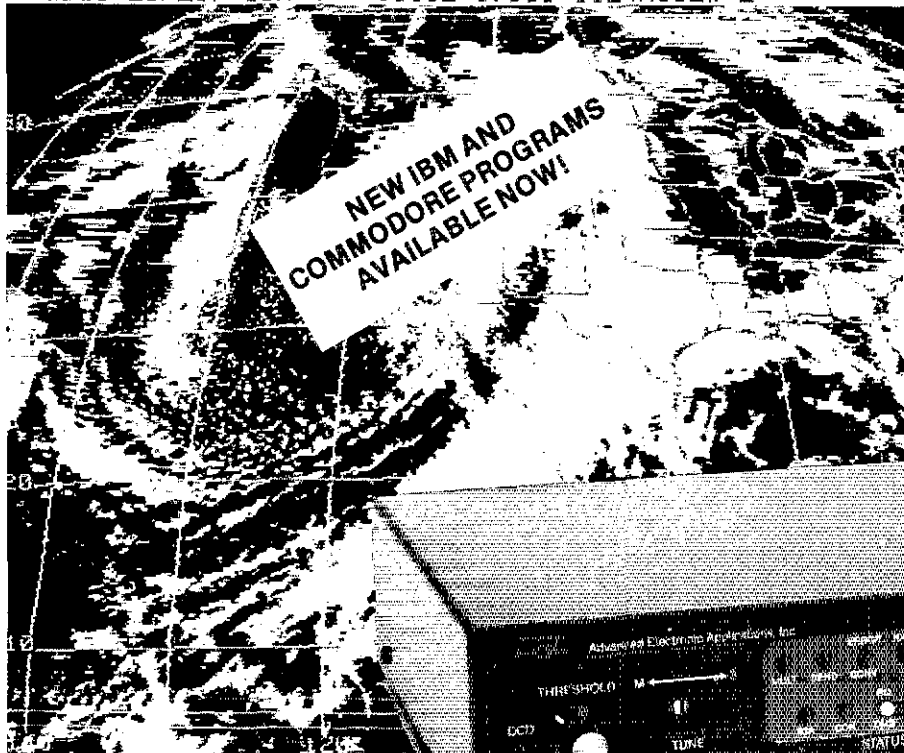
DEPARTMENTS

Amateur Satellite Communications	64	Making Waves	63
Canadian NewsFronts	62	Mini Directory	73
Club Spectrum	65	The New Frontier	59
Coming Conventions	66	New Products	23
Contest Corral	86	On Line	56
Correspondence	50	QSL Corner	53
DX Century Club	54	QST Profiles	60
FM/RPT	55	Section News	89
Ham Ads	141	Silent Keys	68
Hamfest Calendar	66	Special Events	87
Hints and Kinks	36	VHF/UHF Century Club	88
How's DX?	51	The World Above 50 MHz	57
Index of Advertisers	174	YL News and Views	61
League Lines	14	50 and 25 Years Ago	68

New PK-232 Breakthrough

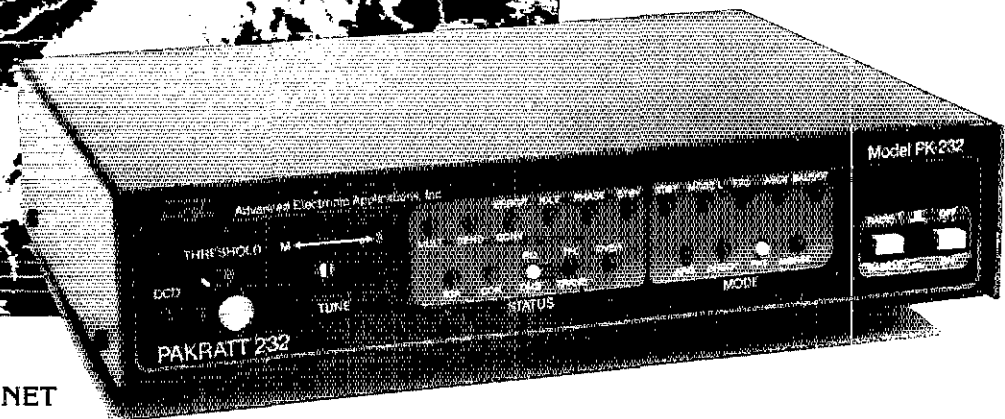
Six Digital Modes - Including Weather FAX

1900 25FE87 38A-4 01052 17831 5024N112W-2



A new software enhancement makes the AEA PK-232 the only amateur data controller to offer six transmit/receive modes in a single unit.

- * Morse Code
- * Baudot (RTTY)
- * ASCII
- * AMTOR
- * Packet
- * Weather FAX



\$319⁹⁵ AMATEUR NET
\$379.95 AEA RETAIL

Your home computer (or even a simple terminal) can be used for radio data communication in six different modes. Any RS-232 compatible computer or terminal can be connected directly to the PK-232, which interfaces with your transceiver. The only program needed is a simple terminal program, like those used with telephone modems, allowing the computer to be used as a data terminal. All signal processing, protocol, and decoding software is in ROM in the PK-232.

The PK-232 also includes a no compromise VHF/HF/CW modem with an eight pole bandpass filter, four pole discriminator, and 5 pole post detection low pass filter. Experienced HF Packeteers are reporting the PK-232 to have the best Packet modem available.

Operation of the PK-232 is a breeze, with twenty-one front panel indicators for constant

status and mode indication. The 240 page manual includes a "quick start" section for easy connection and complete documentation including schematics. Two identical back panel radio ports mean either your VHF or HF radio can be selected with a front panel switch. Other back panel connections include external modem disconnect, FSK and Scope Outputs, CW keying jacks, and RS-232 terminal interface.

The RS-232 connector is also used for attaching any Epson graphics compatible parallel printer for printing Weather Fax. Weather maps and satellite photos, like the one in this ad, can be printed in your shack.

Contact your local AEA dealer today for more information about the one unit that gives you six modes for one low price, the PK-232.



Brings you the Breakthrough

2006-196th St. SW
Lynnwood, WA 98036
(206) 775-7373

DX THAT STANDS OUT FROM THE CROWD

A3

10, 15, 20, *40 meters

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

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

OUTSTANDING A3 FEATURES

- Typical SWR 1.2:1
- Average Band width 500 KHz
- Power Rating 2,000 Watt PEP
- Boom Length 14ft, Weight 27 lbs
- Longest Element 27ft
- Wind Surface Area 4.36ft
- Turning Radius 15.5ft

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

THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

My A3 has performed flawlessly through storms and high winds. Even icing doesn't bother it ... *Gareth W1ACL*

I was glad to find all parts included and everything fit together perfectly ... *Paul N8HMY*

I am very pleased with the A3 it does a very good job! ... *Bob KA0WGQ*

Have the A3 and am having excellent results with it ... *Louis KD3AK*

Good products at attractive prices. I've been a Cushcraft user for many years, and I like what you're doing ... *Roger KD9MQ*



CUSHCRAFT

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

AVAILABLE THROUGH DISTRIBUTORS WORLDWIDE

KENWOOD

...pacesetter in Amateur Radio

#1 Rated HF

“DX-cellence!”

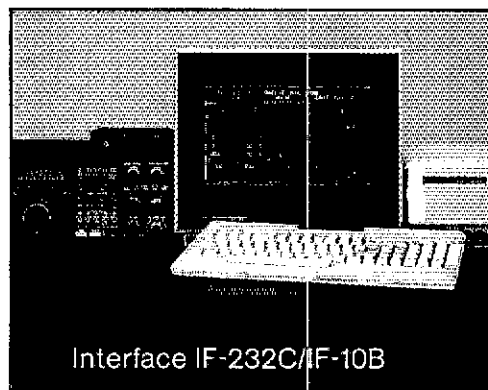
TS-940S

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

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning “feel!”
- **Graphic display of operating features.** Exclusive multi-function LCD sub-

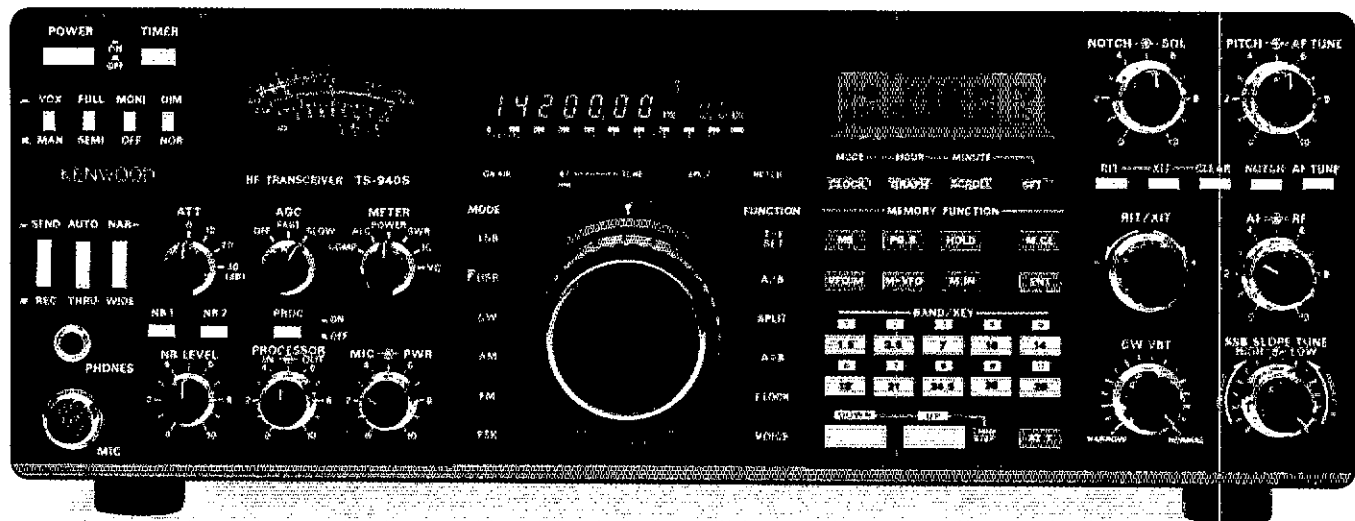
display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.

- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top “quality Kenwood” sound.
 - **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
 - **QRM-fighting features.** Remove “rotten QRM” with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
 - **Built-in FM, plus SSB, CW, AM, FSK.**
 - **Semi or full break-in (QSK) CW.**
 - **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
 - **Programmable scanning.**
 - **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
 - **1 yr. limited warranty.** Another Kenwood First!
- Optional accessories:**
- AT-940 full range (160-10m) automatic antenna tuner • SP-940 external



Interface IF-232C/IF-10B

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



Complete service manuals are available for all 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

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

KENWOOD

...pacesetter in Amateur Radio

3 Choices
70 W/45 W/25 W

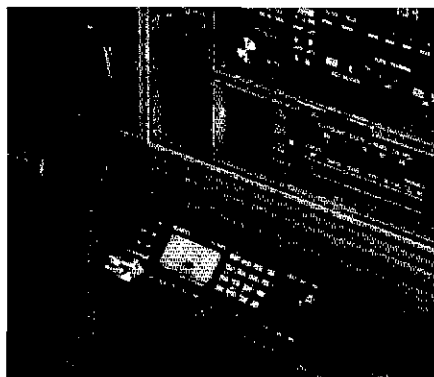
Three Choices for 2m!

TM-2570A/2550A/2530A

Feature-packed 2m FM transceivers

The all-new "25-Series" gives you three RF power choices for 2m FM operation: 70 W, 45 W, and 25 W. Here's what you get:

- Telephone number memory and autodialer (up to 15 seven-digit phone numbers). **A Kenwood exclusive!**
- High performance GaAs FET front end receiver
- 23 channel memory stores offset, frequency, and subtone. Two pairs may be used for odd split operation
- 16-key DTMF pad with audible monitor
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—a **Kenwood exclusive!**



- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)

• Big multi-color LCD and back-lit controls for excellent visibility

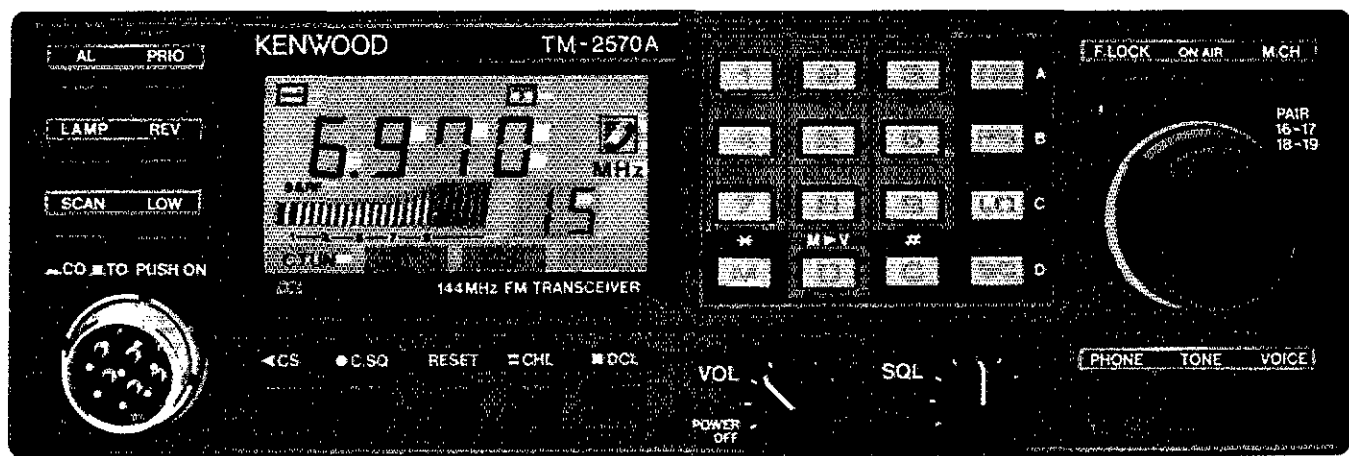
• The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!



Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Micro-processor control assures fast and reliable operation. The whole process happens in an instant!



Optional Accessories

- TU-7 38-tone CTCSS encoder
- MU-1 DCL modem unit
- VS-1 voice synthesizer
- PG-2N extra DC cable
- PG-3B DC line noise filter
- MB-10 extra mobile bracket
- CD-13 call sign display
- PS-50 DC power supply for TM-2550A/2530A/3530A

- PS-50 DC power supply for TM-2570A
- MC-60A/MC-80/MC-85 desk mics.
- MC-48B extra DTMF mic. with UP/DWN switch
- MC-43S UP/DWN mic.
- MC-55 (8-pin) mobile mic. with time-out timer
- SP-40 compact mobile speaker
- SP-50B mobile speaker
- SW-200A/SW-200B SWR/power meters
- SW-100A/SW-100B compact SWR/power meters
- SWT-1 2m antenna tuner

Actual size front panel

KENWOOD

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

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation. *Special offers available on Amateur bands only.*

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: 203-666-1541 Telex: 650215-5052 MCI
MCI MAIL (electronic mail system) ID: 215-5052

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-225-2186.

Founding President

Hiram Percy Maxim, W1AW (1869-1936)

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
(612-473-6478)

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

Bruce O. Williams, WA6IVC, Manager

Circulation Department

Debra Jahnke, Manager

Beth A. Douglass, 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

Lee Hayford, AH2W, Manager

Field Services Department

Richard K. Palm, K1CE, Manager

Administrative Services

Controller: Larry J. Shima, W8PAN

Purchasing/Office Services Department

Kathy McGrath, Manager

Assistants to the Executive Vice President

Michael R. Riley, KX1B

Robert Schetgen, KU7G

Counsel

Christopher D. Imlay, N3AKD

*Executive Committee Member

"It Seems to Us ..."

You Be the Judge

These two letters speak for themselves. We assume ABC News wants to be regarded as a responsible news organization. You be the judge of whether, in declining to air a correction, they have met that test.—David Sumner, K1ZZ



THE AMERICAN RADIO RELAY LEAGUE, INC.

INTERNATIONAL SECRETARIAT OF THE INTERNATIONAL AMATEUR RADIO UNION

ADMINISTRATIVE HEADQUARTERS, NEWINGTON, CONNECTICUT, U.S.A. 06111

August 24, 1987

Mr. Boone Arledge
President, ABC News
7 West 66th St.
New York, NY 10023

Dear Mr. Arledge:

On the first network feed of the August 17 edition of ABC World News, Ted Koppel maligned and offended 430,000 Americans: the nation's amateur (ham) radio operators. No doubt it was unintentional, but the damage thus caused was very real. As we've been able to piece it together, here's what happened.

That morning, the AP wire had carried a story quoting an FAA spokesman as saying a "phantom" radio operator was transmitting false air traffic control instructions on a la Guardia frequency. The item was prepared for Ted Koppel's broadcast, but in place of the word "phantom" used by AP, ABC personnel substituted the word "ham."

"Ham" is not a generic term that might be used to describe anyone with a radio transmitter. Webster's lists one of the meanings of the word "ham" as "a licensed operator of an amateur radio station." The news item described the transmissions as being originated by an unknown person, so it would be utterly speculative to state as a fact that the person was a ham. Indeed, the following morning Alexander Zimney, FCC Engineer-in-Charge of the New York office, said: "We do not know this person to be a ham."

We understand that to its credit, ABC corrected the item on subsequent feeds. But the damage had already been done in millions of households. We do not even know the full extent of the damage, because some local stations that do not broadcast the first feed apparently picked up the item from that feed to be read by their own newscasters. Thus, last Monday night ABC News described ham radio as being a threat to airline safety and planted an unwarranted negative impression of ham radio in the minds of millions of people.

In fact, as I'm sure your own staff will confirm, ham radio operators have provided enormous assistance to relief efforts following recent air disasters; the Delta crash at DFW and the Air Florida disaster at Washington National come immediately to mind. In addition, ham radio has provided considerable support to the electronic media when disasters or crises have occurred in such places as Grenada and Mexico City, where normal communications were disrupted. Your New Haven affiliate has been most welcome to use the facilities at our national headquarters on such occasions, whenever they have asked to do so.

Simple justice requires that a clarification be carried on ABC World News at least as prominently as the original offending item. While the damage can never be fully repaired, we believe this is the least you can do in recompense.

Sincerely yours,

David Sumner
Executive Vice President

LARRY E. PRICE
PRESIDENT
JAY A. HOLLADAY
FIRST VICE PRESIDENT
LEONARD M. NATHANSON
VICE PRESIDENT
WILLIAM J. STEVENS
VICE PRESIDENT
TOD OLSON
INTERNATIONAL AFFAIRS
VICE PRESIDENT
PERRY F. WILLIAMS
SECRETARY
JAMES E. McCOBB JR.
TREASURER
203-666-1541
ARRL
NATIONAL JOURNAL

ABC NEWS
7 West 66th Street, New York, New York 10023 Telephone (212) 687-7777
87 AUG 31 PM 1987



August 27, 1987

Mr. David Sumner
Executive Vice President
The American Radio Relay League, Inc.
Administrative Headquarters
Newington, CT 06111

Dear Mr. Sumner:

Your August 24, 1987 letter to Boone Arledge concerning the World News Tonight broadcast of August 17, 1987 has been referred to me. I have attached the full text of Ted Koppel's on-camera item concerning false instructions radioed to pilots in the New York area.

In the first feed of World News Tonight Mr. Koppel did indeed refer to the illegal transmitter as a "ham radio operator." We acknowledge your point that "ham" was an ill-chosen adjective in that particular context (especially since we still do not know if the source was, or was not, a ham radio operator).

You will note that in the same story Mr. Koppel also characterized the culprit as being a "phantom voice," and it's obvious that his script was not targeted at the nation's amateur radio operators. Nonetheless, we regret the imprecise language -- even though, as you say, it was unintentional. Subsequent feeds of World News Tonight changed the script to clearly identify the transmitter as being of unknown origin.

We appreciate having your views and we are certainly aware of the public service role that amateur radio operators have played in time of crisis. However, I'm afraid I cannot share your conclusion that 430,000 Americans were "maligned" in this incident.

Sincerely,

Robert R. Siegenthaler
Robert R. Siegenthaler
Vice President, News Practices

RRS:as
att.
cc: Ted Koppel.

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

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

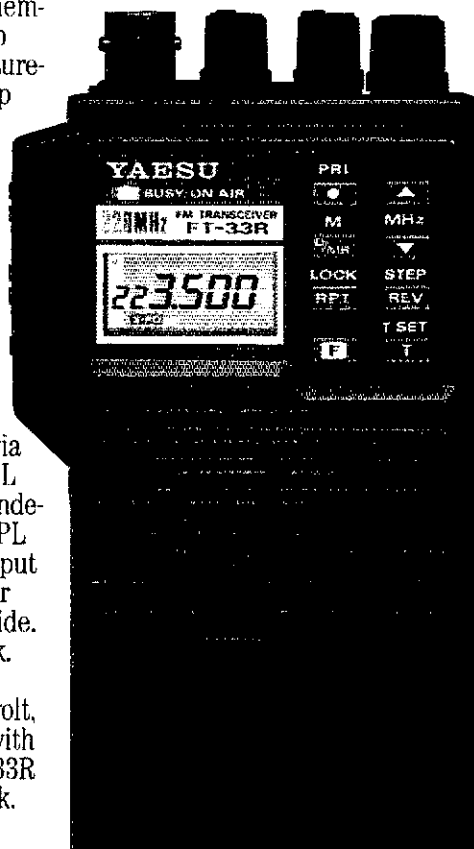
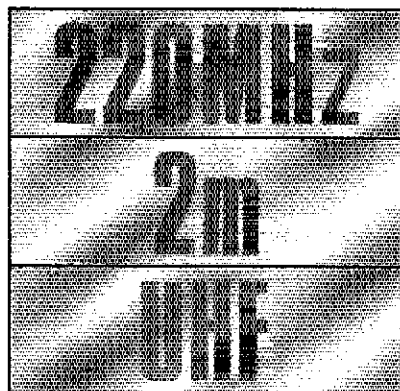
To begin with, you'll find a model that's right on your wavelength. The 2-meter FT-23R. The 220-MHz FT-33R. Or the 440-MHz FT-73R.

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

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

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

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



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

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

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

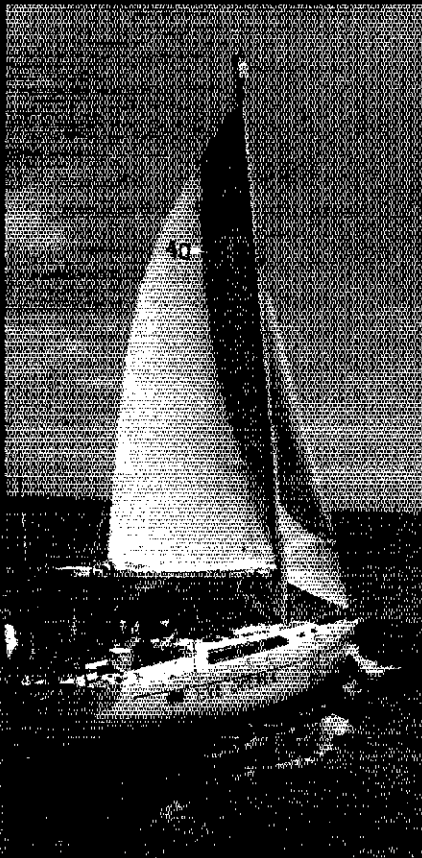


YAESU

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

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

KA3SBU: Ham/Sailor with a Mission



Tuesday, Aug 4:

Friday, Aug 14:



Maxim Award Winner Scott Young, N9FZS

The Hiram Percy Maxim Award is awarded annually in recognition of a young person's accomplishments and contributions in public service, technical development, operating, recruitment, public relations and other amateur-related activities.

This year's winner is Scott Young, N9FZS. Scott is 18 years old and a Senior at Colby High School, in Colby, Wisconsin. He plans to attend the Milwaukee School of Engineering in the fall.

Scott comes from a three-ham family. His younger brother is KA9SMQ, and his father is KA9UXN. Scott was first licensed in 1984 and presently holds a Technician class license. He is very active in various public-service nets, has recruited a number of fellow high-school students into Amateur Radio and has assisted in instructing Amateur Radio classes.

Calling All Vans

ARRL HQ is seeking information on the number of Amateur Radio mobile communications vans in existence across the country. The information will be used in connection with a study of the possibilities of employing mobile vans in a formal, national program of public demonstrations of the capabilities of Amateur Radio. The public would be given a hands-on demo of HF and VHF operations, and invited to participate in local and regional licensing classes.

If you or your local club know of mobile Amateur Radio communications vans, please send related information to ARRL HQ, attention Rick Palm, K1CE.



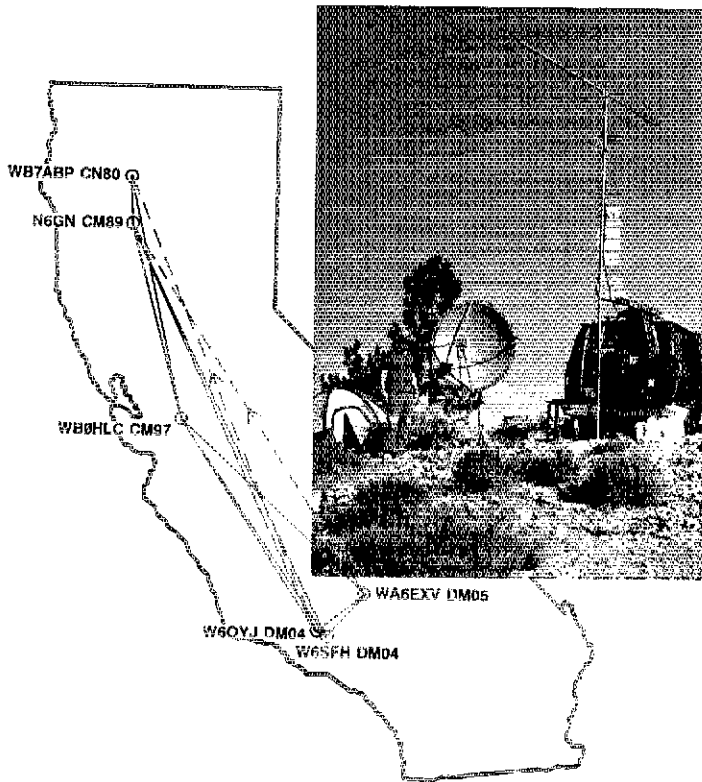
Join-in-Jamboree Worldwide: You can earn this terrific QSL—and win the admiration of Scouts in your area—during the 30th Scout Jamboree-on-the-Air, October 17-18. Invite a local Boy Scout or Girl Scout unit to your shack for a fun-filled introduction to Amateur Radio. As control operator of your host station, you can give a Scout hands-on operating experience during this two-day event. Recall the wonder of your first visit to your Elmer's shack! Help a Scout working toward a Radio merit badge and plant the seed for lifelong Amateur Radio enthusiasm! Contact your local Scout council service center for the name of a unit leader in your area. For complete operating guidelines and frequencies, see this month's Contest Corral, page 86.—*N7IAL*

ARRL Foundation Brings Faraway Places Closer to Students: "Don't worry, young man. Just press the button and speak clearly," says Henry Fales, KZ1V, to an eager, yet shy, Cape Cod fourth grader. Inspired by a ham radio film and talk by Section Manager Luck Hurder, KY1T, two fourth-grade classes plus teachers decided to work toward Novice licenses. The ARRL Foundation and an Eastham, Massachusetts, Parent-Teacher Association provided funds for equipment, which the students enjoyed using for sending radiograms and listening for DX. Now with 40 new Novices, the classes hope to explore packet and ATV—again with equipment courtesy of the ARRL Foundation and PTA. Way to go, folks! You'd have made Marconi, the best-known Cape operator, very proud.



Congratulations, Art! In this column in May, we reported on an exciting new operating challenge: a packet radio endorsement for Worked All States. That call was answered quickly by Art Blumenthal, KF6EE, of Lone, California, who came away with Packet WAS certificate number 1, which he proudly displays here. The first 10 qualifiers will receive a commemorative plaque, so there's still plenty of time to claim one for yourself.





You Asked for It

K. A. Fichthorn, N1AB, of Plantsville, Connecticut, recently wrote to HQ wondering how the number of radio amateurs has compared with the total US population over the years. Among the things we found while researching N1AB's request is that while the US population has nearly doubled since 1930, the amateur population is almost 22 times larger than it was at that time. As for the percentage of hams to the total US population, there's more good news: In 1930, one of every 6500 people was a ham, while in 1984 there was one ham for every 580 people. Here's the breakdown by decade. The ham population now exceeds 430,000.

Year	US Pop	Ham Pop
1930	123,000,000	19,000
1940	132,000,000	56,000
1950	151,000,000	87,000
1960	179,000,000	203,000
1970	203,000,000	264,000
1980	227,000,000	393,000
1984	237,000,000*	410,000

Sources: US Bureau of the Census and FCC figures, rounded off.

*Census Bureau estimate.

Six Make Record 10-GHz QSO in 6-Land

On July 19, after months of preparation and coordination, California Amateur Radio microwave enthusiasts WB7ABP, N6GN, WB0HLC, W6OYJ, WA6EXV and W6SFH (assisted by WA6KOD, shown in the photo) set up stations on six mountaintops in California to attempt to break the North American record and the world overland DX record for 10 GHz.

The effort paid off, and a predawn tropospheric duct opening made multiple contacts possible. The longest contact was 413.8 miles between W6SFH and N6GN, substantially breaking the previous US record of 296 miles. Transmitter power was approximately 250 milliwatts on 10,368.0003 MHz.—Glenn Elmore, N6GN



And the Winner Is: Father Marshall Moran, 9N1MM, has been awarded the second annual ARRL International Humanitarian Award. Shown in the photo (at left), Father Moran greets the King of Nepal, who was part of a group visiting the St Xavier Mission in Nepal, where Father Moran has lived since 1950. (photo courtesy W3WGS)



Ham Radio Teachers Victims of Discrimination?

So it may seem in *this* parking lot. However, citizens of Rochester, New York know the sign is for the customers of Elmer's garage, adjacent to the parking lot.

League Lines

The ARRL has filed comments in PRB-3, the FCC inquiry to determine if the private sector could establish a *program to grant requests for specific amateur call signs*. For further details see this month's Happenings column. Just at press time we received word that the FCC had extended reply comments until September 8. The extension came at the request of Forest Industries Telecommunications, who said that due to delays in receiving copies of the comments filed at the FCC, it was not possible to review them and to prepare and file meaningful replies by the original August 31 deadline.

220 Update: ARRL President Larry Price, W4RA, "completed his rounds" for General Docket 87-14, the proposal to reallocate part of the amateur 220-MHz band, by visiting FCC Chairman Dennis Patrick on August 6; he had called on FCC Commissioners James Quello, Mimi Dawson and Patricia Dennis in June and July.

The ARRL has filed supplemental reply comments in this proceeding; they are detailed in this month's Happenings column.

Meanwhile, the Society of Broadcast Engineers (SBE) has filed reply comments sharply critical of the FCC's proposal: "SBE believes that the reallocation of the 220-222 MHz band to the land mobile industry is unnecessary and would result in underutilization of the band. The Commission's assumption that the land mobile industry needs this additional spectrum is unfounded."

In other news regarding the 220 band, the FCC has denied the petition for reconsideration filed by The Association of Radio Reading Services (ARRS) which had sought the reallocation of 500 kHz of spectrum in the 220-225 MHz band on a primary basis for use nationwide by radio reading services for the blind and print handicapped. The FCC had denied the original ARRS petition in February. The ARRL had filed comments opposing both the original petition and the petition for reconsideration.

In denying the petition for reconsideration the FCC said: "In the case of the ARRS petition, we are convinced that there are existing sufficient means for providing reading services both by radio and by alternative methods. In fact, use of FM subcarriers... and other methods are spectrum efficient ways to provide radio reading services because they take advantage of services already in place without utilizing additional spectrum. Accordingly, we decline to issue a proposal as suggested by ARRS."

ARRL Director and Vice Director elections: At press time the Executive Committee had not yet met to certify the candidates. However, it appears that elections will be held in the Delta, Great Lakes and Midwest Divisions. In the Dakota Division, no petition for Director was received prior to the August 20 deadline. Also in the Dakota Division, Vice Director incumbent Richard Whiting, W0TN has declined renomination, so new petitions for these offices are now being resolicited. See this month's Happenings column.

Open House: The ARRL HQ building and W1AW, the Hiram Percy Maxim Memorial Station, will be open on Saturday, October 24, from 10 AM to 4 PM. If your club would like to schedule a visit on this date, please notify HQ. Be sure to bring a copy of your operator's license if you'd like to operate W1AW.

The 1987 ARRL Simulated Emergency Test (SET) is scheduled for October 17-18. SET is an important exercise that will give the Amateur Radio Emergency Service (ARES) a chance to practice communication skills under simulated emergency situations. For more details, see September *QST*, p 75.

Section Managers please note! The Field Services Department at HQ has just finished revising the "job descriptions" for each of the Section Manager's staff and station appointees. Need to know what your Technical Coordinator is supposed to coordinate or what an Official Observer observes? Contact Field Services for quantities of these important recruitment tools.

Speaking of recruitment, *the Amateur Auxiliary to the FCC's Field Operations Bureau needs more volunteers in your area!* Auxiliary members have assisted thousands of amateurs with keeping their equipment and operating procedures in harmony with FCC regulations for over 50 years. Contact your Section Manager, or Luck Hurder, KY1T, at HQ for more information.

The 1987 edition of the ARRL *Handbook has been sold out!* The 1988 edition, which will have a hard cover, is due out later this fall. Its price will be \$21 (\$23 in Canada) plus \$2.50 shipping if ordered separately from HQ.

Want to learn the latest in amateur packet radio? The 6th Computer Networking Conference book is now available for \$10, plus \$2.50 shipping if ordered separately from HQ. This book consists of 31 papers presented at the Conference, held at Redondo Beach, California, August 29.

CQ SS...CQ SS...CQ SS! It's Sweepstakes time again! For full details about this popular contest, held the first and third weekends in November, see the Sweepstakes announcement on page 72.

Job opening at HQ: The Production/Editorial Department is looking for a ham with an English or Journalism background (education or paid work experience) to fill the position of *Editorial Assistant*. The successful candidate will have a broad range of hands-on editorial responsibilities. Starting salary range \$13,754-16,510. Send your resume and a cover letter to the Assistant Managing Editor at HQ.

The Mystique Behind Miniaturization—Surface Mount Technology

Pocket-size handhelds, TVs the size of a watch— isn't it amazing? Here's a look at some of what makes this technology possible.

By David S. Hollander, N7RK

2313 E Ocotillo Rd
Phoenix, AZ 85016

The electronic packaging revolution is upon us. Electronic equipment is getting smaller and smaller, with miniaturization being the name of the game. We now have hand-held transceivers that fit into a shirt pocket. Station transceivers that would have occupied an entire desktop 20 years ago, now are essentially portable radios. How has this all come about?

One of the major contributors to miniaturization is the use of surface-mount technology (SMT). Several years ago, electronics manufacturers began to mount miniaturized components directly on the surface of PC boards—an automated technique that evolved from thick-film hybrids. (Here, "hybrid" means an assembly built on a substrate using chip capacitors, resistors and so forth.) Today, surface mounting can meet the electronics industries' insatiable demand for boards that are smaller, cheaper and more reliable.

Surface mounting is changing most aspects of the electronic industry. For example, the electronic component industry must now create whole new families of tiny active, passive and electromechanical devices to meet the demand for surface-mountable components. Some of these devices are shown in the title photo. New kinds of automatic assembly and soldering machines currently used in production lines place and attach components to boards at fantastic rates. This automated equipment is constantly being improved.

In this article, I'll introduce you to some surface-mount components available from Motorola, and acquaint you with the

terminology and manufacturing processes of the surface-mount world. Then, you'll have a better understanding of just how all

that electronics power at your disposal is contained in such a small package.

What is Surface Mounting?

Surface mounting involves soldering a component directly to a series of solder pads called a *footprint*, rather than inserting the component leads into holes on a PC board. The footprint is a series of pads that conform to the lead layout of the surface-mount device (SMD) or component (SMC); see Fig 1. Both old and new mounting techniques are shown in Fig 2.

Surface mounting has several advantages over the insertion method it is replacing. For example, the use of smaller components and the elimination of PC-board through holes can *triple* board density. The use of a smaller board with fewer layers cuts costs immediately. Additionally, circuit performance is improved. With the smaller boards, traces between components are shorter, lowering parasitic inductance and capacitance. Table 1 shows the benefits achieved by redesigning a board to use SMT. The table illustrates only the savings obtained by redesigning a *single* board. Approximately 65% of a unit's costs are related to component size. Some of the cost parameters related to component size include the number of PC boards, cabinet size, connectors and cabling, and cooling requirements.

Surface mounting allows components to be placed on *both* sides of a PC board—a major advantage. The use of chip capacitors, resistors and semiconductors can, in theory, give these boards densities equal to those of hybrids.

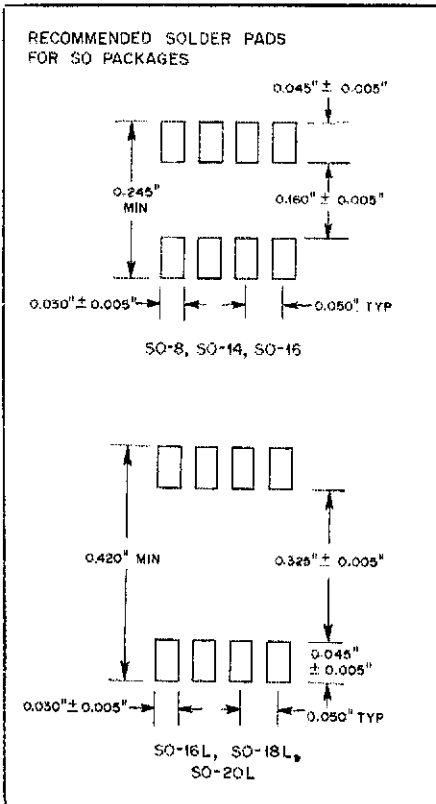


Fig 1—Typical surface-mount component footprints.

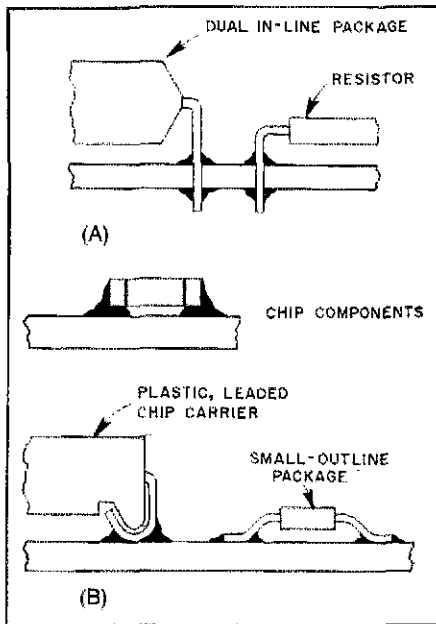


Fig 2—For years, the through-hole mounting of leaded components (A) has been common. Surface-mounting techniques (B) with leadless chip components and miniature IC packages are now being used in volume board assemblies.

The Surface Mount Assembly Process

Figs 3A and 3B show the top and bottom, respectively, of a surface-mount IC. Prior to mounting, the leads of the SMD are plated or tinned to provide a better solder joint. In addition to providing better solderability, the tinning adds a small amount of clearance between the package and the board, which permits automated cleaning of solder flux residue from the board.

Fig 3C shows the PC-board footprint to which the SMD is attached. Pretinned PC boards (provided by most PC-board manufacturers) aid SMD attachment. That's because the electrical and mechanical connections are made at the footprint pad by solder reflowing and joining the parts. Extra solder is required at this joint. Therefore, solder paste is "printed" onto the pads as shown in Fig 3D. This is normally done by a screen printer. The paste allows the required solder to form the joint fillets that are so important to electrical and mechanical connections. After the component is placed on the solder paste (Fig 3E), the operation is completed by means of a vapor phase reflow soldering process that melts the solder and bonds the SMD to the PC board as shown in Fig 3F. Then, the board is cleaned with a solvent and ready to be tested.

Component Packaging

All SMDs come packaged in one of the following forms: tape and reel, sleeves, bulk and in vials. With SMDs, it's no longer necessary to preform axial compo-

Table 1
Assembly Technique Comparison

	Through hole	Surface Mount	% Reduction
Board size (inches)	11 × 14	6.5 × 9.6	59
Number of layers	6	4	33
Board cost (dollars)	150	75	50

nent leads. This eases the automated PC-board assembly process. Automated assembly lines for SMD boards occupy up to 50% less factory space than autoinsert lines do. Fig 4 shows how automation is used in assembly of a surface-mount board.

Surface-Mount Components

Components presently available in surface-mount packages include chip resistors, inductors, chip capacitors, ICs, switches, crystals, relays, transformers and connectors. New surface-mount components are being introduced every day.

Passive Components

A typical chip resistor and its construction are shown in Fig 5. The solder coating on the termination metallization provides a pretinned connection point suitable for reflow or other soldering techniques. The resistance element is a glass-passivated, thick-film element on a highly

pure alumina substrate; the result is a reliable and precision component. Chip resistor values range from 10 Ω to 2.2 M Ω , with tolerances of 5 or 10%; power dissipation is 1/8 W.

Chip capacitors (Fig 6) are of monolithic construction and have a totally encapsulated electrode system and metallized terminations. The electrodes are deposited in the ceramic chip using an interleaved pattern, with two electrodes forming a single capacitive layer. The layers are stacked to increase capacitance. Chip capacitor values presently range from 1 pF up to 33 μ F.

Discrete Low-Power Packages

There are several low-power packages in SMDs. These include the SOT-23, SOT-143, SOT-89 and SO-8; the SO prefix stands for "small outline." The SOT-23 (TO-236) shown in Fig 7A is 0.115 inch wide and 0.090 inch high. Such a package

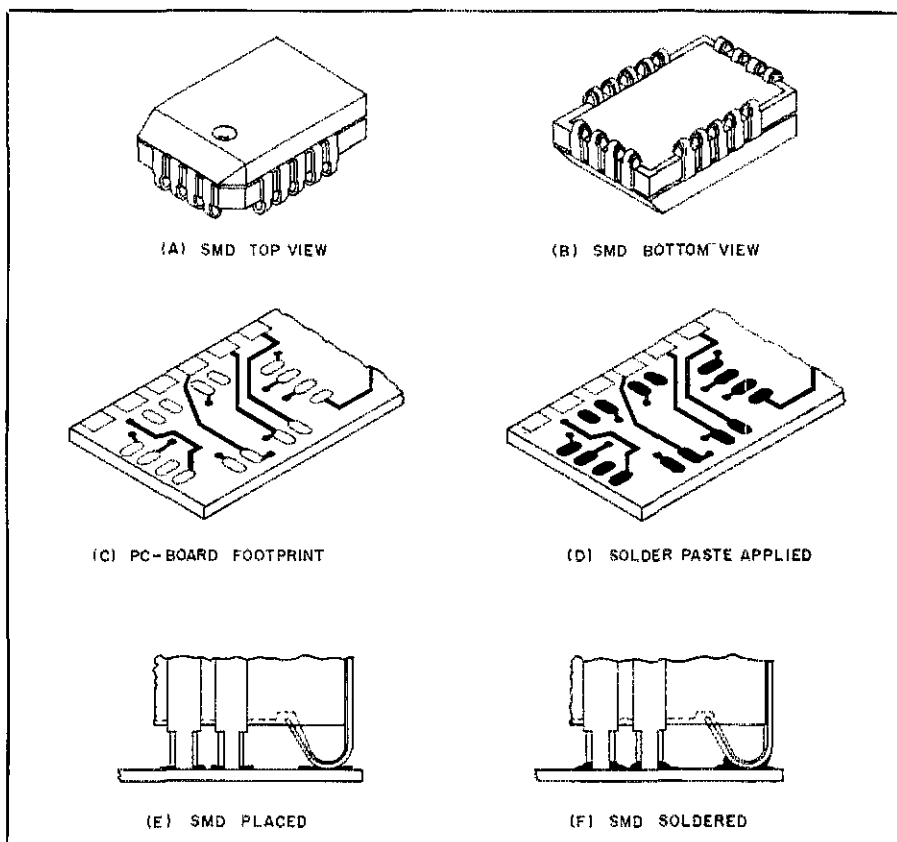


Fig 3—A pictorial description of the surface-mounting process. Close-ups of one corner of the SMD are shown at E and F. See text for more details.

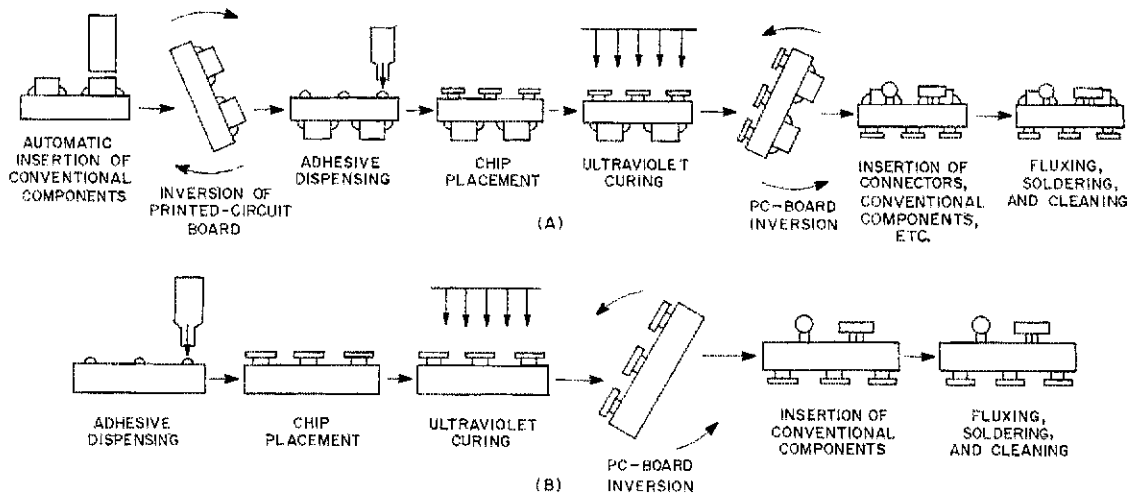


Fig 4—Surface-mount PC-board assemblies can be produced automatically (A) or semiautomatically (B). On semiautomatic assembly lines, the through hole leaded components are inserted manually.

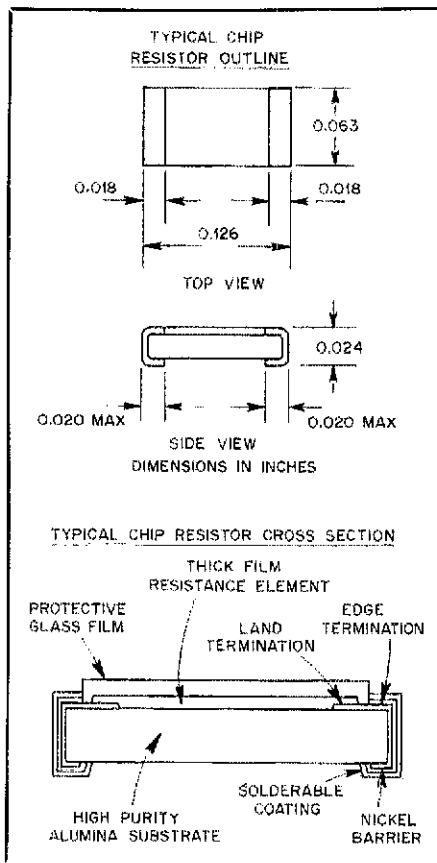


Fig 5—Typical surface-mount chip resistor construction.

can dissipate up to 200 mW in free air, or up to 350 mW when attached to a ceramic substrate. Products available in this package include small-signal transistors (bipolars and FETs), tuning, switching and Zener diodes, and SCRs. The SOT-143 is similar to the SOT-23 with the exception of having four leads. Bipolar RF transis-

tors are available in this package.

For applications where high power dissipation is needed, there's the SOT-89 (Fig 7B). This package (only 0.178 inch across and 0.059 inch high) can dissipate 500 mW in free air and 1 W when mounted on an alumina substrate. Products in this package include bipolar, high-voltage, RF and Darlington transistors.

There are two packages available for use in RF applications: the SOT-143 and an SO-8 modified for RF use known as the SORF. The SORF package has a power dissipation of 1.5 W at 25°C. Currently, 870-MHz bipolar transistors are being offered in this package. Where the need arises for transistor and diode arrays, Motorola offers low-voltage quad transistor arrays in the SO-16 package and diode arrays in the SO-14 package.

Leadless Diodes

A wide variety of rectifiers and Zener diodes are produced in the small cylindrical glass package referred to as MELF (metallized electrode face), MINI-MELF and MLL (Motorola leadless). Two packages are offered—the MLL34 and MLL41. A full range of ¼, ½ and 1-W Zener diodes are made using the same die as products presently offered as DO-35 and DO-41 Zener diodes. The rectifier category includes 0.5- and 1-A general-purpose and Schottky rectifiers.

Power Devices

Until recently, SMDs have been primarily available in the low-power category. For applications requiring high-power components, there are two options: the DPAK and TO-220 cases.

The DPAK is a power package developed specifically for surface-mount applications; it resembles a miniature TO-220 case. The DPAK has a power dissipation of 1¼ W at 25°C in free air, and 1¾ W when

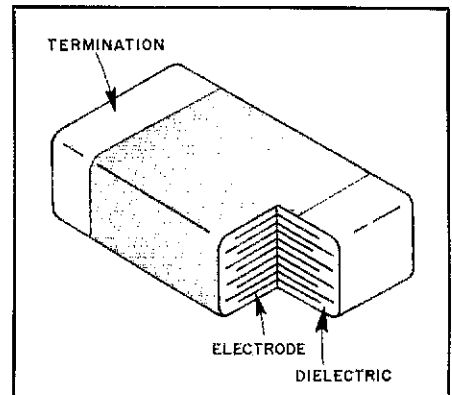


Fig 6—Chip capacitor construction.

mounted to a glass-epoxy PC board. DPAK product offerings will include bipolar power transistors, TMOS™ power MOSFETs, thyristors, rectifiers, Zener diodes and transient suppressors.

For power devices requiring a higher power rating and larger die size than DPAK can accommodate, there's the industry-standard TO-220 package. The TO-220 has a power dissipation rating of 4 W when mounted on a glass-epoxy PC board. Any existing TO-220 product can be lead-formed for surface-mount applications. The current Motorola TO-220 family includes bipolar power transistors, TMOS power MOSFETs, thyristors, rectifiers, Zener diodes, transient suppressors and RF power transistors.

Integrated Circuit Packages

ICs are produced primarily in two packages: the SOIC (standard outline integrated circuit) and the PLCC (plastic leaded chip carriers). The packages have pin counts dependent on the device functions. PLCCs offer the flexibility of higher pin count functions in a smaller package than its

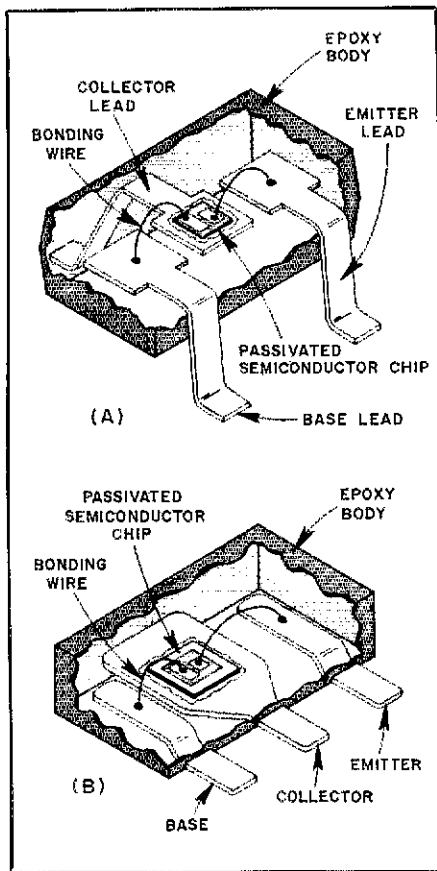


Fig 7—SOT-23 (A) and SOT-89 (B) package construction.

leaded equivalent. PLCCs take up approximately one-third the board space of their equivalent leaded device. A wide variety of digital-logic and linear ICs is produced as SMDs.

Gull-Wing and J Bends

SMDs are supplied with the two lead configurations shown in Fig 8. SOICs, SOTs and plastic flatpacks have gull-wing leads; PLCCs have the J bend. There are advantages and disadvantages to both lead types. Gull-wing leads can be probed easily by test leads and gull-winged packages are more easily handled by "pick and place" equipment. Packages with J-bend leads have smaller footprints and take up less real estate on the PC board. Their solder joints, however, are not inspected easily and test points must be provided to access the leads.

Surface-Mount Devices and You

Although surface-mount technology is benefiting Amateur Radio in commercially produced equipment, it's probably not well suited for use by the casual experimenter. Many of the components are designed to be placed on circuit boards by high-speed automated pick-and-place equipment and cannot be manipulated easily by hand. Additionally, most of the SMDs are presently not available in small quantities: One must purchase an entire reel of components, which could contain as many as 10,000 pieces! If you want to try hand

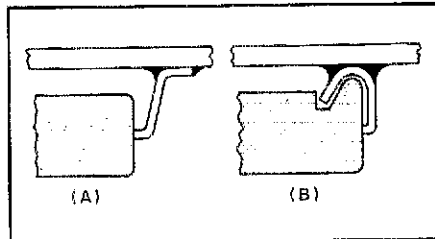


Fig 8—SMD lead variations. Gull-wing leads (A) are inspected easily; they can be accessed with test probes. The J-shaped counterparts (B) have a smaller PC-board footprint and are handled easily by automatic feeding machines.

assembly with SMDs, here are some ideas on how to go about it.

First, you'll need some sort of magnifying glass because most of the components are extremely small. The PC boards must be laid out with footprints to accommodate the devices to be used. Recommended footprints for SMDs can be found in most manufacturer's data books, data sheets or surface-mount guides.

The techniques for laying out and etching an SMD PC board are much the same as you've always used, except that no through holes are necessary for mounting SMDs. When determining component placement on the board, anchor the board so it is free from vibration. If you sneeze or bump the board before the components are glued in place, you'll not only have to start over, you may have a difficult time finding the missing components! Prior to component placement, all pads should be tinned. Glue the component into location. Although I've not done so, you might try using Super Glue™ as it can be dissolved with acetone or nail polish remover (take proper precautions when using these materials) if a component is placed incorrectly.

To handle the small components, you'll need tweezers, perhaps of different sizes. The tweezers should preferably be the type that are normally closed, as they will retain the component easier than standard tweezers. Once all the components are in place, proceed with the soldering. Use as little heat as possible on components with metallized ends (chip capacitors, diodes, and so on) as too much heat can cause the metallization to leach off, which renders the component unusable.

After soldering, clean the boards of remaining flux. Inspect the board with a magnifying glass. Look for solder bridges, cracks in traces, leads or components, cold solder joints, missed connections and so on. Remember: For SMDs, the solder joint provides the mechanical and electrical connection of the component lead to the board. Too little solder results in a weak joint that can cause problems later.

To remove a misplaced or defective component from the board, use solder wick and an adhesive remover. Dispense the adhesive remover using a small syringe to keep the

liquid confined to the component being removed.

Summary

Surface-mount assemblies are becoming more common every day. These assemblies increase the potential of fully automated assembly lines and lead to size and cost reductions as well. How much smaller can your radio be? Only time will tell!

Dave Hollander's interest in radio dates back to 1961, when he built a crystal set. About the same time, his father, then unlicensed, gave Dave an old Hallicrafters S-41W receiver. SWLing kindled Dave's interest in Amateur Radio and DXing. Dave obtained his Novice license, WN6IWX, in 1963, and immediately began operating. The DX bug bit hard when a KM6 called Dave early one morning on the 80-m Novice band. In 1965, Dave acquired his General class license and the call WB6NRK, which he held until 1977 when he received N7RK. Dave's also held the calls ZM0AJN and VK2ERK.

Over the years, Dave's interests in Amateur Radio have included building equipment and antennas, CW operation, HF and VHF DXing, and HF mobile operation. Dave has 320 countries to his DXCC credit, but claims his biggest accomplishment in the DX realm is receiving WAZ No. 23 on 75-m phone—the sixth such certificate issued in the US, and the first one to be issued outside of California.

There are several hams in his family. Dave's wife, Jo Ann, is KA7LRG; his dad is N6UC (another DXer) and his brother-in-law is WA6SOJ.

Dave holds a BSET from Arizona State University and has worked at Motorola in the Discrete Semiconductor Group for over 13 years. That experience includes having worked five years in the RF Power Transistor group (100-MHz to 1-GHz power devices), three years in the Low Frequency Power Transistor group (he was involved in the start-up of TMOS Power MOSFETs) and the past three years in Discrete Product Marketing.

Dave's other interests include downhill skiing, camping, model railroading and antique cars—he owns a 1947 Plymouth coupe that he restored. Dave has published articles in QST and several of the electronic trade journals, and he has published several application notes at Motorola.



QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

Fuji-OSCAR 12 is Japan's first Amateur Radio satellite. Its downlink signal is transmitted by phase-shift keyed (PSK) modulation, and JAMSAT designed a PSK modem to decode the satellite's packet signals. In turn, the Tucson Amateur Packet Radio Corp tested and evaluated the modem, making appropriate circuit changes for more efficient operation. TAPR "lets the cat out of the bag" this month by featuring the schematics of their modified PSK modem in the pages of QEX.

The September issue of QEX also includes articles on:

- "Thoughts on Emergency Use of Phase IIC and Phase IV," by James Eagleson, WB6JNN

- "Circuit Designer's Interface for the IBM PC," by Larry Rockfield, W6UB

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL/AMSAT members is \$8 for 12 issues; for nonmembers, \$16. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

Alternative Energy—An Overview of Options and Requirements

Part 2: Energy storage is necessary to smooth out natural variations in supply. And what about system safety once your alternative energy plant is up and running?†

By Michael Mideke, WB6EER

Box 123
San Simeon, CA 93452

Some alternative energy sources, such as wind and sunshine, are intermittent and variable in nature. Others may be constant, but of a level too low to meet intermittent peak demands. In all such cases, energy use is determined by the vagaries of nature unless some form of energy storage is employed. One way or another, a means of smoothing out the peaks and filling in the valleys of energy production must be provided.

In hydroelectric systems, this storage may amount to no more than the confinement of water in a reservoir until its energy is needed. Then, opening a valve or sluice gate sets the water in motion, and the kinetic energy in the flow may be tapped by a turbine. Reservoirs work well with water, but are impractical—to say the least—when the energy source is wind or sunshine. A way must be found to store the energy from these sources after it has been converted to electricity.

Capacitive Storage

Electrical energy can be stored in capacitors. This is a useful approach when the available charging current is small in relation to a momentary high-current demand, as in photoflash systems, or if the powered system requires voltage at relatively little current, as is the case with short-term memory backup in computer circuitry. Advances in capacitor design allow us to store more and more energy in ever smaller packages, but we are still a long way from seeing capacitors that can compete with storage batteries when the

application is one of sustained and regulated discharge.

Electrochemical Storage

Storage batteries provide a practical means for storing large amounts of electrical energy, though it is not really accurate to say that *electricity* is stored in such a battery in a manner akin to capaci-

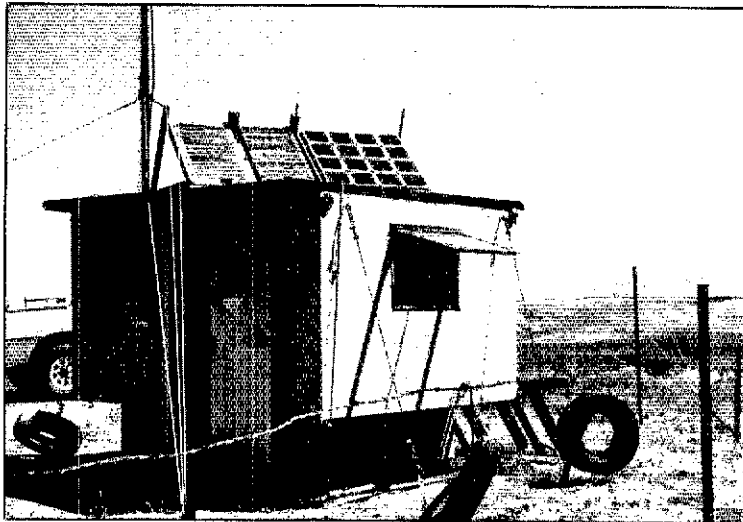
from tiny to enormous. Various battery chemistries are used, depending on the intended service. Which battery you use is determined by the application you have in mind. Size, weight, charge and discharge characteristics, expected lifetime in the proposed service—all of these are important considerations in choosing a storage battery. There is some advantage in using

the largest batteries that size, weight, cost and acceptable float-charge load allow: Large batteries mean a large reserve capacity for emergencies or unanticipated use. For a given battery chemistry, life expectancy is generally greater for large batteries than for small ones.

Nickel-Cadmium Batteries

Highly portable low-power applications are commonly powered by nickel-cadmium (NiCd) batteries. These batteries produce a nominal 1.2 V per cell and should survive around 500 charge-discharge cycles. Some NiCd cells can safely sustain rapid recharging, providing an extra measure of flexibility in portable and emergency situations. NiCd

cells are produced in the cell packages commonly associated with primary cells (AA, D, C and so on) and can be used interchangeably with primary cells to some extent. It's important to bear in mind, however, that the difference between zinc-carbon and NiCd cell voltages at full charge (0.3 V) makes for significant under-voltage when NiCd cells are series connected to take the place of an equal number of zinc-carbon cells. Perhaps one or two more NiCd cells can be added to such a battery to make up the difference. But the voltage



Here's solar-powered 2-meter repeater WB6RHR/R, Red Hills (near Shandon), California. Although this installation is not connected to commercial power in real time, it owes its hardware and maintenance to energy-intensive techniques—as do all alternative-energy systems. (photos by WB6EER)

storage. Rather, electrochemically stored energy is invested in a chemical reaction that is reversed when the battery is discharged. The reversibility of this storage reaction is what makes the difference between primary and secondary cells: The electrochemical reaction in primary cells is not easily reversible, disallowing recharging; secondary cells may be discharged and recharged many times.

A wide variety of storage batteries has been developed to meet many storage needs. Sizes and storage capacities range

†Part 1 appeared in Sep 1987 QST, p 17-21.

match is rarely exact in such cases, and addition of more NiCd cells often means substituting too much battery voltage for too little. Since equipment may be damaged by excessive supply voltages, substituting NiCd cells for zinc-carbon units is trickier than it may seem at first—especially if you've added additional cell holders to a battery and someone unknowingly installs zinc-carbon cells!

Lead-Acid Batteries

When small battery-powered equipment is used in such a way that the battery is subject to frequent deep discharges, NiCd cells may be the preferred choice. Where deep discharges are only occasional and float-charge current is generally available, a gelled electrolyte lead-acid storage battery should prove more economical in the long run. The nominal cell voltage for lead-acid batteries is 2.0 V.

When it is necessary to power remote sites, especially if they are not vehicle-accessible, 12-V gel batteries rated at about 30 Ah are nearly ideal. Weighing 25 to 30 lbs, they can be transported nearly anywhere with relative ease. Because these are sealed batteries with rugged mechanical characteristics, there is little danger of damage regardless of the contortions that may be necessary to get them to their destination. When higher voltage or greater storage capacity is required, simply use more batteries in series or parallel and distribute the hauling job among carriers or over time. This is infinitely superior to struggling with one giant battery.

Higher power applications, such as operating HF transceivers or household lighting and appliances, require larger batteries. Where the powered site is accessible and power requirements are large, the 30 Ah gel battery is no longer a cost-effective building block. Then, the best compromise between economy and service life is the liquid-electrolyte lead-acid battery.

Automotive batteries are often pressed into this service, more because of their ready availability than suitability for the job. The automotive battery employs a lead-calcium plate chemistry that is satisfactory for brief periods of high-current discharge followed by immediate and complete recharging. Such batteries are not suited to deep-discharge applications where they will be repeatedly drained to a 50% discharged state. In fact, a dozen or so such cycles will reduce the battery's capacity to the point where it should probably not be counted on to start a car. By contrast, batteries designed for deep-cycle service should be good for a few hundred charge-discharge cycles.

This does not mean that automotive batteries are unsuitable for all alternative energy applications. Where the average load current is low and some energy is available to keep the battery float-charged

to near capacity most of the time, its useful life may considerably exceed its rating for automotive service. Although the life of such a battery *will* be reduced by deep discharging, the battery will deliver something close to its rated capacity for the discharge rate in question. Prompt recharging will restore the battery almost to its initial capacity. The self-discharge rate for healthy automotive batteries is lower than that of equivalently rated deep-cycle batteries, so the float-charge current required to keep an idle battery fully charged will be lower for the automotive battery.

Where regular use of higher-power equipment (perhaps 30 W and up) or conversion of battery power to 117 V ac is contemplated, the most practical and economical battery "building block" appears to be the 6-V, 217-Ah units designed for golf carts and similar applications. These are deep-cycle batteries with a lead-antimony plate chemistry. They weigh approximately 70 lbs each and can be moved around fairly easily. For increased storage capacity, they can be connected in series and parallel. Such deep-cycle batteries should have a service life of nearly 10 years if reasonable care is taken in their application.

Large batteries no longer capable or trustworthy in their original service may still do useful work with smaller or less critical loads.

Battery manufacturers consider a battery's useful life to be over when its storage ability has dropped to 50%-80% of its capacity when new. This does not really hold true where the battery has more capacity than necessary for the job. If normal usage of a battery draws only 10% of its rated capacity, it doesn't make much difference whether the battery is 90% as good as new or only 50%. As long as the battery delivers its rated open circuit voltage (no shorted or dead cells) and maintains acceptable voltage under load through the required duty cycle, it is still usefully "alive" for that application. Of course, as a battery ages, its emergency reserve becomes questionable, and overall efficiency is reduced. Eventually, the battery *will* fail; all batteries have a finite life span. The point here is not that we should buy batteries that are much larger than we need, but that large batteries no longer capable or trustworthy in their original service may still do useful work

with smaller or less critical loads. This is especially true of older batteries, which can be used to store surplus energy if it is available to trickle charge them.

More Battery Chemistries, Old and New

Earlier this century, much use was made of the nickel-iron chemistry of the Edison cell, particularly because of its lighter weight and tolerance of abuse as compared with the lead-acid batteries of the day. If you can find salvageable Edison batteries, it's quite possible that they can be made to work for you. See the sidebar, "Edison Batteries," for the story.

Looking to where the present blends into the future, research continues in the quest for increased battery life and capacity. Recently, rechargeable lithium cells have made the scene.² The dependability of alternative energy systems rests heavily on energy storage, so each improvement in battery and energy management technology is good news for alternative energy planners—especially as the reliability of new technology goes up and costs come down.

Safety in Alternative Energy Systems

As consumers of commercially produced power, we are protected to a considerable degree from electric shock, explosion, mutilation, poisoning and a host of other potential consequences of living in close proximity to the systems and energies that power our civilization. When we take things into our own hands and build energy systems from the ground up, we must consciously build safety in. It is necessary to evaluate hazards and take measures to minimize them.

Next, we'll survey the basic classes of hazards you may encounter in working with the sort of alternative energy techniques outlined so far. This material should not be a substitute for all warnings and instructions that may come with machinery and substances employed in alternative energy work. Nor should it be a substitute for doing personal safety research, in the library and face-to-face with experienced people.

The hazards inherent in the production and storage of electrical energy may be divided into three closely related categories: mechanical, chemical and electrical. Some of these hazards are no different from those encountered by any electricity user. Others are more characteristic of complete power systems. As different as they may seem from each other, mechanical, chemical and electrical hazards *are* closely related: A failure or accident in one category is likely to bring about failures in one or both of the others. Such multiple failures can be nearly instantaneous and the consequences can be catastrophic.

²Noulan Bowker and Christopher Dollard, "The Magic of MOLI," Jun 1987 QST, pp 22-25.

Edison Batteries

First marketed in the early 1900s, the nickel-iron alkaline Edison cell has accumulated a reputation for capacity and indestructibility that is only partially justified. It is *not* the perfect storage cell, but it does have some interesting qualities. Batteries of Edison cells were designed to survive rough mechanical abuse in railroad lighting and vehicle propulsion service. Largely because of the strong, lightweight construction of its steel case and its rugged internal structure, the Edison battery achieved this objective with a better power-to-weight ratio than could be attained readily by the lead-acid batteries of the time.

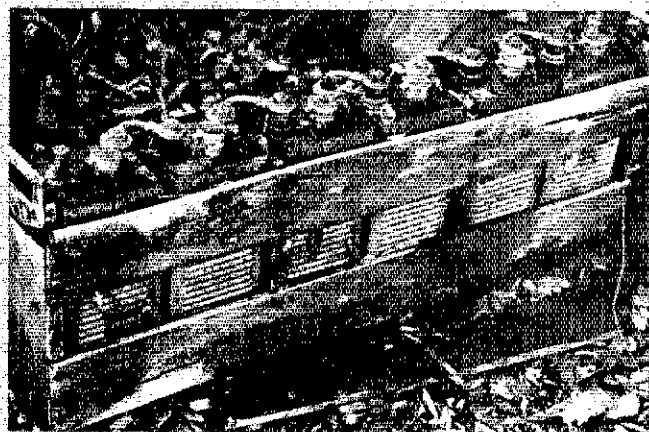
The construction and chemistry of the nickel-iron cell is such that it can survive abuse that would be fatal to a lead-acid cell. As long as it is not drastically overheated, the Edison cell can be overcharged to the point of vaporizing all of the electrolyte and no great harm will result. Nor will the cell be harmed by being left in a totally discharged condition. I know of used Edison cells that recovered a good percentage of their original capacity upon being filled with distilled water and run through a few charge-discharge cycles—after having been dry and totally neglected for over 40 years.

Now for the bad news. As compared to lead-acid cells, the Edison cell has a high internal resistance and a high self-discharge rate. Thus, voltage regulation during load variation is poor, and the cell shows a continuous loss of voltage throughout its discharge cycle—from nearly 1.4 V at full charge to 1.0 V at the bottom of the cycle. Hydrogen and oxygen are vented continually, though to varying degrees.

Edison cells employ a potassium hydroxide electrolyte. This is a strong base and must be handled with caution. Acids and acid-contaminated tools should *never* be used in or around Edison batteries—something to keep in mind if your battery “stable” is to include both lead-acid and Edison cells.

A hydrometer is not of much use in determining the state of an Edison cell because the specific gravity of the electrolyte changes little between the charged and discharged states. Cell voltage, charging time and charging current are the best indicators of charge for Edison batteries.

Terminal voltage in the discharged condition for a single Edison cell is considered to be 1 V. New Edison batteries had an expected lifetime of 2000 charge-discharge cycles. Most of these batteries were probably used by railroads for passenger car lighting and trackside signaling, although



A battery of six Edison cells as collected on a salvage expedition. Most of the cells are good, but the original wooden rack is in bad shape. These are A-8 cells, originally rated at around 220 Ah each.

many saw service in domestic wind power installations. Despite their age, however, Edison batteries may still be found. Many of their cells will undoubtedly be in salvageable condition (see photo).

If you come across an odd-looking battery like that shown in the photo, don't assume that it is dead and gone. If the steel case of a given cell is intact and the poles are not internally shorted or shorted to the case, it is quite possible that the cell can be revived. Cases of adjacent cells in an Edison battery must be insulated from each other or electrolytic action will eat through them in short order. (In an Edison cell, the steel case is isolated from both poles but common to the electrolyte.) A socket wrench and a good gear puller are essential for disassembly of Edison batteries. Details on the care and feeding of Edison batteries can be found in older electrical engineering handbooks.*

*Greatly detailed information on Edison and other secondary cells may be found in George Wood Vinal, *Storage Batteries*, 2nd ed (New York: John Wiley and Sons, 1930).

The sidebar, “Harmless,” offers an example of the kind of nasty multiple failure that can happen around an alternative energy installation. Although the chain of events depicted there may seem farfetched, it isn't. When you achieve long periods of accident-free alternative energy production, you *won't* have wasted your time anticipating and guarding against the worst!

Mechanical Hazards

Moving parts, especially gears, vee belts, pulleys, wind turbine propellers and the like, should all be made inaccessible to accidental contact. This is usually accomplished with covers and enclosures. When such moving parts must be exposed, they should be located out of reach. A wind turbine should not be able to touch anyone on the ground or working on its tower.

Towers should be designed and supported to withstand worst-case weather conditions for the area. They should receive

Persons developing any energy resource must take a certain responsibility for their safety and that of their neighbors.

regular inspections and maintenance as needed. When in doubt, consult a structural engineer. Towers are attractive

nuisances, so they should not be climbable by children or passersby.

Chemical Hazards

All motor fuels and their vapors are flammable and potentially explosive. They must be handled in suitable containers, lines and fittings. Most fuel vapors have distinctive odors, so use your nose! Don't ignore what your sense of smell tells you. Track down and repair leaks. Never store fuels near operating engines or sources of open flame and sparks.

Internal combustion engines produce carbon monoxide gas as an exhaust product. This is a colorless, odorless and lethal substance. Do not breathe exhaust fumes; also, do not risk operating engines in enclosed spaces unless exhaust fumes are properly vented through a gas-tight system. Even with a good exhaust system, it's good

Harmless

An industrious mouse enters the battery compartment of an alternative energy system. Shuffle, sniff. No loose scraps worth taking—just a foot-long piece of bare no. 10 wire carelessly abandoned in the framing of the compartment two years ago. Exiting the compartment, the rodent shoulders the scrap aside, causing it to fall across the terminals of a 12-V storage battery. There is an immediate electrical failure as the wire welds to the battery terminals, shorting the system. The wire reaches red heat in a matter of seconds. As it glows brighter and begins to melt, the wire slumps onto the plastic battery case. The case melts like butter under a hot knife.

At this point, the electrical failure is over: The wire melts through the battery case with a sizzling arc that causes the hydrogen and oxygen within the battery to unite with

explosive force. The explosion rips the already damaged battery open, spewing sulfuric acid, acid vapors and hot metal all over the battery compartment.

With luck, the problem ends here, with no fire climbing the walls and no injuries—just a terrible mess to clean up. But don't count on it. A chance encounter with a harmless scrap of wire and a mouse has already blown up your battery. Why should chance stop there?

Such a series of events may seem highly improbable. But trusting to probability implies taking chances—in other words, playing odds. And that's exactly what *not* to do when building safety into an alternative energy system. Dangerous system failures are possible unless care is taken to make them *impossible*. You must build safety in.

insurance to keep a carbon monoxide alarm in the engine room.

Engine exhaust systems can emit burning gases and hot carbon particles, both of which can ignite dry materials in the vicinity of the exhaust outlet. When internal-combustion-engine driven generators are to be used outdoors under dry conditions, use spark arresting mufflers or spark arresters approved by the US Forest Service. Clear a ten-foot radius to bare dirt around the generator and *keep* it clear. Have a shovel and fire extinguisher nearby and in plain sight.

Whether they're acidic or alkaline, battery electrolytes are nasty substances. They can corrode metal, creating both mechanical and electrical problems. They can destroy clothing in short order, and their activity does not stop when they get to the flesh underneath. Soft tissues, such as eyes, are particularly prone to rapid damage from exposure to battery electrolytes, so wear eye protection when working around batteries. Keep some means of flushing away accidental exposures at hand; a garden hose will do. Don't wear your best clothing when working with batteries—some exposure to electrolyte is almost inevitable. The evidence may not appear until that special shirt comes out of the washer looking like cheesecloth!

Avoid panic by having emergency procedures well in mind. Your flesh won't dissolve right off your bones if you *do* get electrolyte on it, so don't go into shock. Just start flushing the affected area immediately. If garments are saturated, get out of them.

Storage batteries (except for completely sealed recombining types) emit hydrogen and oxygen gases, particularly under heavy charging and overcharging. This is a highly flammable, explosive mixture. Although hydrogen is much lighter than air and tends to dissipate rapidly, it cannot do this in confined spaces—such as the space between the electrolyte surface and the filler cap of a battery. Dangerous concentrations of

hydrogen can accumulate here. Thus, checking the electrolyte level by match light or "testing" a battery by drawing sparks across its terminals are dangerous techniques and should *never* be used.

Dangerous system failures are possible unless care is taken to make them impossible. You must build safety in.

Storage batteries also tend to vent corrosive vapors that can damage delicate electronic equipment. If vented batteries are used indoors, the vents should be extended to the outdoors with plastic tubing. The best practice is to provide storage batteries with their own well-ventilated compartment or room.

Electrical Hazards

Electric shock is to be avoided at all costs. Shock danger from 12-V dc systems is minimal, but as system voltage approaches 32 V, it's possible to get "bitten" and even be electrocuted if conditions are just right (or wrong!). Both storage batteries and solar panels connected in series can add up to shock potential in short order. Remember that the output voltage from solar panels is much higher with no load than it is when a load is connected. Where sinusoidal ac energy is concerned, thinking in terms of RMS voltage can be deceptive, because ac peak voltage works to overcome your skin resistance—and *peak* voltage in a sine wave exceeds RMS by a factor of 1.414.

Current Kills—But It Also Burns

Even small storage batteries can deliver high currents sufficient to bring small con-

ductors to red heat, creating potential for fire and burns. Larger batteries, such as those found in automobiles and alternative energy storage systems, can deliver hundreds of amperes. Such currents can heat and melt large conductors. Rings, bracelets and wristwatches should never be worn by people working with electrical systems for this reason. Electrocutation may be the first danger that comes to mind when considering the wearing of metal jewelry, and it should never be ruled out, of course. But stories of fingers amputated and cauterized by a white hot ring welded across a high current source are not fables—it can happen to *you*.

Protect battery terminals from short-circuits. Exercise extreme caution if you must work around batteries with metal tools. Always keep one terminal covered to avoid the possibility of a short circuit.

Modern battery cases melt readily even at soldering temperatures (360-460° Fahrenheit for common solders). These cases also deteriorate rapidly in sunlight,

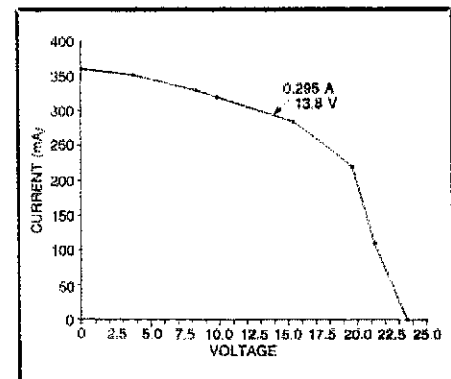


Fig 2—Voltage across the terminals of a "12-V" solar panel varies considerably with load, and this must be allowed for in the design of a solar energy system. (The graph shows voltage versus current for the 5-W Sovonics panel described in the article called out at Note 1 in Part 1 of this article.)

leading to embrittlement and cracking. Keep them out of the sun and handle them with care.

Fusing and Load Switching

Fuses are essential insurance for electrical safety. Fuses or circuit breakers rated to handle full load current should be placed as closely as possible to the battery. Great care must be taken with insulation and dress of the wiring from battery terminals to fuses. Since high currents at low voltages are involved, low-resistance connections to fuses and breakers must be provided. Further fusing of subsystems as appropriate to their individual current demands can be installed at a convenient location farther from the battery.

In switching and fusing a photovoltaic system, bear in mind that "12-V" solar panels may produce more than 20 V across an open circuit or high-resistance load (see Fig 2). This could have disastrous consequences for equipment should the line from the PV array to the battery open with equipment still connected to the PV array. If at all possible, meters should be used to monitor charging current, load current and battery voltage in an alternative energy system. Then, proper operation of the system can be confirmed at a glance.

Conclusion

If you find yourself inspired to become involved with alternative energy projects,

you'll discover a wealth of literature devoted both to specific and general topics in the field. The few references I've listed in the bibliography will help get you started. It's also quite likely that you can share ideas and questions with someone in your own area who is working commercially or privately with some aspect of alternative energy. Such people may well be the most valuable untapped resource you'll find as you work to develop an operational energy system.

Bibliography

General Alternative Energy

Reader's Digest Editors, *Back to Basics: How to Learn & Enjoy Traditional American Skills* (New York: Random House, 1981). Good wind- and waterpower chapters in this general book on the "simple life."

Richard Merrill and Tom Gage, *Energy Primer* (revised edition) (Pine Brook, NJ: Delta Books, 1978). Not currently listed in *Books in Print*, but worth a library/used-book store search.

Stewart Brand, ed., *The Next Whole Earth Catalog* (Ellenwood, GA: Alternatives, 1981). Published by Alternatives, PO Box 429, 5263 Bouldercrest Rd, Ellenwood, GA 30049. Includes excellent listings of alternative energy literature and hardware.

Batteries

Warren Dion, "A New Chip for Charging Gelled-Electrolyte Batteries," *QST*, Jun 1987, pp 26-29.

Richard A. Perez, *The Complete Battery Book* (Blue Ridge Summit, PA: TAB Books, 1985).
M. Wilson, ed., *The 1987 ARRL Handbook* (Newington: ARRL, 1986). See especially "Battery Power," pp 6-25 to 6-28, and Chapter 27, "Power Supply Projects," pp 27-28 to 27-36.

Solar Energy

C. Philip Chapman, Paul D. Chapman and Alvin H. Lewison, "Amateur Use of Solar Electric Power," *QST*, Oct 1982, pp 11-14 (Part 1) and Nov 1982, pp 30-34 (Part 2).

Waterpower

Dermot McGuigan, *Harnessing Water Power for Home Energy* (Charlotte, VT: Garden Way Publishing, 1978). Available from Garden Way Publishing, Storey Communications, Inc, Schoolhouse Rd, Pownal, VT 05261.

Kvaerner Hydro Power, Inc, 1978 Commerce Rd, Springfield, OH 45504, manufactures Leffel hydroelectric turbines. See especially their Pamphlet A, "Hints on the Development of Small Water Powers" and Bulletin H-49, "Hydro-Electric Power from a Hoppes Hydro-Electric Unit."

Wind Power

Carl J. Heinen, "Watts from the Wind," *QST*, Jul 1977, pp 15-19.

Park and Schwind, *Wind Power for Farms, Homes and Small Industry* (Springfield, VA: National Technical Information Service, 1978). Available from US Dept of Commerce, National Technical Information Service, 5285 Port Royal Rd, Springfield, VA 22161.

□

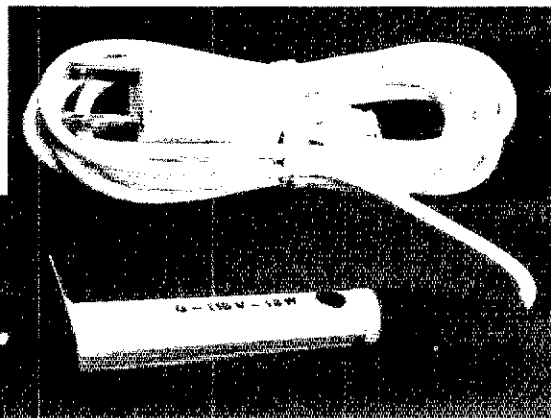
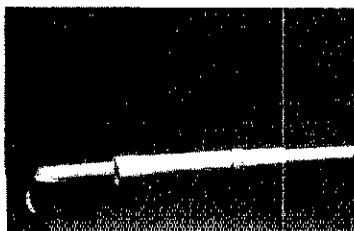
New Products

ANTEX MINIATURE SOLDERING IRON

□ An industrial-grade miniature soldering iron that heats and cools rapidly is available from Antex. The Model G soldering iron reaches operating temperature in just 45 seconds and cools enough to be put away in less than two minutes. The soldering-iron handle always stays cool because the heating element is in the tip. Designed for continuous or intermittent operation, over 40 different slide-on tips are available, including a 0.012-inch tapered needle point.

The iron is only 6½ inches long, weighs a mere ¾ ounce and is equipped with a 6-ft, 3-wire cord. The Model G is designed to fit neatly into a field-service tool kit.

For information contact: M. M. Newman Corp, Charles F. Loutrel, Sales Manager, 24 Tioga Way, PO Box 615,



Marblehead, MA 01945, tel 617-631-7100. Retail price: \$15.95.

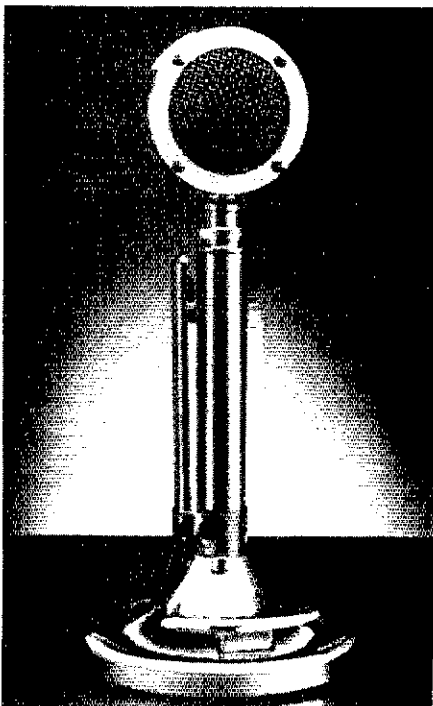
ASTATIC SILVER EAGLE PLUS MICROPHONE

□ Astatic Corp, manufacturer of the D104 microphone, has introduced a new version of the Silver Eagle. The ETS9-D104SE is the Silver Eagle plus a new mic amplifier, switching system and built-in end-of-transmission signal (ETS). The ETS is a switch-selectable, 1-kHz tone produced when the mic is unkeyed to indicate completion of the transmission. The tone is audible to the mic user as well as the person receiving the transmission.

Additional features include a new VOX switch, a redesigned amplifier circuit and a

20-dB pad on the audio output. The Silver Eagle can be powered by a 9-V battery or directly from the radio.

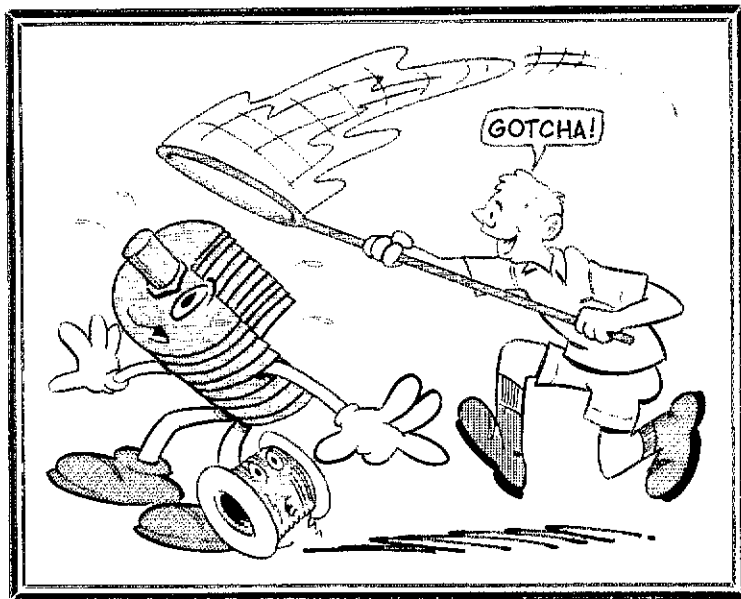
The Silver Eagle Plus is manufactured by Astatic Corp, Harbor and Jackson Sts, Conneaut, OH 44030-0120, tel 800-421-3161. Price class: \$136.



Stalking Those Fugitive Components

Specialty components appear hard to find for those who aren't experienced gleaners. Let's learn where and how to obtain some of these bread-and-butter items.

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



What's this you're saying? You would build more ham gear if only you could obtain the necessary components? I receive dozens of letters to this effect each year. Most of them seem to be from the newer hams who have yet to learn the fine art of foraging for those seemingly elusive parts. Some correspondents are critical because my *QST* articles are not based on using parts that can be purchased at Radio Shack stores. Sure, Radio Shack stocks a lot of things that are useful for building projects, but many of the circuits we amateurs want to build require components that Radio Shack will never carry. A designer is severely restricted if he has to rely on any single supply source. At best, his output will soon be reduced to rinky-dink projects.

What, then, might you do to solve the annoying parts-procurement problem? This subject has been addressed frequently in *QST*, but only in general terms. That is, the authors did not focus on specialty items that many of us need from day to day. This article is aimed at those unique parts that we do not find at the corner parts store. All you need is some ambition and a few postage stamps to equip yourself with the means to get the parts highlighted here.

Some of the suppliers I list in this article have many parts to offer in addition to those discussed here, and numerous other suppliers exist. I concentrate in this article on those dealers from whom I purchase most of my parts and materials. I consider their prices fair and generally below the figures set by new parts distributors that aren't in the surplus business. I have experienced neither poor service nor rip-

offs from any of the dealers listed, but neither the ARRL nor I endorse them. As the saying goes, "let the buyer beware."

Locating Component Sources

I watch for some of the smaller display ads in *QST* and other amateur publications, and keep tabs on the classified ads in the various magazines. That is where you'll often see information that can lead to a free catalog of bargain parts. I respond to every ad of that type. Consequently, I have stacks of catalogs. It is a practice I recommend to all of you who enjoy building amateur equipment. There is scarcely a component I can't find for my projects, if I scan the pages of these mail-order catalogs.

Writers (myself included) often recommend ham-radio flea markets as a source of parts for home use. Flea markets are, indeed, wonderful places to look for certain items. But, owing to the infrequency of flea-market events in any given region, procuring parts by that means is a long-range situation at best. I depend on flea markets mainly to stock up on items for future, unplanned projects. For example, if I see a super bargain on 2N2222s, polystyrene capacitors or 2200- μ F filter capacitors, I buy them for later use. This practice also enables me to help other hams in the area, should they have a sudden need for something I have in my goodie cache.

Parts and materials never appear magically! We may daydream until doomsday, but that won't yield results. We must also innovate as the demand dictates.

Equipment Cases

Consider the low cost and simplicity, for

example, of fashioning a small project case from galvanized furnace-ducting material. Most plumbing and heating shops will give you scraps or pieces from stock, or they may charge you a few cents per pound for the material. A large pair of tin shears can be used to cut the sections of metal to shape, and bending can be done by hand over any right-angle form. The cabinet walls and top can be soldered together, or fastened with no. 6 sheet-metal screws. The completed cabinet can be spray painted with sandable gray primer, sanded and then coated with your favorite color of paint for the finishing touch.

Large cabinets, such as those used for antenna-matching networks, can be fashioned from tempered Masonite[®]. This material can be painted any color you prefer. The front panel can be made from an aluminum cookie sheet, available at most variety stores. There is no need to contain a Transmatch in a shielded cabinet, since it does not generate TVI. The signal going into the Transmatch should already be clean!

I have mentioned many times the ease and low cost of making small boxes from sections of single- or double-sided PC board. The cost of any of these homemade enclosures is substantially less than that of a commercially made box, and the materials are available locally. These methods permit almost instant construction of an equipment case.

Magnet Wire

Many hams ask me where they can find magnet wire. I must say that the market has, for the most part, dried up with respect

to magnet wire. Radio Shack sells small spools of enameled wire, but only in a few popular gauges. Jug Wire Co in New York was my primary source for magnet and bare bus wire, but a recent notice from Jug indicated that they were going out of business.

What can you do to solve this problem? First, check with your local electric-motor repair shops. The operators are often willing to reel off a reasonable number of feet of the wire you need, and at a nominal cost. Here, again, use your initiative.

When I first became a ham, it was common practice for my colleagues and me to acquire old power transformers just for the purpose of removing the magnet wire from the windings. The same was true for old dynamic speakers from junked radios. The speaker field coils contain hundreds of feet of small enameled copper wire! Still another source of magnet wire is the field coils of large, low-resistance dc relays—12- and 28-V units in particular. Generally, the larger the relay and the lower the field-coil resistance, the larger the wire gauge. Look for these relays at flea markets. They can be available for 25 cents or less.

Another excellent source of magnet wire is picture-tube yokes from discarded TV receivers. The vertical- and horizontal-deflection coils contain many feet of usable sizes of wire.

Litz Wire

Litz (short for *litzendraht*, which means “stranded wire”) wire is desirable for winding small LF, MF and HF slug-tuned coils. It provides a higher Q than plain enameled wire. This is because many strands of enameled wire are used to form a cotton- or silk-covered conductor. The additional surface area afforded by multiple conductors offsets *skin effect*—the tendency for ac to flow at or near the surface of a conductor, resulting in greater ac resistance with rising frequency. I have never seen Litz wire offered in surplus equipment catalogs. I obtain my Litz wire by purchasing old RF chokes and slug-tuned coils that are wound with it. Many WW II power RF chokes contain Litz wire, and you may want to consider this method of garnering some.

Coil Forms and Insulating Material

Blank slug-tuned coil forms are currently too expensive to consider for most amateur projects. There are some surplus bargains, however, and you should watch for them. Stock up on these forms should you see them at flea markets, but be aware of the effects of improper core material on operating frequency. Low-frequency cores will spoil the Q of an HF or VHF slug-tuned coil. The same is true of improper toroid-core material. A relative test of coil Q may be made by winding a coil on an unknown form, then placing a silver-mica or variable capacitor in parallel with the coil to obtain resonance at a desired fre-

quency. Check the tuned circuit with a dip meter. If a good dip can be had with the dipper coil a fair distance from the test coil (say, one inch), the Q is reasonably high. If, however, the dipper must be coupled tightly to the test coil to obtain a dip (usually shallow at best), the Q is probably too low to consider for your circuit. In other words, the farther the dipper coil is from the test coil, consistent with a deep dip reading, the higher the Q of the coil.

Homemade fixed-inductance coils can be wound on plastic tubing and rods at a low cost. Included are power-line RF chokes, antenna traps and antenna-loading coils. First, check the scrap department of your local plastics outlet for odd-lot bargains. Such materials as Teflon®, Delrin, polystyrene, Plexiglas™, PVC, Tenite® and Lexan® are often available in small pieces at attractive prices. You may also obtain a catalog from United States Plastic Corp in Lima, Ohio, a mail-order house that has tubing, rod and sheeting of all types (see listing at the end of this article).

Feed-line spreaders can be made inexpensively from such materials as hair curlers, plastic clothespins, sections of plastic coat hangers and even ballpoint pen bodies. Again, I stress the value of being innovative!

Special Capacitors

I've read many laments about how “impossible” it is for some *QST* readers to locate high-voltage disc-ceramic capacitors, polystyrene capacitors, NP0 capacitors and even silver-mica capacitors. These items are *widely* available from the surplus-parts vendors. I must admit, however, that large transmitting variable capacitors *are* scarce (and extremely expensive). Radiokit seems to be the main outlet for large

variable capacitors. When the Cardwell Corp bought the tooling and stock of E. F. Johnson and Hammarlund several years ago, it seemed that a variable capacitor monopoly was taking shape. The James Millen Co was the only other major manufacturer of these parts and, to complicate matters more, Millen went out of business, too. It was a sad day for Amateur Radio! You may still be able to obtain Millen capacitors from Radiokit. Our best hope is to remove large variable capacitors from surplus radio gear, such as WW II command transmitters and BC-191/BC-375E transmitter tuning units. Fair Radio Sales in Lima, Ohio is worth checking for these units and other large WW II electronics equipment. Their catalog will fill many of you older hams with nostalgia!

The Joys of Stripping

Let someone misunderstand, I refer to radio parts! When Lew McCoy, WIICP, was the Beginner and Novice editor for *QST*, years ago, he constantly stressed the value of stripping parts from old TV and radio sets for use in ham projects. I'm sure that many of you recall his “transmitters from old TV sets.” We at ARRL HQ often wondered why he never made a TV set from *an old transmitter*, but he refused the challenge when it was offered to him! Nonetheless, his advice in those days was sage. Even today we can glean countless excellent small parts from old TV and transistor-radio sets. I saw six table-model TV sets for sale last fall at the Hudsonville, Michigan, ham flea market. The owner was asking 25 cents apiece for the sets! Many PC-mount fixed and slug-tuned coils are found in TV receivers, in addition to a host of resistors and capacitors. Also, you can

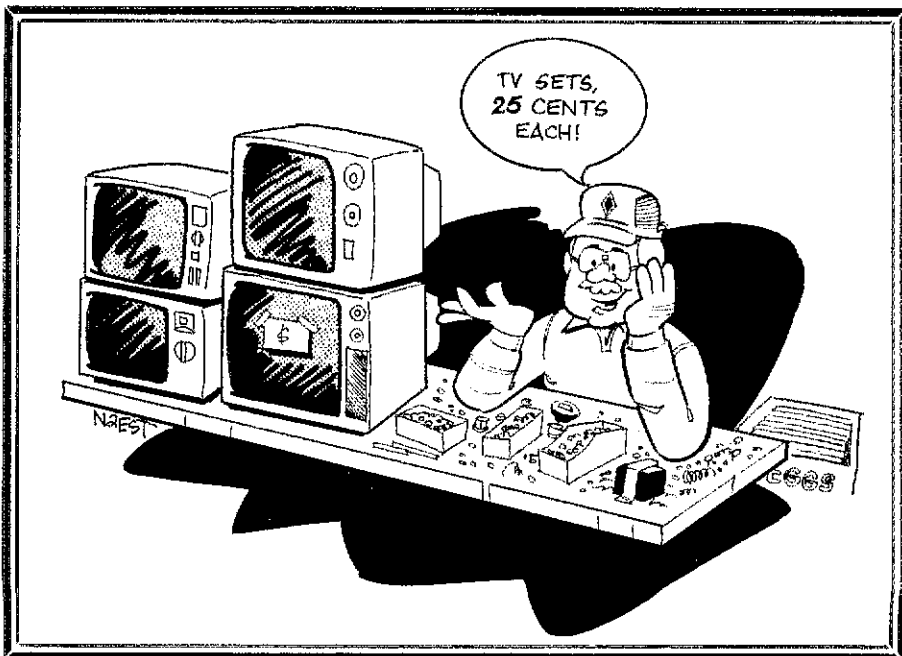


Table 1**Sources for Hard-to-find Components**

<i>Item</i>	<i>Source*</i>	<i>Item</i>	<i>Source*</i>
<i>Capacitors</i>		<i>Small relays</i>	AE, BCD, ME, MPJ, DK
Feedthroughs	MPJ	<i>RF and audio transformers</i>	
High-voltage disc	ME, MPJ	Audio (miniature)	CS, ME
Monolithic chip	AE, CS, MPJ	IF (455 kHz and 10.7 MHz)	BCD, CS, ME, DK
NPO ceramic	CS, ME	RF transformer blanks	AA
Polystyrene	AE, ME	(slug-tuned)	
Silver mica	AE, CS, ME, MPJ	<i>Switches</i>	
Small air variables	BCD, FRS, MPJ, RK	Microswitches	AE
Tantalum capacitors	AE, ME, MPJ, DK	Multi-deck push button	AE
Transmitting variables	FRS, RK	Small rotary wafers	AE, BCD, ME
Trimmers	BCD, CS, FRS, ME		
<i>Chokes and Coils</i>		<i>Toroids and other cores</i>	
Coil forms	BE, USP	Balun (binocular) cores	AA
Loopsticks	CS	Ferrite beads	AA, BCD
RF chokes (miniature)	BCD, CS, ME, DK	Powdered-iron toroids	AA, PE, RK
Slug-tuned inductors	BCD, DK	Ferrite pot cores	AA, BCD
<i>Crystals</i>		Ferrite RF-choke forms	
Specific-frequency	ICM, JAN	with leads	AA, BCD
Microprocessor	BCD, CS, MPJ, DK	Ferrite rods	AA
<i>Muffin fans</i>	AE, ME, MPJ, DK	Ferrite toroids	AA, BCD
<i>Hardware</i>		<i>Transistors</i>	
Dial cord	ORA	Small-signal bipolar	BCD, ME, DK
IC headers	CS, ME, MPJ, DK	Japanese (large listing)	ORA
Machine screws and nuts	BCD, BE, ME, DK	JFETs	CS, DK
Metric hardware	ORA	RF power	BCD, CS
Metal standoff spacers	BE, ME, MPJ, DK	Unijunction	CS
Telescoping antenna rods	ORA		
<i>Heat-shrink tubing</i>	CS, MPJ, ORA, DK	*Sources	
<i>Heat sinks</i>	AE, BCD, ME, MPJ, DK	AA	Amlidon Associates, Inc, 12033 Otsego, N Hollywood, CA 91607.
<i>Keyboards and key pads</i>	AD, BCD, BE, ME, MPJ, DK	AE	All Electronics Corp, PO Box 20406, Los Angeles, CA 90006.
<i>PC-board materials</i>		BCD	BCD Electro, PO Box 830119, Richardson, TX 75083-0119.
Donut pads, layout tape	CS, ME	BE	Bigelow Electronics, PO Box 125, Bluffton, OH 45817.
Perf board, push-in terms	BE, CS, DK	CS	Circuit Specialists Co, PO Box 3047, Scottsdale, AZ 85257.
Tin-plating solution	CS	DK	Digi-Key Corp, PO Box 677, Thief River Falls, MN 56701.
<i>Plastic tubing, rods and sheeting</i>		ICM	International Crystal Mfg Co, 10 N Lee St, Oklahoma City, OK 73102.
Acrylic, Delrin, Lexan, Nylon, polyethylene, polyurethane, PVC, Teflon and Tenite. Also, plastic cements and tooling.	USP	JAN	JAN Crystals, 2400 Crystal Dr, PO Box 06017, Fort Myers, FL 33906-6017.
		ME	Mouser Electronics, 11433 Woodside Ave, Santee, CA 92071.
		MPJ	Marlin P. Jones & Assoc, PO Box 12685, Lake Park, FL 33403-0685.
		ORA	ORA Electronics, 20120 Plummer St, PO Box 4029, Chatsworth, CA 91313.
		PE	Palomar Engineers, Box 455, Escondido, CA 92025.
		RK	Radiokit, PO Box 973, Pelham, NH 03076.
		USP	United States Plastic Corp, 1390 Neubrecht Rd, Lima, OH 45801.

salvage many potentiometers and switches, as well as a variety of hardware to add to your stock of nuts and bolts.

Pocket-size transistor radios are loaded with small resistors and capacitors. How many of these little radios have you thrown away when they became defective? Consider the parts you could have salvaged for later use. Discarded AM and FM receivers also contain small variable capacitors that can be used for homemade receivers and QRP transmitters. The IF transformers can be used as is, or can be rewound for other frequencies. Not only can you increase the bulk of your parts larder by stripping TV sets and transistor radios, you will have a nice pastime for those rainy or snowy evenings in winter. Solder wick or solder suckers are invaluable for this job.

Source Listing


Table 1 lists a number of hard-to-find

components keyed to the suppliers that stock them. The dealer identification is given at the bottom of the table. I have identified specific components that are offered by these suppliers, but they carry many additional items. Their catalogs are worth adding to your reference library. Remember that quantities and specific values may be limited, depending on the supplier.

Some Final Comments

Although this month we haven't covered theory, applications or a practical project, I feel that parts procurement is an important part of construction. I have addressed those parts that readers seem to have the greatest difficulty locating. Perhaps this article will reduce the number of inquiries I receive!

Unfortunately for us amateurs, some of the suppliers listed specify a minimum

order. In such instances, it is sometimes convenient to pool your order with those of other hams in your area. This may require some salesmanship on your part, but it can be done. Good luck in stalking those fugitive components! 

Strays**I would like to get in touch with...**

anyone with a schematic for a Vista XXR power supply. T. W. Jentges, W6ALO, 706 East Adams Ave, Orange, CA 92667; Vernard Rush, W9LDS, 5234 SR 45 S, Lafayette, IN 47905.

anyone with operating instructions for an Electronic Measurements Corp Model 801 resistance capacitance bridge. Raynald Gilbert, 2604 Mont-Joli St, Sainte-Foy, PQ G1V 1C3.

Amateur Radio and the Blind

Part 1: What difficulties does a blind person encounter with Amateur Radio? What advantages and opportunities does Amateur Radio offer the blind? In this series, we'll discuss subjects you may have thought of only occasionally, but you're certain to find interesting and informative.

By Butch Bussen, WA0VJR
Box 142,
Wallace, KS 67761

I've been an active Amateur Radio operator for the past 18 years. Like most of you, I marvel at what technology has brought us. I've watched my ham shack fill with radio and computer equipment as I try RTTY, AMTOR and packet radio.

Think back a few years: Who would have dreamed so many of the technical miracles we enjoy today would be possible so soon? Now, close your eyes for a moment and ask yourself: "How could I make use of all of this marvelous technology if I couldn't see?" That's what this article series is about.

Certainly there are other, possibly better, solutions to the problems I'll be discussing. This article isn't the end, only the beginning; it's the tip of the iceberg. It's written to encourage those handicapped hams who have wanted to try these communications modes and for those hams without handicaps who want to get some idea of how they can help us. I'm writing about some of my experiences and the solutions I found to some of the difficulties I encountered.

Although I'm addressing visually handicapped hams here, let's not forget those who are deaf or have impaired motor skills. And, there are those who have combinations of two or more of these handicaps. Yet, we *can* and *do* enjoy Amateur Radio!

Some Background

I've been totally blind since birth, yet I can now enjoy many facets of our hobby that a few short years ago would have been unreachable. I've always loved technical things, especially electronics. This is probably because I always depended on electronics for entertainment. I love the old radio mysteries and used to listen to them for hours; and I enjoy "watching" TV. Most of the books and magazines I read are either on record or tape, so it was only natural that I looked toward Amateur

Radio for more knowledge and entertainment.

Some Hills to Climb

Many of the problems I faced as a new ham parallel those faced by visually handicapped people all through life. It's hard to explain, but it's the *little* things that really drive you crazy! For instance, it's not knowing when the cup of coffee you ordered has been placed in front of you, or not knowing someone is holding out their new hand-held transceiver for you to see. Some people are thoughtful and understand a blind person's situation without being told. Then there are those who come up to you and say, "Guess who this is!" or, "Do you know who I am?" That kind of thing really can put you on the spot! If you're not sure you will be recognized, just *say* who you are. If I don't recognize the voice right away, at least that way I'll know for sure who I'm talking to. As I said, it's the little things.

I think reading is the thing I miss most.

Two of the big obstacles blind people face are not being able to drive a car and not being able to read printed material. Amateur Radio has helped overcome these hurdles. I can visit anywhere in the world through my radio. Many times I have had another ham—hundreds of miles away—locate a transistor substitute or an address I need.

I think reading is the thing I miss most. Henry Kuhn, W2IRU, of Buffalo, New York, offers a magazine on audio tape. It's called *The Radio Digest*. Henry has been producing this monthly magazine for over

25 years. How do you thank someone for that kind of dedication? Henry reads selections from the various computer, electronics, and Amateur Radio magazines. *The Radio Digest* is available from the Associated Services for the Blind.¹ *QST* is also available on floppy disk from the Library of Congress.²

It's impossible for me to separate Amateur Radio, computers and general electronics from my daily life. They're all tied together and I depend on them so much. Amateur Radio is not just one of my hobbies, it's a *necessity*.

My Introduction to Amateur Radio

I attended the School for the Blind in Kansas City, Kansas, for 11 years. In my senior year, I attended our local high school. When I was in the seventh grade, a Kansas City ham volunteered to teach a Novice license class. His name is Elmer Rose. Elmer showed up without fail each week that year until we all had passed our tests. Jerry Foster, my sixth-grade teacher's husband, was also involved in helping us. Jerry's was the first ham station I saw. I don't remember Jerry's or Elmer's call sign, but I will always remember them. I hope somehow they know their efforts were not in vain. At least one of us out of that class finally upgraded and continued on in Amateur Radio. Jerry and Elmer, wherever you are, thank you!

I never understood the logic of it, but after we got our Novice tickets, we were not allowed to assemble a station at school! The school let us hold the Novice instruction classes, but antennas and radios were "too ugly," so, no ham station. I came home with my license and had no idea where to turn! I ran an ad on a local radio station and was contacted by a couple of hams from Colby, Kansas. One of them

¹Notes appear on page 31.

Hammarlund HQ-110 receiver he wanted to sell; I finally convinced my Dad that I just *had* to have it! I barely figured out how to run the receiver. I had no idea how to put up and tune an antenna, or how to tune and operate a CW transmitter. No one else in my family knew anything about electronics, and they weren't interested in it, so I was on my own. I listened a lot, but never got on the air. I never made one contact. My license expired, I sold the receiver, bought my first stereo and joined a record club. Novice tickets weren't renewable in those days.

The Ham Bug Keeps Biting

In 1966, I graduated from high school and enrolled at a local vocational technical school to study electronics. I'd tried enrolling in a couple other schools in Kansas, but they refused me, saying: "There is no future in a blind person studying electronics," and "We have no idea how to teach you, anyway." One of the first things our vocational school class did was tour the KLOE TV and radio stations in Goodland, Kansas. That is where I met John (Darel) Graves, WA0GBN. I told him I was interested in Amateur Radio, and he said he would be glad to help. The ham bug just would not go away!

Darel loaned me an old paper-tape code-

practice machine and read the sample questions and answers to me on tape so I could study the theory. He had to learn how to read and describe schematic diagrams to me. To a blind person, everything is point-to-point wiring. It is done like this: "The base of transistor Q1 goes through R2, a 47-kΩ resistor, to ground. The base also goes through a 0.001-μF capacitor to the hot side of J1, the audio-input jack." Explained that way, the diagram can be written in Braille, or put on tape for review later. We blind people learn to read descriptions like that and put the picture together in our heads.

A Shocking Experience

At that time, I didn't have a receiver to copy CW, but some people I met in Goodland gave me a Hallicrafters S-38C. I spent a lot of hours listening to that receiver (and I still have it). I strung a wire out the window for an antenna and tied it to the clothesline. It was steel wire and really worked fine. One damp and rainy day, Mom wanted to know why she got shocked when she touched the clothesline. It didn't take me long to figure that one out: The S-38 receiver is a 5-tube ac/dc set!

My First Real Rig

One Sunday afternoon I was listening to

my receiver (no longer hooked to the clothesline), and I heard a strong signal. It belonged to Ray Penington, WA0CTP, who lived in Oakley. That's a town about 40 miles east of me; Ray ran a drugstore there. The next time I was in Oakley, I walked in, asked for Ray, and introduced myself. He acted as if he had known me forever, and promised me this time I *would* get on the air! It took less than 10 minutes for him to get my name and phone number and to offer the loan of a rig, a Heath HW-12.

Because of my handicap and the distance I lived from an FCC field office, I was eligible to take the Conditional-class license test. Roy Sanderson (Sandy), W0EKL, gave me my test. He said he was sure I had passed, but I wasn't convinced. In a couple weeks I got a letter from the FCC. I knew it had to be bad news—you don't get a license that quickly! Sure enough, no license; I had forgotten to sign something. Well, at least they didn't say I had failed. Finally, the license came!

The next day, it was back to Oakley to get the HW-12, an ac-operated power supply and portable dipole from Ray. I went home, ate dinner in record time and put up the antenna. Ray had sent everything, including the transmission line. All I had to do was climb my tower, affix the

Where to go for Help

Lloyd Rasmussen, National Library Service for Blind, 1291 Taylor St, NW, Washington, DC 20011, tel 202-287-9324. Check here for the location of your regional library. Many books, magazines and journals, such as *QST*, are available free of charge.

National Braille Press, 88 St Stephens St, Boston, MA 02115, tel 617-266-6160. Source for some Braille information. Publications include *The Second Beginner's Guide to Personal Computers for the Blind and Visually Impaired* and *Add-Ons: The Ultimate Guide to Peripherals for the Blind Computer User*. Copies are available in Braille, audio cassette and printed form.

Stanley Doran, Newsreel Club, 176 Braille Ave, Columbus, OH 43223, tel 614-279-0780. An audio tape newsletter.

Ed Potter, *Playback*, 1308 Evergreen Ave, Goldsboro, NC 27530, tel 919-734-9173. This is an audio tape newsletter of general interest that reviews various types of electronic equipment and includes many addresses and toll-free telephone numbers.

American Printing House for the Blind, 1839 Frankfort Ave, Louisville, KY 40206 tel 502-895-2405. Sells tape recorders, appliances and books recorded on audio tape and in Braille.

Bill Gary, Smith-Kettlewell Visual Sciences, 2232 Webster St, San Francisco, CA 94115, tel 415-567-0667. Produces a quarterly electronics magazine in Braille called the *Smith-Kettlewell Technical File*.

Educational Tape Recording, 10234 S Kedzie Ave, Evergreen Park, IL 60642-3795, tel 312-499-3666. Offers books on audio tape; several computer manuals are also available.

Recorded Periodicals, 919 Walnut St, 8th Floor, Philadelphia, PA 19107, tel 215-627-4230. Several technical magazines are available on audio tape. You may rent these at a cost of \$20 a year. (I highly recommend *The Radio Digest*.)

Recordings for the Blind, 215 East 58th St, New York, NY 10022, tel 212-751-0860. Several books (including computer

manuals) are available on tape.

IRTI, 26699 Snell La, Los Altos Hills, CA 94022, tel 415-948-8588. Sells audio tape and other products of interest.

Trian Corp, 302, 177 Telegraph Rd, Bellingham, WA 98226, tel 800-628-2828. Sells a talking clock for \$30 and talking watch for \$50.

Sense-sations, 919 Walnut St, Philadelphia, PA 19107, tel 215-627-0600. A source for appliances and other aids for the blind.

Street Electronics Inc, 1140 Mark Ave, Carpinteria, CA 93103, tel 805-684-4593. Comments: Manufactures the Echo GP, Echo PC and Echo Plus speech synthesizers.

Stone Mountain Engineering Co, PO Box 1573, Stone Mountain, GA 30086, tel 404-879-0241; in Canada, Atlantic Ham Radio Ltd, 416-636-3636. Comments: Offers the QSYer, a DTMF keypad that plugs into the Yaesu FT-757GX and IC-735 transceivers to permit direct entry of frequency. Price: \$89.50 plus \$2.50 shipping and handling. (See also S. Reyer, "The DIGI-CAT," Apr 1987 *QST*, pp 40-43.)

Franklin Research Center, 20th and Race St, Philadelphia, PA 19103, tel 215-448-1416. Offers a talking digital multimeter (\$450).

American Foundation for the Blind, Consumer Products Department, 15 West 16th St, New York, NY 10011, tel 212-620-2000. They sell many products especially adapted for the visually handicapped—games, tools, kitchen appliances and more.

Talking Computer Products, Ronald (Butch) Bussen, Box 142, Wallace, KS 67781, tel 913-891-3532. A source for computer aids for the blind including speech synthesizers, the Laser 128 (an Apple compatible computer), talking software and items produced by Computer Aids of Fort Wayne, Indiana. Talking Computer Products items, such as The Talking Checkbook program, are also available.

Computer Aids, 124 West Washington, Lower Arcade, Fort Wayne, IN 46802, tel 219-422-2424.

center insulator, tie the ends of the dipole to tent stakes driven in the ground and that was it. I connected everything together—and I was on the air! Ray was my second contact that afternoon. Over the years, we spent hundreds of joyful hours on the air. Ray is now a Silent Key, but I will never forget him.

The HW-12 didn't really need any tuning. I had no idea what the antenna system SWR was. I wasn't even sure that it mattered, and I didn't have an SWR meter anyway. I had no way to tell what frequency I was on, but that didn't matter either, as the rig covers 3.8 to 4.0 MHz, so I was "legal" anywhere the rig would go. But, you know hams—we always want more. There were all those other bands... and I needed *my own* radio.

...how do I tune the radio?

Finally, I bought a National NCX-300. This is a 5-band version of the NCX-3 tri-band transceiver. But now, I had real problems. How could I tell what frequency I was on? This transceiver can cover entire amateur bands! The rig has tuning and loading controls! How do I tune the radio? I had to get someone to read the manual to me so I would know what to do with all those "extra" knobs.³

Receiver/Transceiver Tuning

Until the days of microprocessor-controlled radios, determining my operating frequency was a problem I never solved. The best solution I ever came up with was to use a crystal calibrator, find the beat notes and count the turns of the VFO knob. If I lost count, I went clear to the top or bottom of the band and started counting all over. At least I had an idea where I was—sort of. Once I called an SSB CQ on 3.770, before this was part of the US phone band. When I finally discovered where I was, I dreaded getting the mail for a month fearing someone had heard me!

Transmitter Tuning

Tuning a tube-type transmitter is critical, and I've tried several approaches. I found I could take a standard broadcast radio, key the transmitter and find a heterodyne. By listening to this, I could adjust the drive, plate and load controls. Then, I got a little E. F. Johnson monitor from Ray. In the AM position, I could hear and peak the audio hum from my transmitter to get maximum output.

Then I *really* came up in the world! A ham in California sent me a transistor device that hooked across my plate-current meter and gave me an audible indication of what was going on. As the current rose, so did the tone pitch; if the current fell, so

did the pitch. I know several articles have been published describing such devices (see the bibliography), but this one is the best I've found so far. It's the most sensitive and stable. I use this same device plugged into my SWR meter, and by listening to the pitch of the tones on forward and reflected power, I can get an idea of the SWR.

Radios and What to Look For

I've spent a small fortune trying to keep pace with technology, and have owned quite a few different radios. After the NCX-5, I bought a Yaesu FT-101. This is a nice radio, but I still had to use a crystal calibrator to determine my operating frequency, and I used an audio device tied across the plate-current meter for tuning. I could get the drive adjustment close just by peaking the receiver noise.

When the all-solid-state radios appeared on the market, I knew I *had* to have one! It's so neat to change bands at the flip of a switch, and no transmitter tuning is required! If you remember the old rigs, try and imagine the fun I had trying to tune my old E. F. Johnson Viking One on 160 meters!

The solid-state transceivers still left me with the problem of getting to a specific frequency or telling me where I was. I had a Ten-Tec transceiver equipped with the optional speech synthesizer. The synthesizer helped a lot, but it was difficult to find an exact frequency as I had to turn the dial a bit, listen to the readout, and then turn the knob again. What a sighted person can see at a glance, I have to listen to. My next rig, an IC-701, was equipped with the optional RM-2, which allows direct keyboard entry of the operating frequency. I still could not read the display, but I could at least key in my operating frequency. The keys on the RM-2 are laid out like those of a Touch Tone[®] telephone, so it's easy to use.

Gary McDuffie, AG0N, recorded the '701 manual on audio tape and did a lot of work on the radio for me, including some modifications. I used the '701 for quite a while and traded it in for a Yaesu FT-980. I liked this rig a lot, but I missed the IC-701's keypad layout; the '980 keypad is unlike a Touch Tone pad or calculator key pad. Also, the FT-980 has no provision for a speech synthesizer. I really think the keypad and synthesizer are helpful. If I had to pick one or the other, I would choose the keypad, but a synthesizer makes it easy to tell exactly where you are. It just goes to show you: There is no end to a wish list! Enter Kenwood's TS-940S and '440 (I now own a '440). They have keyboard entry, an optional speech synthesizer and CW announcement of the mode you've selected.

Keyboard frequency entry, a speech synthesizer, or both, make it so easy to get on or find a particular frequency. Much Amateur Radio operation these days is channelized, and it's essential to be on the

proper frequency. VFO stability is very important; I want to be—and stay—where the readout, keyboard or speech synthesizer say I am. Stability is important because of the narrow bandwidth of these digital modes and also because I cannot read the modem tuning lights or an oscilloscope display. If my radio drifts, it's very difficult to chase the station I'm talking to up and down the band. Things like that can drive you nuts if you are trying to figure out what is wrong and there is no sighted ham around to give you a clue!

For AMTOR, TR (transmit/receive) switching time is another factor to consider. Though this is important to a sighted person, I feel it is even more so for me as I have enough things to keep track of.

VHF and Up

For operation on 6 meters and above, we must be more selective. A lot of this equipment, though digital, has just up and down frequency control keys. Not many such rigs have provision for keyboard entry of the operating frequency. Blind hams should try and spend some time with a particular radio at the store or at a friend's house before deciding on what they're going to buy. For instance, I bought an IC-551 6-meter transceiver a few years ago. I kept it only about six months because it was so difficult for me to operate. There is no provision for a frequency entry keyboard or speech synthesizer. Every time you power it up, it comes on tuned to the bottom of the band. The problem is that its VFO "tunes forever." There is no mechanical stop for reference, and if I got lost, I had to power down and start over. All I could do was count the turns of the knob. If I got down to 50.000 MHz and moved slightly below, the rig went to 53.999 MHz.

...the keypad and synthesizer are helpful.

I've owned radios with thumbwheel switches. There is usually no way to mark such switches; they just keep going round and round. So, if you forget what frequency you're on, you'll need sighted help.

If a radio has frequency-controlling keys, be sure you can enter the operating frequency directly. There was a 10-meter FM radio I wanted, but the frequency controlling keys were just up/down keys. I could not enter the *exact* operating frequency I wanted. Some hand-held transceivers are also set up this way. The presence of a speech synthesizer doesn't solve all the problems. Be sure it will tell you *all* you want to know. Does it announce the offset, memory number and the frequency stored? If the radio has an



Fig 1—Here's how the Dymo label is used to identify a floppy disk. (photos by Gary McDuffie, AG0N)

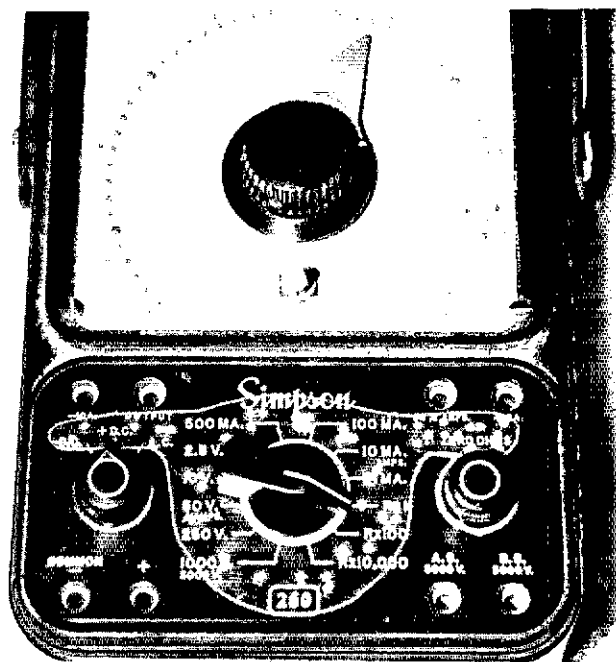


Fig. 2—A Simpson 260 VOM outfitted with a Braille dial and a tone generator. The pointer-equipped knob is turned until the tone is nulled out; then you read the Braille scale. Since this is a linear scale, a Braille conversion table must be used for reading resistance.

optional subaudible tone, does the synthesizer voice the tone settings as well? Can you tell if you are transmitting on VFO A or B? Can you tell if you are operating "split" between the two? The synthesizer should also be able to speak when the radio is in the transmit mode so you can be sure where you are transmitting.

I have an IC-02AT. I don't have much trouble operating it, except for the keyboard lock. To lock or unlock the keyboard, you hold down the FUNCTION key and press the LOCK/UNLOCK key. The problem is that there is no way to tell whether the keyboard is locked or unlocked unless you have a local repeater you can bring up as a reference. What's really needed is a hand-held with a built-in speech synthesizer.

... spend some time with a particular radio at the store or at a friend's house before deciding what to buy.

I find the Kenwood '7800 and '7900 series radios easy to use on 2 meters. The '7900 series has a feature that really comes in handy. The radio emits an audible beep each time you select the first memory. I've also used the KDK-2016. The frequency switches on this radio have stops on them,

so it's easy to dial up what you want.

Something else to look for in a rig is the control layout and presence of knobs with pointers or notches that are easy to feel. Such knobs are especially important on microphone gain and transmitter drive controls that are difficult to set without reading a meter. Once I know where to point the knob, I can get pretty close. If I have no way to read the meter, I have a sighted friend check me once in a while to be sure things are as they should be. If I can get someone to read the instruction manual to me, and go over the location of the various front- and rear-panel controls, switches and jacks of the radio with me, I put this information on audio tape for later reference. Such a recording is handy until I get things memorized; and the recording is nice to have around for later reference.

There are different methods you can use to identify things around the shack. One method I use is to put Braille characters on half-inch-wide Dymo® tape to label switches, disks, audio and video tapes and other items (see Fig 1).

Antenna Work

I don't have much trouble doing my own antenna work. I can climb towers well enough, but sometimes need help to tell which way the antenna is pointed, or to make sure I don't have any wires crossed. I use a noise bridge or an audio device plugged into the SWR meter for making antenna adjustments. A speech synthesizer connected to the meter would be a welcome addition; it could tell me at which frequency the SWR dip occurred. Fortunately, my TS-440 has a built-in automatic antenna

tuner, so tuning for minimum SWR is one less thing I have to worry about. Aiming a rotatable antenna can be a problem. Telex manufactured a Braille rotator control box, but it is no longer in production. The only rotator I know of that can be equipped with a speech synthesizer that tells you which way your antenna is pointed is the controller from Prosearch.⁴ I saw one at Dayton a year or two ago, and put it on my wish list. It's a very smart box with memory, direct degree entry from a keyboard, and it talks! It costs about \$500 with the synthesizer, but some day I hope to have one.

Test Equipment

When I began studying electronics, I had a need for various types of test equipment. One of the first things I got was an aural signal tracer. Because I cannot read a scope, this was the best way to trace a signal path through a piece of equipment. I now have a new Heath solid-state unit with a built-in audible continuity checker. It is completely portable and very handy.

Science Products (formerly Science for the Blind) offers an audible VOM, among many other items.⁵ The meter is a modified Simpson 260 with a Braille dial (see Fig 2). A pointer-equipped knob is turned until the tone is nulled, then you read the Braille dial. (This company also makes a device that can be connected across an existing voltmeter.) I have never found this meter practical for tuning a circuit as it is much too slow to follow circuit action with the pointer. Listening to a changing tone is much easier and faster, so I usually use this type of device for adjusting trans-

mitters, aligning tape heads and the like.

I also have a talking digital voltmeter. This one speaks the reading every six seconds or so, or you can use a foot switch to make it speak when you want. The meter works fine for monitoring power-supply voltages and is quite accurate, but it's also not practical for tuning purposes. This is true of most digital measuring equipment, whether or not it talks.

Some Hints

Before anyone gets really excited about all this great talking technology, I must warn you that all of it is not cheap! I'm lucky to be able to afford what I have over the years. The talking digital meter costs around \$500. My first talking calculator cost \$395. Now, Sharp and other companies have talking calculators for around \$50.

A lot of features and equipment that are novelties for most people are necessities for the blind. Be careful when purchasing equipment. Remember, most of this stuff talks because modern electronics has made synthesized voice cheap and cute, not because it's designed for use by the blind. Radio Shack's talking watch (RS 63-5040) and talking clocks (RS 63-903 and 63-906) are great buys. The Radio Shack talking clocks are easy to set and use. I've not tried setting their talking watch. The talking watch I have (a Setoki) speaks the time when you press the button, but nothing talks when you set it, so you can get into some real problems trying to set the time. My watch has a calendar, alarm, elapsed time and all that, but only the time is announced.

I mention my watch to stress a point. If at all possible, *try before you buy!* As you will find when I discuss talking computers and software, there are very few sighted people who *really* understand or appreciate what we need. Something that may talk well enough for them, may not talk enough for us—or it may talk *too much*. What may be fast and convenient for a sighted person to use may be impossible for us to use independently.

If you are assisting a handicapped person, try to be patient. Give that person time to become familiar with the controls and features of the equipment. On the other side of the coin, a handicapped person who goes shopping should take someone along who is willing to take the time to explain things and read controls and specifications from the instruction manual.

Enter the Computer

About three years ago, I got an Apple® computer and equipped it with a speech synthesizer. I use software especially written to allow the computer to talk, and I cannot begin to tell you the changes the computer has made in my life! As far as Amateur Radio is concerned, the computer has opened the door to digital communication for me. I put my talking computer

...most of this stuff talks because modern electronics has made synthesized voice cheap and cute, not because it's designed for use by the blind.

together with some of the modern modems and I have access to RTTY, AMTOR and packet. The problems and solutions associated with interfacing a computer and Amateur Radio equipment are subjects for future discussion. In upcoming installments, I'll cover computers, voice synthesizers, software, modems, RTTY/AMTOR and packet-radio operation. Computers are a dream come true for many of the handicapped.

Notes

¹Associated Services for the Blind, Recorded Periodicals Division, 919 Walnut St, Philadelphia, PA 19107, tel 215-627-0600.

²Library of Congress, Division for the Blind and Physically Handicapped, 1291 Taylor St, NW, Washington, DC 20542, tel 202-287-5100.

³Kantronics and AEA make equipment manuals available as ASCII text files on disk for handicapped hams. Some of the older Kantronics manual files are available on Apple formatted disks; newer manual files are on MS-DOS formatted disks. Contact Kantronics at 1202 East 23rd St, Lawrence, KS 66044, tel 913-842-7745.

AEA manuals for the PK-87 and PK-232 can be obtained from Norm Sternberg, W2JUP, PO Box 125, Farmingville, NY 11738 (telephone no. unpublished), or by contacting AEA at 2006 196th St, Lynnwood, WA 98036, tel 206-775-7373. (Requests sent to AEA are routed to Norm.) Requests should indicate the disk format preferred: IBM PC or AT, Apple, C64 and so on. Almost any disk format (with the present exception of Atari) can be supplied. AEA and Kantronics do not charge for these services: Stamped mailers and formatted disks are not required.

⁴Prosearch Electronics, 1350 Baur Blvd, St Louis, MO 63132, tel 800-325-4016; in Missouri, 314-994-7872.

⁵Science Products, Box A, Southeastern, PA 19399, tel 215-296-2111.

Bibliography

Note: This bibliography contains references to material for blind, deaf and motor-impaired individuals.

Alliston, W., "A Morse Readout for Your Digital Dial," Nov 1979 *QST*, pp 33-37.

Brandt, R., "An Audio Tone-Shift Power/SWR Meter," Sep 1979 *QST*, pp 28-29.

Bartlett, M., "An Audio Transducer for the Deaf," Jun 1979 *QST*, p 26.

Conover, D., "A Spectacle-Mounted Code Blinker," Feb 1978 *QST*, pp 25-27.

Hevener, K., *ARRL Program for the Disabled* (Newington: ARRL, 1985). This book contains much of the *QST* and *QEX* material listed in this bibliography. Additional references to material published in *Ham Radio*, *73 Magazine* and *CQ Magazine*, as well

as other sources of information, are in this book, available free of charge from the ARRL. Send your request to: ARRL Program for the Disabled, 225 Main St, Newington, CT 06111, or call 203-666-1541.

Horn, G., "Braille Tactile Transducer—New Freedom for the Sightless," Dec 1981 *QST*, pp 45-47.

Langner, J., "A Talking Frequency Display," Apr 1985 *QST*, pp 14-17.

Mayer, E., "Audible SWR Indicator," Feb 1985 *QEX*, pp 3-7.


Rand, P., "The 'Beeper': An Audible Frequency Readout for the Blind Amateur," Sep 1983 *QST*, pp 19-24. Also, *Feedback*, Jan 1984 *QST*, p 49.

Stockemer, L., "The SHARC Audible Current Meter," Apr 1979 *QST*, pp 22-27.

Swail, J., "Transistor Auditory Meter for the Blind," Nov 1963 *QST*, pp 32-33.

Swail, J., "A Digital Readout System for the Visually Impaired Operator," Mar 1982 *QST*, pp 11-15.

Wagner, W., "An Audible Digital Voltmeter," Aug 1979 *QST*, pp 32-34. Also, Hall, J., "Additional Notes on the Audible Digital Voltmeter," Aug 1979 *QST*, pp 34-35.

[If Butch's byline seems familiar to you, it's probably because he authored "The Squawker," which appeared in July 1987 *QST*. You can find his biography there.—Ed.] 

Strays



I would like to get in touch with . . .

anyone with information on a Swan linear amp. Russ Smith, W6ONK/7, PO Box 141, Brownsville, OR 97327.

anyone with a manual for a General Radio Type 650-A impedance bridge. Robert Weir, HH2WR, MFI Box 15665-WT, West Palm Beach, FL 3406.

anyone with a manual/schematic for a Central Electronics monitor scope, Model MM-2. Burt Engel, W3KFZ, 17425 N 96th Dr, Glendale, AZ 85508.

anyone with a schematic for a W-S Engineering Portapeater board. Duane Kilbourn, W8NZ, 453 W Territorial, Battle Creek, MI 49105.

anyone with information on using a Xerox 400-1 FAX machine for amateur FAX. Hal Wilson, WB9FNN, 11727 Lamey's La, Evansville, IN 47711.

CHECK YOUR LABEL

Are you a League member and FCC-licensed, but your call sign doesn't appear on your *QST* mailing label, and your membership certificate says "Associate Member"? Then you're missing out on the chance to vote for League Directors, Vice Directors and Section Managers. Help us correct your membership records by sending your name, address and call sign (and, if possible, the seven-digit number that appears on your mailing label) to ARRL Circulation Dept, Dept C, 225 Main St, Newington, CT 06111.

ICOM IC-275A 2-Meter Multimode Transceiver

The ICOM IC-275A is the 2-meter offering in ICOM's latest line of VHF/UHF transceivers. The new rigs are noticeably smaller than the last generation, yet they pack a number of added features. If you didn't know that this was a VHF transceiver, you would think it was an HF rig at first glance.

Like the previous generation of ICOM 2-m multimode transceivers, there are two versions of the IC-275 available in the US marketplace. The IC-275A features SSB, CW and FM operation from 140.1 to 150 MHz, 25-W-plus output and a GaAsFET front end. In addition, there are 99 memories, a versatile scanning system, passband tuning and notch filter, subaudible tones and full-break-in CW operation!

A switching power supply is built in, but there is a jack on the rear panel if you want to use an external 13.8-V source (at 6 A). The IC-275H offers the same features as the IC-275A, except that power output is 100 W.

It would take many pages to describe *all* of the features of the IC-275A. I'll highlight some of the significant and not-so-obvious features.

Frequency Control

The IC-275A features ICOM's direct-digital synthesizer. This allows the transceiver PLL to lock up in just 5 ms. Fast lock-up time is important for modes (such as AMTOR) that require fast TR turn-around time. We measured turnaround times of 7 ms using the DATA (quick TR) feature in the USB or LSB mode (typically used for RTTY or AMTOR). See Fig 1.

The IC-275A shares many of the elaborate frequency-control features found on other ICOM HF and VHF rigs. There are provisions for VFO A/B selection, a scanning mode that allows scanning of selected portions of the band or preset memory channels, RIT and complete flexibility in selecting standard repeater offsets or programming oddball ones.

With such a large frequency range to cover, the main tuning knob does yeoman duty. For large frequency excursions, punch in the MHz button to the right of the main tuning knob, and each revolution of the knob moves you 10 MHz. Once you're in the right MHz range (for example, 144 MHz for SSB and CW or 146 MHz for repeater operation), you can tune around at several rates. On SSB or CW, normal tuning is in 10-Hz steps at 10 kHz per knob revolution. Normal tuning for FM is 5-kHz steps and 500 kHz per revolution. Pressing the TS switch in any mode changes the tuning rate to 1-kHz steps at about 100 kHz per revolution. For SSB and CW, the TS feature is handy for large frequency excursions, while for FM it is useful for tuning odd splits.

The IC-275A has VFO A/B capability that may be used for split-frequency operation, one for receive and the other for transmit, or they may be used independently. The VFOs need not be set to the same part of the band or even for the same mode.

Repeater offsets are controlled by the DUP button. Press the DUP button once and the transmit frequency automatically shifts *down* 600 kHz from the displayed receive frequency. Press it again, and the transmit frequency shifts *up* 600 kHz from the receive frequency. Press it again and you're in the simplex mode. You press the CHK button to listen on the repeater input frequency (your transmit frequency).

If you want to use a split other than the standard ± 600 kHz, you have two choices. You can use the SET switch in conjunction with the main tuning knob to set the offset to anything up to 9.999 MHz, or you can use the SPLIT switch and set one VFO to the input fre-

quency and the other to the output. With this much flexibility, you can work *any* repeater.

The display tells you at a glance whether your offset is DUP+ or DUP-, and always shows the operating frequency (transmit or receive). The display also shows when you're in the SPLIT mode.

Memory and Scanning

When the MEMO switch is pressed, the MEMO DN/UP knob below the RIT control

allows you to switch through the IC-275A's 99 memories. Each memory stores not only the frequency, but also the mode of operation and any information on repeater splits or subaudible tones. For example, memory 1 might store 144.200 USB; memory 2 could store 145.010 FM, DATA mode (simplex); standard ~ 600 -kHz offset; and memory 4 could store 146.100 FM (duplex, +850-kHz offset). The possibilities are endless.

Memory information is written from the VFO dial with the MW switch, and memory information is cleared with a touch of the M-CL switch. If you want, you can turn frequency control over to the VFO at the memory channel selected by pressing the M>VFO switch.

This transceiver can scan! There are four powerful, yet easy-to-use scanning modes, each of which is designed for a distinctly different purpose.

1) If you press the MEMO and then SCAN buttons, the IC-275A automatically scans through all programmed memory channels, skipping the ones with no information programmed into them.

2) You can select any two frequencies (memories P1 and P2) and scan continuously between them. For example, you can let the transceiver scan 144.080 to 144.250 MHz, if you anticipate a band opening, but don't want to sit in front of the rig turning the knob all evening. The TS switch will speed up or slow down the scanning rate.

3) Using the MODES switch, you can scan only those memories that are programmed with a specific mode (for example, FM).

4) By using the SKIP switch, you can lock out any memory channels that you don't want to scan. For example, you can program the scanning function to check only memories 1 through 9, 67 and 85.

The receiver scanning speed is adjustable by a switch inside the top cover. In any of the four scanning modes, the scan will stop when a signal breaks the squelch. You can use the main tuning knob or press the SCAN switch to remain on that channel. If you don't press the switch, scanning resumes after 3 or 10 seconds (user selectable).

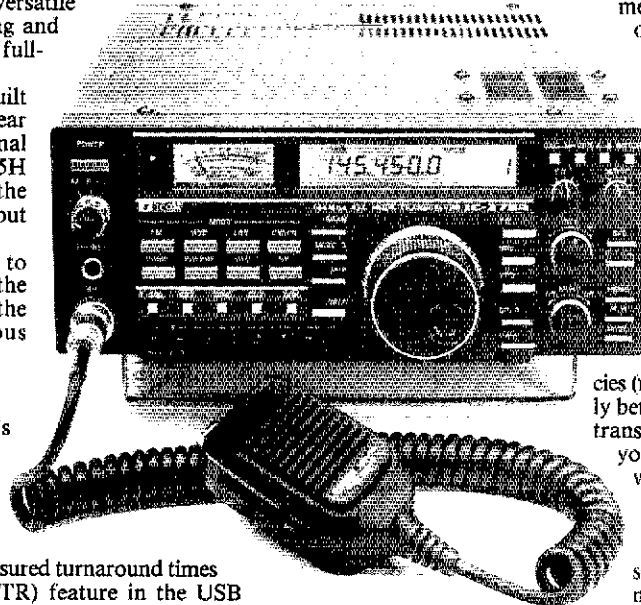
Receiver

The IC-275A has several useful receiver features. The squelch works in all modes. I found the noise blanker to be very effective against automobile ignition noise, but it often didn't do much for power-line noise. Unfortunately, with the noise blanker in operation, the receiver's dynamic range is reduced and strong local signals create noise and spurious signals that mask weaker signals. If interference is a problem, you can try the passband tuning (PBT) feature or the notch filter. Both are reasonably effective in combating nearby interference on CW and SSB. The AGC switch affords two choices—fast or slow.

Transmitter

Like most current multimode VHF radios, the IC-275A offers 25 W (and more) output on all modes. This power level is convenient for local "barefoot" operation, and will drive a number of popular solid-state and tube-type power amplifiers.

The COMP button switches in a speech compressor. You can adjust the compression level with a rear-panel COMP LEVEL control. Another interesting rear-panel control is the MIC TONE adjustment. By using a combination of the tone and compression-level controls, I was able to get a clean-sounding signal with a little added punch. This is a step forward for VHF transceivers. (Of course, I was also able to adjust these two controls for a truly awful sounding signal! It's important that you or a friend monitor your transmitted signal



ICOM IC-275A 2-Meter Multimode Transceiver, Serial No. 01182

Manufacturer's Claimed Specifications

Frequency coverage: Transmitter, 140.10 to 150.00 MHz; receiver, 138 to 174 MHz.
Modes of operation: FM, USB, LSB, CW, digital.
Frequency display: 7-digit LEDs, black on a yellow background, 3/8-in-high digits.
Frequency resolution: 100 Hz.
Frequency stability: ± 5 ppm (0° to 50°C).

S-meter sensitivity (μV for S-9 reading):
Not specified.

Transmitter

Power output: 2.5 to 25 W, adjustable.
Spurious signal and harmonic suppression:
Greater than 60 dB below peak power output.
Third-order intermodulation distortion products: Not specified.
Keying waveform: Not specified.

Receiver

Receiver sensitivity: SSB and CW, less than $0.1 \mu\text{V}$ for 10 dB S/N; FM, less than $0.18 \mu\text{V}$ for 12-dB SINAD; less than $0.25 \mu\text{V}$ for 20-dB quieting.
Receiver dynamic range: Not specified.

Receiver recovery time: Not specified.

Squelch sensitivity: SSB/CW, less than $0.56 \mu\text{V}$; FM, less than $0.1 \mu\text{V}$.

Receiver audio output at 10% total harmonic distortion: More than 2 W.

Color: Black.

Size (height, width, depth): 4.25 x 9.6 x 11.6 in.

Weight: 13.6 lb

Measured in ARRL Lab

As specified.

As specified.

As specified.

As specified.

Less than 100-Hz drift after 30 min.

6.1 (USB mode). Note: S meter was not accurate; 10-dB increase in signal results in approximately 20-dB increase on meter.

Transmitter Dynamic Testing

2.7 to 34.8 W.

-66 dB (see Fig 4).

See Fig 5.

See Fig 2.

Receiver Dynamic Testing

Minimum discernible signal (Noise floor), (dBm):
-139

Blocking dynamic range (dB):
111

Note: Measurement may be in error because AGC could not be defeated.

Two-tone, 3rd-order intermodulation distortion dynamic range (dB):
89

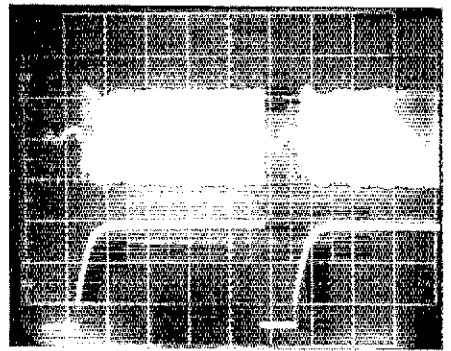
Note: Measured at 40-kHz spacing. The measurement was noise-limited at the normal 20-kHz spacing.
Third-order input intercept (dB):
-5.5

Receiver quieting (μV for 12-dB signal + noise + distortion/signal + distortion):
0.165

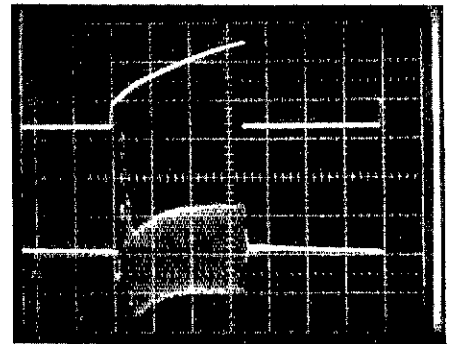
See Fig 1.

Min $0.07 \mu\text{V}$, max $0.28 \mu\text{V}$.

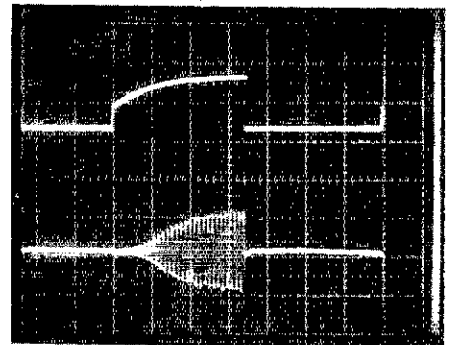
2 W



(A)



(B)



(C)

Fig 1—Receiver recovery (turnaround) time waveforms for the IC-275A. Shown at A is the turnaround time in USB mode using the DATA feature. This combination might be used for AMTOR operation. Each horizontal division is 100 ms. The lower trace shows the PTT release. The upper trace is receiver audio output. The receiver is tuned to an S1 signal. Upon key opening, the delay from opening to 90% audio output is measured. The turnaround time is 7 ms. A similar measurement is shown at B, but in the FM mode using the DATA feature. This combination might be used for packet radio operation. Each horizontal division is 10 ms. The upper trace shows PTT release, while the lower trace shows receiver audio output. There is some audio at 3 ms after PTT release, but it is lost in a spike. At 5 ms, there is usable audio. The turnaround delay is about 13 ms until audio is at the 90% level. For comparison, the photo at C shows turnaround time in the FM mode, but without using the DATA feature. Note the absence of the audio spike. Turnaround time here is 24 ms.

to get the right settings.)

The IC-275A has new features for the CW operator. Although full-break-in (QSK) CW operation is standard on most of the newer HF transceivers, I'm not aware of any 2-m transceivers other than the IC-275A that offer this feature. A three-position rear-panel switch allows you to choose between SEMI and FULL break-in, and also allows you to turn the break-in feature OFF. After careful listening tests, it quickly became obvious that the QSK mode really works! You can hear signals in the receiver between characters, and there is only the slightest shortening of transmitted characters. Of course, you'll have a tough time finding a power amplifier and mast-mounted preamplifier that can support QSK on this band.

The CW signal sounds good in either full or semi-break-in, and I couldn't hear any

clicks while listening to a second receiver located in the shack. See Fig 2. If you're serious about CW operation, you'll want the optional 500-Hz filter. An 800-Hz sidetone-monitor level control is located on the rear panel, but there is no pitch control.

Packet operation with the IC-275A is a snap. There is no need to disconnect your microphone when you want to operate packet—there are connections for audio IN and OUT for your TNC on the rear panel. The DATA switch mutes the microphone input. Using the DATA feature and FM mode, we measured receiver recovery (turnaround) times of 13 ms—quick enough for efficient packet operation. Fig 3 shows that the carrier has a remarkably quick fall time ($45 \mu\text{s}$) in the FM mode using the DATA feature. This quick fall time as the PTT is released causes a click that could cause interference to nearby stations.

ICOM has included a subaudible tone encoder with a choice of 32 frequencies. To dial up the tone frequency, press the TONE and SET buttons, then turn the main tuning

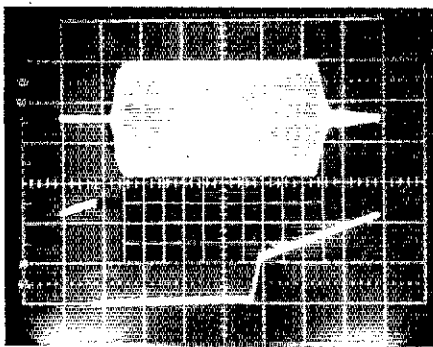


Fig 2—CW keying waveform for the IC-275A. The upper trace is the RF output; the lower trace is the actual key closure. Each horizontal division is 5 ms.

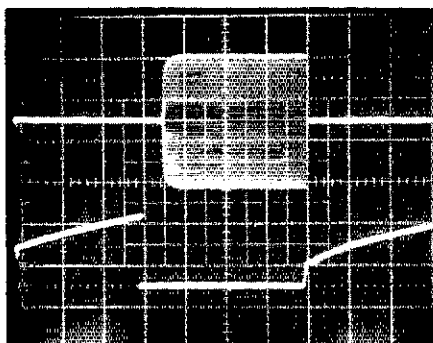


Fig 3—Photograph of the transmitted waveform of the IC-275A in the FM mode using the DATA feature. The upper trace is the RF output; the lower trace is the PTT line closure. Each horizontal division is 5 ms. The rise time is about 300 μ s, and the fall time is about 45 μ s.

knob until the correct tone frequency appears on the display.

The Manual

The IC-275A manual does an excellent job of explaining the rig's many features, and uses a unique method of combining text with graphics to describe the controls and operation. In the "Control Functions" section, miniature outline drawings of the front or rear panels are shown for each control, with an arrow locating the control and a brief description of its function. A "Beep" beside the drawing designates those controls that produce an audible tone when the control is used. In many cases the control's use is explained in detail later in the "General Operation" or "Function Operation" sections, so appropriate reference to the page is given.

This same approach is followed in detailed descriptions of operations, and illustrations are included to show which controls are exercised and the method of doing so. This manual is probably the most understandable I have ever seen.

Operation

I used the IC-275A during late winter and early spring. The rig holds its own at the weak-signal end of the band. The receiver is sensitive enough to hear plenty of signals around New England, in Canada and south as far as Virginia.

FM operation is convenient, thanks to the memory features. After the initial setup, there

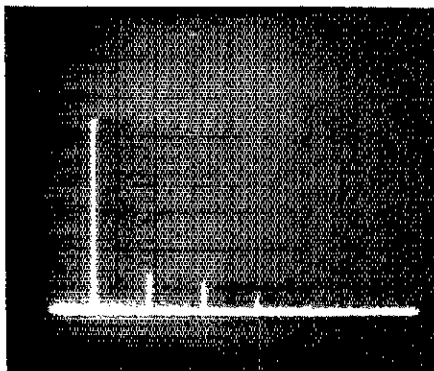


Fig 4—Spectral display of the IC-275A operating at full output. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. The output power is approximately 35 W at 147 MHz. The fundamental has been reduced in amplitude approximately 25 dB by means of notch cavities to prevent spectrum analyzer overload. All harmonics and spurious emissions are at least 66 dB below peak fundamental output. The IC-275A complies with current FCC specifications for spectral purity.

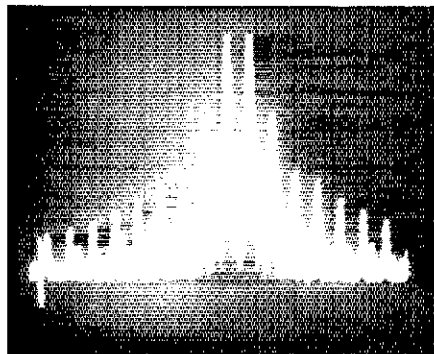


Fig 5—Spectral display of the IC-275A during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 25 dB below PEP output, and fifth-order products are approximately 40 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver was being operated at approximately 35-W PEP output on 144 MHz.

is little to do except recall your most-used channels. Most of the time I used the rig by itself, or with an RF Concepts Model 2-317 solid-state power amplifier. The 30 W or so from the IC-275A is plenty for local QSOs, but the amplifier helped on the longer-distance contacts.

The acid test for the IC-275A came during the 2-m ARRL Spring Sprint. John Lindholm, W1XX, and I traveled to a Rhode Island hilltop, mainly to try out his new hilltopping van and generator. The transceiver proved to be well suited for such portable operation. Space is at a premium in the van, so the IC-275A's compact size and built-in power supply really helped out. The receiver held up reasonably well under strong-signal conditions. Although the IC-275A has a sensitive receiver, the preamplifier in the RF Concepts amplifier made a noticeable improvement on some weaker signals. All in all, though, the IC-275A held up well on a crowded band during the Sprint.

ICOM has made some improvements over the last generation (the IC-271A) that really make this transceiver easier to use. There is provision for a CW filter. I prefer a narrow CW filter for weak-signal work. Also, there is now provision for keying an external power amplifier. The ACC jack on the rear panel provides a ground on transmit for this purpose. In addition, I had no trouble keying this rig with either of my keyers. I still would like to see a 1/4-in KEY jack rather than the present 1/8-in jack, though.

One feature that I had not experienced in a 2-m transceiver before is the ability to monitor public service frequencies outside the amateur band (the receiver covers 138 to 174 MHz). It is interesting to use the IC-275A to hear police and fire calls, as well as listen to NOAA weather broadcasts. Such a broad receiving range gives you something to put in all those memories! The IC-275A can be the basis for a comprehensive 2-m station.

Manufacturer: ICOM America Inc, 2380-116th Ave NE, Bellevue, WA 98004, tel 206-454-7619. Price class: IC-275A, \$1200; FL-83A CW filter, \$35; AG-25 preamplifier, \$95; UT-36 voice synthesizer, \$34; UT-34 tone squelch unit, \$50.—Mark J. Wilson, AA2Z

RF CONCEPTS RFC 2-317 2-METER AMPLIFIER

What's new in VHF and UHF equipment? For one thing, a new line of RF power amplifiers from a new company—RF Concepts of Gilroy, California. Always anxious to try out a new piece of VHF gear, I wanted to test the RF Concepts RFC 2-317 as a companion to the IC-275A reviewed in this month's column. This "brick" amplifier features 170 W output for about 25 W drive, which is just about right for most of the current crop of 2-m multimode transceivers. If your rig operates at a different output-power level, check out similar RF Concepts amplifiers with different drive requirements. They have a complete line of amplifiers with different drive/output specifications.

Circuit Highlights

The power amplifier is a single-stage design using a pair of SRF3897 power transistors in parallel. There is room on the board for another amplifier stage; this space is probably used in other models requiring less drive power. The receive preamplifier is a two-stage design using a CF300 dual-gate GaAsFET driving a U309 FET. The result is 20-dB gain with a noise figure of about 1 dB—not bad for a "free" preamp!

The RFC 2-317 is always biased for linear operation, even when the front-panel mode-select switch is set for FM. The only difference between the SSB and FM mode settings is the TR relay dropout time delay. The relay drops out instantly in FM, but dropout time delay may be increased so that the relays do not "chatter" during SSB operation. It's easy to vary the dropout time by adjusting a potentiometer that is accessible through the side panel.

RF-sensed switching is standard in the RFC 2-317, but there are several ways to key this amplifier. Whenever the POWER switch is ON and RF drive is applied to the RADIO (input) jack on the rear panel, the amplifier automatically switches into the transmit mode. In this mode, the power amplifier is switched into the line and the preamplifier (if the PREAMP switch is ON) is switched out of the

circuit. A phono jack is provided on the rear panel for "hard wiring" the antenna relay to control it from the transceiver. You have a choice of two hard-wired keying options: Ground the center pin to transmit or apply a positive voltage to transmit. The choice depends on the requirements of your transceiver. As it comes from the factory, the RFC 2-317 requires a positive voltage to transmit.

RF-sensed switching is convenient, and in this amplifier it works very well. The manual suggests taking advantage of the manual keying feature if you plan a lot of SSB operation. If you hard wire the relay, you won't have to worry about it dropping out during pauses in your transmission.

RF Concepts has made it very difficult for you to hurt this amplifier. Protective circuitry includes:

- A built-in thermostat to shut off the amplifier if the heat-sink temperature reaches 175°F; it will not come back on until the heat-sink temperature drops to a safe level.

- SWR protection. If the SWR exceeds 3:1, the amplifier automatically shuts off. You must toggle the POWER ON/OFF switch to turn it back on.

- A 35-A fuse in the dc power line in case of a catastrophic failure.
- Reverse-polarity protection.
- A pair of diodes to protect the pre-amplifier from strong signals.

All components are mounted on a single high-quality glass-epoxy circuit board. The chassis, PC board and power transistors bolt to a low-profile heat sink that is surprisingly heavy for its size. There is evidence of high-quality construction throughout. For example, plated through-holes are used on the board; the RF interconnections are made with miniature Teflon® coaxial cable; book-mica fixed capacitors and ceramic trimmers are used in the matching circuits; and liberal use of RF chokes and decoupling capacitors are in evidence.

There are three switches and four LEDs on the front panel. The POWER ON/OFF switch controls the power amplifier. As described earlier, the SSB/FM switch changes the time delay. The PREAMP ON/OFF switch controls the preamplifier. The power amplifier and preamplifier may be used separately or simultaneously, as operating conditions dictate. The four LEDs tell you when the power is ON, when the preamp is ON, when the amplifier is in the transmit mode and when the SWR protective circuitry has come on.

The rear panel is equally straightforward. There are two SO-239 connectors for input (RADIO) and output (ANTENNA), a phono jack



RF Concepts RFC 2-317 2-Meter Amplifier, Serial No. 1114

Manufacturer's Claimed Specifications

Frequency coverage: 143 to 149 MHz.

Modes of operation: FM, CW, SSB.

Power output: 170 W with 30-W drive.

Input power: 0.2 to 30 W.

Spurious signal and harmonic suppression:

Receive preamplifier: 20-dB gain with 1-dB noise figure.

Power requirement: 13.8 V dc at 22 A.

Size (height, width, depth): 3 × 6 × 11.5 in.

Weight: 5 lb.

Measured in ARRL Lab

Tested only from 144 to 148 MHz

As specified. Also works packet radio.

175-W output with 30-W drive;

130-W output for 10-W drive;

90-W out for 5-W drive.

See Fig 6.

22.93-dB gain, 1.02-dB NF at 146 MHz.

13.8 V at 21.5 A for full output.

for TR control, a five-pin DIN remote-control jack, a four-pin Jones receptacle for dc power, and the fuse holder.

If you wish, you can mount this amplifier in a remote location—say in the trunk of your car—and control it from your operating position. The five-pin DIN jack on the rear panel allows you to remotely turn the POWER and PREAMP switches ON and OFF, as well as switch between SSB and FM modes. Although RF Concepts does not provide a remote-control head, all that's required is a few switches and a 10- μ F capacitor.

Hookup and Operation

The RFC 2-317 requires approximately 22 A at 13.8 V dc, so the manual recommends using no. 8 or 10 wire between the power source and the amplifier. If possible, the wires coming out of the back of the brick should be connected directly to the battery or ac-operated supply.

There really isn't much to hooking up the amplifier. Connect a short piece of coaxial cable between the amplifier and transceiver, connect a power supply and antenna, and you're on the air! Because the RF-sensed keying scheme suits my needs, I didn't bother to wire up a hard-keying cable.

I used the '2-317 with an ICOM IC-275A 25-W multimode transceiver. Although I made a few test QSOs on FM, I didn't have much call to use the amplifier during normal operation from my home. The ICOM is a 25-W radio to begin with, and because I live in a fair VHF location, I can work most of the local repeaters barefoot.

I do enjoy 2-m SSB and CW operation, though, so the RFC 2-317 got quite a workout on that part of the band. Near the end of the review period, I took the IC-275A/RFC 2-317

combination on a couple of portable operations at Buck Hill, Rhode Island, in grid square FN41. Using this pair makes for a compact, yet powerful and easy-to-assemble portable station. The first operation, during the ARRL 2-meter Spring Sprint, netted more than 100 QSOs in an hour and a half of operation. During this period of constant operation, the amplifier got *mildly* warm to the touch. It just sat there quietly and worked, requiring no attention whatsoever. During this contest, I had no problem working stations from northern Maine to Virginia, and out west to Ontario. During the second operation, the 902-MHz Spring Sprint, the same setup served as a liaison radio for setting up contacts on 902 MHz. Again, the amplifier performed flawlessly in the field.

I am impressed by the preamplifier in the RFC 2-317. In the past, I've found that although preamplifiers in solid-state bricks help on some contacts, for the most part they increase noise and just make the S-meter readings higher. This preamplifier, however, made a noticeable difference in readability for many QSOs, and is well worth using.

The RFC 2-317 is a well-built piece of gear that deserves consideration if you want to add some punch to your 2-meter signal. With nearly 200-W output, it's within a few decibels of 4CX250-class power amplifiers, and it takes up a lot less space. If you like to work DX, this power level is enough for aurora and meteor-scatter QSOs—and for moonbounce too, if you want to work W5UN!

RF Concepts offers a 5-year warranty on the RFC 2-317 (except for power transistors, which are warranted for 6 months). Price class: \$264. Manufacturer: RF Concepts, 2140 Jeanie La, Gilroy, CA 95020, tel 408-847-7373.—Mark J. Wilson, AA2Z

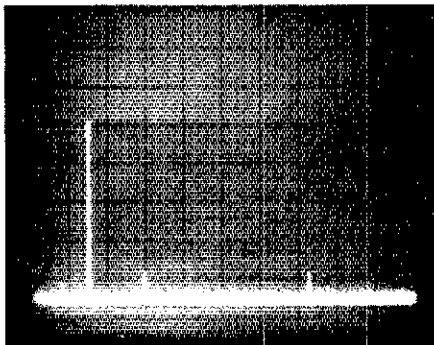


Fig 6—Worst case spectral display of the RFC 2-317 operating on the 2-m band. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 175 W at a frequency of 146 MHz. The fundamental amplitude has been reduced approximately 28 dB by means of notch cavities to prevent spectrum analyzer overload. All spurious emissions are at least 68 dB below peak fundamental output. The RFC 2-317 complies with current FCC specifications for spectral purity.

REDUCING AM DETECTION IN DIRECT-CONVERSION RECEIVERS

□ While building equipment for the 40- and 30-meter bands, I discovered that AM detection is a common problem in D-C receivers. I used a singly balanced, four-diode detector followed by 85 dB of audio gain and a conventional RC active filter with additional gain. When the receivers were completed, both would detect any AM signals above about 200 μV in level. This is a problem because there are many such signals in the neighborhood of our 30- and 40-meter bands.

I went to some lengths to decouple and shield each receiver's LO, and to provide RF decoupling between the detector and the audio amplifier. Neither of these changes made any improvement.

Oscilloscope display of the detected AM signal showed an interesting peculiarity: At the receiver input, most signals exhibited symmetrical noise—but the detected AM signals showed only *negative-going* noise. This led me to suspect that the detection was actually taking place in the audio amplifier. Further, working with a receiver with no front-end selectivity, I found that sensitivity to AM detection decreased with increasing separation between LO and AM signal frequencies. This strengthened my hunch.

I solved the problem by installing a passive L-network filter, with a bandwidth of several hundred hertz, between the detector and the audio amplifier. I used a design similar to that shown in Fig 12 on p 77 of *Solid State Design for the Radio Amateur* with good results. With the filter installed, the modulation on AM signals of several thousand μV is inaudible with a 10-kHz LO/signal spacing. —Denton Bramwell, K7OWJ, St Joseph, Michigan

PL-259 INSTALLATION HINTS

□ When installing a PL-259 connector on RG-8 cable, many amateurs find it impossible to tin the braid and solder it to the connector without melting the cable dielectric. Here's an alternate method of joining RG-8 cable to a PL-259 connector. This method has all the integrity of a soldered connection, but none of the usual headaches. The possibility of heat damage to the cable dielectric is minimized because the only soldering involved is at the tip of the PL-259 center pin.

Refer to Fig 1. First, remove 15/16 inch of the jacket using a sharp knife. (Do not cut or nick the braid.) Next, cut through both

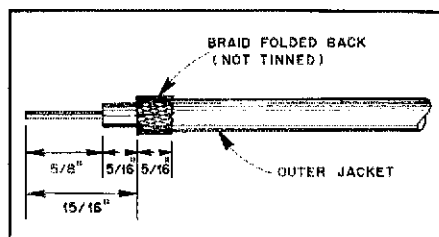


Fig 1—Cable prepared for connector mounting per KG6QY's suggestion.

braid and dielectric 5/8 inch from the end of the cable and remove the cut braid and dielectric. Slip the connector outer shell onto the cable. Unravel the remaining 5/16 inch of braid and fold it back over the cable jacket. Forcibly thread the body of the PL-259 onto the cable by hand. Lightly clamp the knurled portion of the PL-259 body with pliers, and screw the body tightly onto the outer jacket until the end of the inner conductor shows at the end of the connector tip. Use pliers to grip the cable while screwing it into the connector, but be careful not to damage the cable. Lastly, solder the tip of the center pin to the inner conductor and make the usual checks for continuity and short circuits. —Bruce M. Haldeman, KG6QY, Sun City, California

MAKE A SNUG FIT FOR TELESCOPING TUBING

□ In many antenna projects, it is desirable to have two pieces of metal tubing with a snug telescoping fit. Quite often, I find that the tubing "just right" for such a job isn't just right because the slip joint is too loose. Here is a solution I developed while constructing a two-section, push-up antenna mast from 1 1/2- and 1 1/4-inch thin-wall electrical conduit.

First, remove the cutting blade from a pipe cutter that is large enough to cut the tube you wish to form. Purchase or fabricate a new steel roller (Fig 2). The new blade rolls a groove (Fig 3) in the pipe or tubing instead of cutting it. Install the new roller in the pipe cutter.

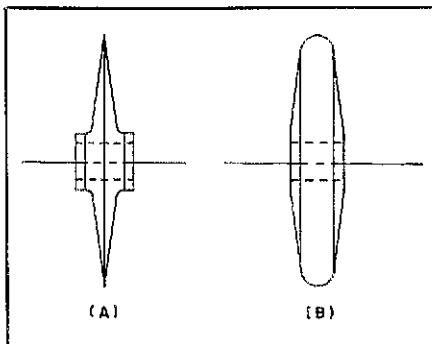


Fig 2—The original cutting roller (A) and a new forming roller (B) used to work tubing for a snug fit. (The exact shape of the new roller is not important. It should be ground from solid steel and have the same hub width and outer diameter as the cutting roller it replaces.)

I tried Bruce's suggestion with a PL-259 and RG-213 in the ARRL lab. Pliers were needed to screw the connector onto the cable, and some distortion of the cable jacket resulted. This unwanted effect should be reduced by trimming some of the braid flush with the end of the cable jacket or by trimming the shield to about 3/18 inch after folding. —Bob Schetgen, KU7G, ARRL HQ

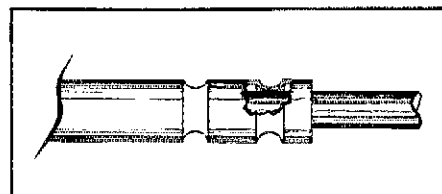


Fig 3—Use the new roller to groove the larger tube of a slip joint. This reduces the tube's inner diameter slightly to provide a snug fit with a smaller tube.

Use your new forming tool to tighten loose slip joints in this way: Place one tube inside the other and use the modified pipe cutter to roll two or more grooves in the larger tube. Continuously turn and slide the smaller tube to test the fit. Stop when there is a noticeable increase in the friction between the two tubes. (If you roll the groove too deeply, the two tubes will be permanently bonded together! This method is useful, however, for locking two pieces of tubing together.)

Application of this method is not limited to large tubes or thin-wall tubes. A similarly modified small tube cutter works with diameters as small as 1/4 inch. I have used the larger tool to groove standard 1 1/2-inch water pipe. No doubt it would work just as well with heavier (schedule 80) pipe. My only problem I encountered using this method has been an occasional split seam while I was experimenting to see how deeply I could groove welded tubing. —J. M. Simms, N7BBC, Tucson, Arizona

AN EMERGENCY REPLACEMENT FOR NUTS WITH ODD-SIZED THREADS

□ I recently required the use of an old millimeter, which had the mounting screws permanently embedded in the case flange. The nuts for the no. 2 mounting screws were missing, and there were no replacements in any of my accumulated hardware. By using the plastic sleeve that insulates hook-up wire as a replacement nut, I quickly secured the meter on the new panel (see Fig 4).

Find a short piece of insulated wire with a conductor diameter slightly smaller than the threads you wish to fit. Slide enough insula-

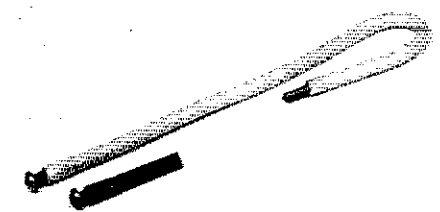


Fig 4—Samples of W1HHF's nut-from-insulation technique.

tion off one end of the wire to cover the exposed screw threads. Form a handle at the other end of the wire by making a bend. Expand the empty insulation with some needle-nose pliers, and apply a small amount of lubricant to the screw. Turn the screw into the open end of the insulation. Once the joint is tight, cut off the excess wire and insulation.—Antonio G. O. Gelineau, *WIHHF, Burlington, Vermont*

SCHOTTKY DIODES DO IMPROVE PRODUCT-DETECTOR PERFORMANCE—BUT WHAT ABOUT AM DETECTION?

□ In November 1984 Hints and Kinks, the Rev Doug Millar, K6JEY, described how he replaced the 1N60 point-contact diodes in a TS-830S product detector with Schottky mesh diodes.² I recently made this modification to my Kenwood TS-820 transceiver and want to add my enthusiastic endorsement.

Rebalancing the product detector is simple. Connect an oscilloscope to the '820's rear-panel IF OUT connector. Set the scope sensitivity to 50 mV/div. With the '820's RF GAIN control at minimum, adjust trimmer potentiometer VR3 and trimmer capacitor TCS (both near the product-detector diodes on the IF board) for minimum deflection on the scope.—Dick A. Mack, *W6PGL, Santa Cruz, California*

Editor's Note: Many hams use their general-coverage transceivers for shortwave broadcast reception and listening to WWV and CHU, and this often means using an AM envelope (signal rectification) detector. What about replacing a radio's AM detector diode with a Schottky diode of some type? The Rev Millar's 1984 H & K item sparked controversy on this question in shortwave listening circles to such a degree that a number of shortwave equipment dealers now offer a Schottky-diode AM detector modification for some receivers.

In the February 1986 Canadian International DX Club *Messenger*, Technical Talks editor Don Moman, VE6BOD, wrote of modifying his ICOM IC-R71A receiver for A/B comparison between passivated Schottky and point-contact rectification detectors: "Yes, background noise did drop roughly 3 dB, but so did the [recovered] audio level of weak signals. Using a Hewlett-Packard HP-606 generator cranked down to under 0.1 μ V, I could never create a situation where there was any difference. On the HF bands, with weak or strong signals, again there was no advantage to the HCD [hot-carrier diode]. . . I don't have equipment to measure audio distortion, so I can't say much [about that] here. I couldn't note any improvement."

Have any H & K readers had quantifiable success using Schottky diodes as rectification detectors?

WHEN FUSES SHATTER

□ In the course of performing their function, tubular glass fuses may shatter if subjected to a severe overload. This causes two problems: (1) glass shards in the holder and (2) the detached fuse end cup inside the holder base. These remnants can usually be ejected by inserting a small rod through the back end of the holder if that end of the holder is accessible.

These problems can be minimized by wrapping the glass body of the fuse with vinyl tape. One or two turns are enough; 3/4-in.-wide tape is a perfect fit on standard size fuses

²D. Millar, "Diode-Ring Product Detectors," *QST*, Nov 1984, pp 55-56.

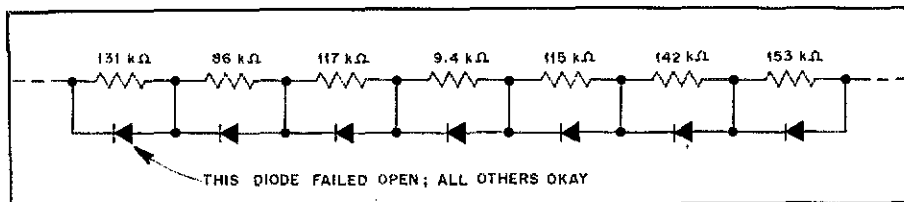


Fig 6—Equalizing resistors of unequal resistance caused breakdown in K2OZ's voltage doubler circuit. All of the resistors were originally 150-k Ω \pm tolerance; overvoltage shifted their values unequally.

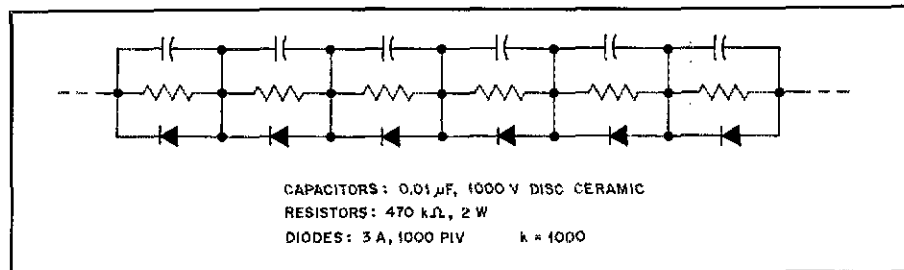


Fig 7—Equalizing resistors and transient-suppression capacitors keep series-connected diodes working within their ratings. The voltage rating of the capacitors and resistors should equal or exceed that of the diodes.

(3AG, and so on). Use transparent tape to allow visual inspection of the fuse element.

If the back cup of a disintegrated fuse can't be pushed or pulled from the holder by other means, here's an adhesive solution: Put a dab of mixed five-minute epoxy glue on the passive end of a wooden match. Carefully insert the matchstick into the fuse holder, glued end first. When it bottoms, twist it gently, but firmly, to seat it in the fuse end cup. Allow the epoxy cement to cure for 10-15 minutes and pull out the matchstick. If you recover only glass fragments, repeat the procedure until the errant cup is extracted.—Marty, *W6BDN*, and Dan, *N6BZA*, *Levin, Menlo Park, California*

UNEQUAL EQUALIZING RESISTORS SPELL DIODE DOOM

□ Over the past 20 years or so, I have found the most failure-prone system in various high-power amplifiers to be the power supply—especially power supplies using voltage doubling circuitry.

My latest power supply failure occurred in a commercial amplifier less than two years old. The power supply in this amplifier uses seven 3-A, 600-PIV diodes in each of two voltage doubler legs. Each diode was shunted by a 150-k Ω , 1/2-W equalizing resistor; there were no protective capacitors.

As I inspected the rectifier stack for damage, I saw that one diode in one leg had cracked completely in half. But why? Measurement of the resistances of the equalizing resistors provided the answer: The resistors differed greatly in value! (See Fig 6.) (I used a digital multimeter to make this measurement, taking care to keep the positive probe on the cathode of the diode across the resistor under test. This ensured that diode conduction would not interfere with the resistance measurement.) Before the failure, the only hint of the problem had been the odor of burning resistors. Until the fireworks occurred, the amplifier worked well and the

output of the power supply was normal.

In my opinion, the only way to avoid replacing components again and again in such circuits is to use a configuration similar to that in Fig 7. I use 2-W resistors because they can take a 500-V drop without breaking down. The use of equalizing resistors and spike suppression capacitors is a tried and true method. I have used a solid-state voltage doubler based on the circuit in Fig 7 for over 20 years without component failure.—Paul T. Atkins, *K2OZ, Park Ridge, New Jersey*

Editor's Note: As K2OZ reminds us, resistors have voltage as well as power ratings—and resistance shift caused by overvoltage was the impetus behind the high voltage metering fix presented by Steve Powlisken as part of "Improving the K1FO 8874 432-MHz Amplifier," *QST*, Jul 1987, pp 20-23. "Diodes in Series," p 6-6 of the 1987 *ARRL Handbook*, covers the how and why of RC protection for rectifier diodes, including a discussion on the voltage ratings of resistors from 1/4 to 2 W.

REDUCTION-DRIVE TUNING CAPACITORS FROM UHF TV TUNERS

□ Surplus UHF TV tuners, and those in discarded TV sets, may serve as a source of reduction-drive tuning capacitors. The geared reduction drives on these variable capacitors have practically no backlash. After you have located such a tuner, carefully open it. You should see a tiny three-section variable capacitor with an integral reduction drive. Depending on when the tuner was manufactured, it may have a detent system for channel selection. If such a system is present, remove or otherwise disable it.

Now, let your creativity be your guide. In one project, I disconnected the capacitor stators from the tuner circuitry, wired them together and brought a lead from the parallelled stators out through a hole in the tuner box. I kept the tuner knobs and used them to adjust the capacitor.—James Smith, *KD4YD, Ellenton, Florida*

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

THE MOON AND IONS

□ I listen almost nightly to BBC on 5.975 MHz. Around the full-moon period, when the moon is on a high azimuth track, I note the audio identification from the Republic of South Africa's Johannesburg transmitter beneath the BBC signal.

In the '40s, '50s and '60s (I was in Newfoundland and Labrador in the early '60s), I was active on 75 and 80 meter SSB and CW. I definitely recall that a number of contacts with South Africa were made when the moon was full, or nearly full. From Newfoundland, I recall a 75-m "S9 + 40" SSB contact with Venezuela—again, the moon was full.

At the moment, I do not have HF gear, otherwise I would recruit a South African station and arrange for tests on 20 and 80 meters. Has anyone else noticed extraordinary skip conditions on the lower frequencies when the moon is full?—*Phil Loosen, VE1CF, 201 Willow Ave, Fredericton, NB E3A 2E3, Canada*

THE MAGNIFICENT SEVEN

□ In Warren Dion's article, on p 29, beneath the heading "The Seven-Cell Battery," Warren states: "There's no such thing, but maybe there should be. . . ." Well, there is! A complete line of such batteries is available from the Globe Battery Division, Johnson Controls, 5757 North Green Bay Ave, Milwaukee, WI 53201, tel 414-228-2393. I purchased my 7-cell battery for the same purpose given in Dion's article—flying glider airplanes. I've had my battery for about four years.—*Kjeld Hyatum, KR1Q, PO Box 267, MIT Branch, Cambridge, MA 02139*

PROGRAM UPDATE

□ I enjoyed Warren Dion's article, "A New Chip for Charging Gelled-Electrolyte Batteries."² The program he presented can be converted easily for use on the Radio Shack computer Models I-III and Model 100. The changes required involve program lines 100, 140 and 210:

100 R2 = 20000/(VL*(1 - 2.3/VL))

140 R2 = 230000/(VL*(1 - 2.3/VL))

210 AS = INKEYS:IFAS = "" THEN 210

—*Ronald W. Brown, WA6WY, 14155 Brandon Rd, Pine Grove, CA 95665*

EMP REVISITED

□ The *QST* series by Dennis Bodson, W4PWF, contains excellent information for the radio amateur and is one I expect to use often as a source of reference information.³

Although the title contains the words "electromagnetic pulse," readers should not lose sight of the fact that much of the information applies to protecting amateur equipment from nearby lightning strikes.

There is an error in Eq 3 as published on p 33 of the November 1986 issue. The radical line should be continued over the letters SWR. When corrected in this manner, the equation correctly gives the RMS value of the RF voltage between the two conductors of a transmission line, if the line Z_0 , the SWR and the power level are known.

There is another error in this section of the November installment that is somewhat more subtle, related to the definition of peak envelope power (PEP). Rather than being peak instantaneous power, as many amateurs have been led to believe, a PEP value is the average power present at the peak of the RF envelope. Using Bodson's values for his Eq 4 as an example and the corrected version of Eq 3,

$$V = \sqrt{100 \times 52 \times 1.5} = 88.3 \text{ volts}$$

This means the RF voltage between the conductors of the 52- Ω line will be 88.3 V RMS at the peak of the envelope of a 100-W PEP signal. But for determining the clamping voltage for protection, we need to determine the instantaneous peak voltage value. This value is $88.3 \times \sqrt{2}$ or 124.9 V. Rather than converting RMS to peak voltage as a separate operation, it is more straightforward to incorporate a 2 under the radical sign of Eq 3. Thus, the corrected and complete version of Eq 3 is

$$V = \sqrt{2 \times P \times Z \times \text{SWR}} \quad (\text{Eq 3})$$

—*Gerald (Jerry) Hall, KITD, Editor, The ARRL Antenna Book*

WEATHER RADAR ACCESS

□ The Peacock Amateur Television Club is now operating a remote transmitter connected to a computer graphics system. The computer continuously accesses weather information from the National Weather Service and displays an updated radar display of rainfall.

This system normally monitors the Marseilles, Illinois, data, which is converted to a video signal at the club's facility at WMAQ-TV in Chicago. The amateur TV transmitter, located at a mid-rise downtown building, operates with an ERP of 40 W at 426.25 MHz. (The transmitter may be moved to a higher location in the near future.) The signal is horizontally polarized, and standard fast-scan vestigial-sideband TV transmission is employed. Station identification is made with a sequenced video display and an audio cartridge machine.

Hams from various Chicago TV stations support this system. Others involved or interested in weather forecasting or weather-related public-service work (such as

SKYWARN) are invited to join PATC. For more information, contact Henry Ruh, KB9FO, c/o WMAQ-TV, Merchandise Mart Plaza, Chicago, IL 60654.—*Henry Ruh, KB9FO*

LINEARIZING CLASS-C VHF TRANSISTORS

□ Because medium-power class-C VHF transistors are much cheaper than their linear counterparts, it's tempting (as well as feasible) to use them even for linear applications. If simple diode biasing alone is used, however, the transistors (such as the MRF227) go into thermal runaway. Two solutions to this thermal runaway problem were devised in the ARRL Lab, both of which preserve the advantages of a dc grounded case: the use of current limiting and an active bias network.

The current-limiting technique should work with any device, but is not recommended where current drain is an important consideration. The approach is simply to use a current-regulated power supply and forward bias the transistor. An LM317 current-regulated circuit is shown in Fig 1A. The transistor operates class B; forward bias is chosen by proper selection of resistance values for R_{B1} and R_{B2} .

The active biasing circuit of Fig 1B is not new, but is not commonly applied in amateur circuits. Basically, the current drawn by the transistor is monitored using a small-value sensing resistor. The voltage developed across R_s controls the biasing circuit. When properly implemented, an increase in the current drawn by the transistor reduces the forward bias, and a decrease in transistor current increases the forward bias.

Experimentation may be required to determine the correct amount of feedback required. (Use a current-limited supply to avoid destroying transistors.) These circuits are offered as starting points for further experimentation, and the ARRL Lab cannot supply complete designs for various applications.

Using \$4 transistors instead of \$15 transistors certainly reflects the amateur spirit! The money-saving aspect alone should create a desire for experimentation on your part!—*Zack Lau, KH6CP, ARRL Lab Engineer*

ASCII TEXT FILE MANUALS

□ Kantronics and AEA make equipment manuals available as ASCII text files on disk for handicapped hams. Some of the older Kantronics manual files are available on Apple formatted disks; newer manual files are on MS-DOS formatted disks. Contact Kantronics at 1202 East 23rd St, Lawrence, KS 66044, tel 913-842-7745. AEA manuals for the PK-87 and PK-232 can be obtained from Norm Sternberg, W2JUP, PO Box 125, Farmingville, NY 11738 (telephone number unpublished), or by contacting AEA at 2006 196th St, Lynnwood, WA 98036, tel 206-775-7373. (Requests sent to AEA are

¹W. Dion, "A New Chip For Charging Gelled-Electrolyte Batteries," Jun 1987 *QST*, pp 26-29.

²See Note 1.

³D. Bodson, "Electromagnetic Pulse and the Radio Amateur," in 4 parts, *QST*, Aug, Sep, Oct and Nov 1986.

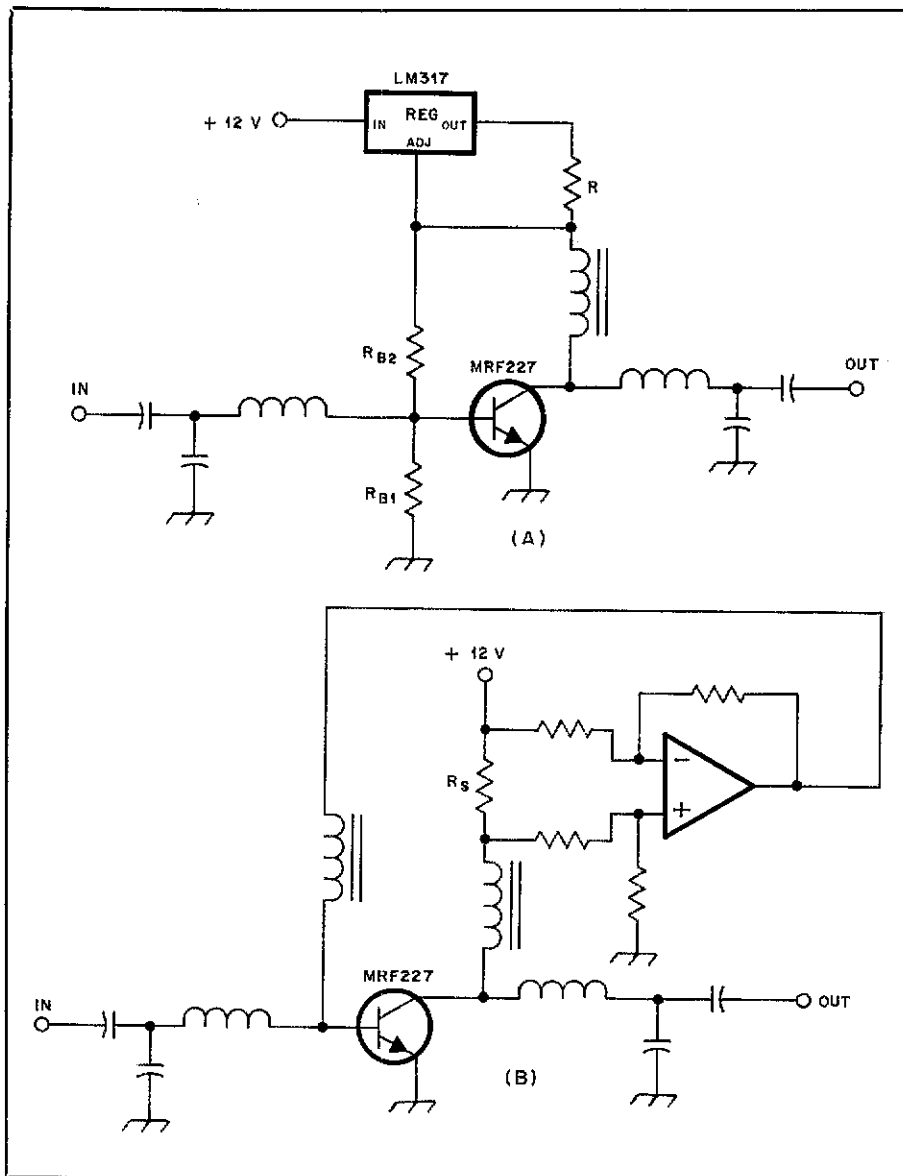


Fig 1—Two methods of using transistors designed for medium-power class-C applications in linear applications. See text for details.

routed to Norm.) Requests should indicate the disk format preferred: IBM PC or AT, Apple, C64 and so on. Almost any disk format (with the present exception of Atari) can be supplied. AEA and Kantronics do not charge for these services; stamped mailers and formatted disks are not required.—Ed.

TVI—ANOTHER APPROACH (COMMENT)

□ A footnote in the July 1987 Technical Correspondence mentions Viewsonics as a source of a 10-dB amplifier. Bob Wanderer, KT2D, acting on correspondence received from Bob Koffron, WA8LPQ, learned from John Ferrareso of Viewsonics that they do not sell the amplifiers in small quantities. But Viewsonics is not the only source of 10-dB TV-channel amplifiers. You can find them at most electronic components dealers, mail-order electronic suppliers, TV repair shops and Radio Shack stores. I've seen them at some discount stores, too.—Ed.

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

Feedback

□ Please refer to "Some Reflections on Vertical Antennas," Jul 1987 *QST*. On p 18, beginning at line 15 of the left-hand column, the sentence should read: "For example, at 14 MHz, substantial RF currents flow down..." The reference to 14 MHz was inadvertently omitted in the published article.

In the Appendix on p 19, the definition of term *p* has the radical sign extending too far to the right. The correct definition is:

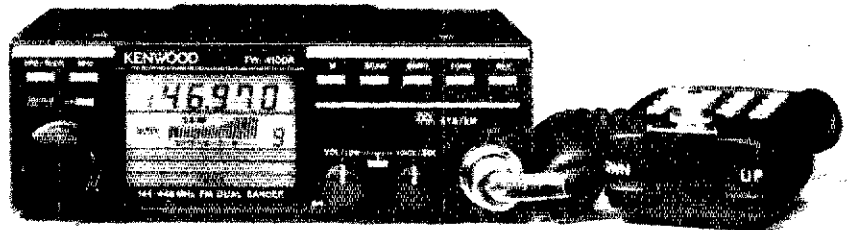
$$p = \left[\frac{X \times B}{2} \times \left(\sqrt{1 + \frac{G^2 \times 10^4}{B^2}} - 1 \right) \right]^{1/2}$$

New Products

KENWOOD TW-4100A 2-m/70 cm FM DUAL-BAND TRANSCEIVER

□ Kenwood's second-generation Dual Bander delivers 45 W output on 2 meters and 35 W on 70 cm. Low power on either band is 5 W (adjustable). Features include:

- Selectable full-duplex, cross-band operation. Cross-band repeater operation possible (a control operator is needed for repeater operation).
- Frequency coverage: 142-149 MHz, 440-449.995 MHz.
- GaAsFET front-end receiver.
- Programmable band scan and memory scan with memory-channel lockout.
- Ten memory channels with lithium-battery backup. Two channels store transmit and receive frequencies independently for odd



splits or cross-band operation.

- Non-volatile operating system. Even if memory back-up cell dies, all operating features remain intact.
- Separate antenna ports for VHF and UHF.
- Front-panel-selectable CTCSS tone (with

optional TU-7).

- Digital Channel Link (DCL) option.
- Multifunction voice synthesizer (VS-2) option.

Manufacturer: Kenwood USA Corp, 2201 E Dominguez St, Long Beach, CA 90810, tel 213-639-9000. Price class \$650.

A Camera's Eye View of *The New World of Amateur Radio*

There was action galore during the filming of ham radio's newest video.

By Paula Place, N1DNB
Editorial Assistant, ARRL

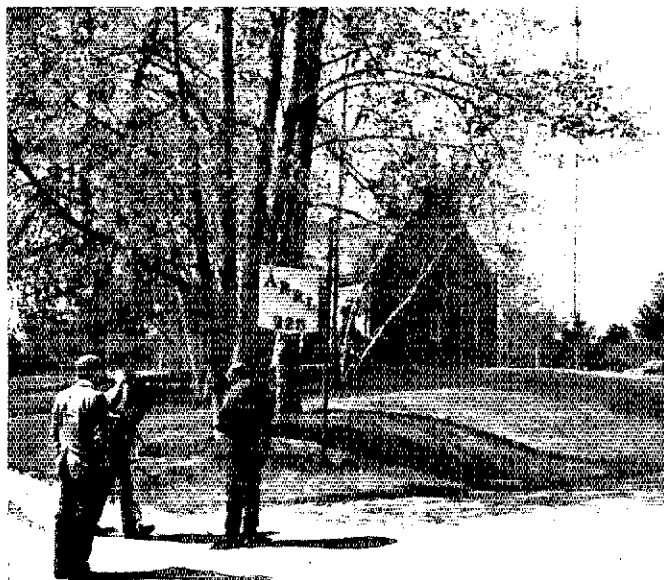
Have you seen it yet? You know, the recently released video produced by the ARRL, with funding assistance from ICOM America, Kenwood USA Corporation and Yaesu USA. If you missed the premiere airing via satellite on September 20, a note or call to ARRL HQ will remedy that. Ordering details follow later in the article. However, to give you just a glimpse of what's in store, we present a photo log detailing some of the travels of the peripatetic crew.

Roy Neal, K6DUE, Frosty Oden,

N6ENV and Bill Pasternak, WA6ITF (Executive Producer/Writer, Producer/Editor and Associate Producer/Technical Director, respectively), assisted by local ham cameramen and sound technicians, journeyed from coast to coast to film Amateur Radio in its many aspects. The result? An action-packed video in magazine format specifically designed to attract potential hams between the ages of 12-20 and those over 65, yet with something for everyone interested in the variety offered by ham radio. Distribution to junior high

schools is being assisted by a grant from AEA, Inc.

Follow the eight-step photo log as we become part of the crew and see just how *The New World of Amateur Radio* came to life. Remember, this is only a fraction of the action. There's much, much more! For a complete viewing, the video may be borrowed from the ARRL HQ Audiovisual Library or purchased for personal use from the Publications Sales Dept for \$20 plus \$2.50 for shipping and handling or \$3.50 for UPS.



1

Newington, Connecticut—April: From left, Roy, K6DUE, cameraman George Barker, NA1F and Frosty, N6ENV take exterior shots of W1AW and its tower. (KZ1A photo).



2

Washington, DC—April: At W3 United States Senate, cameraman Larry D'Anna, WA3KOK, tapes Bob Wallar, WB6QNR and Senator John Glenn (seated at left) chatting with students in a Los Angeles school. (WA6ITF photo)



3

Staten Island, New York—May: Carole Perry's class at IS 75 take their places when soundman Steve Mendelsohn, WA2DHF and cameraman George Barker, NA1F, say "lights, camera, action." Carole, WB2MGP, had been selected in April as DARA Radio Amateur of the Year. (WA6ITF photo)



4

Lower Manhattan, New York—May: Just across the Upper Bay, the "Crew at 22" (PS 22) proudly shows their school station. The students of Joe Fairclough, WB2JKJ, center, discover the world by talking to it through ham radio. (WA6ITF photo)



5

Houston, Texas—May: Frosty, cameraman Don Smith, KC5UP and Roy take a break to operate from W5RRR at the Johnson Space Center.



6

Houston, Texas—May: What's the future of Amateur Radio in space? Hear it from Astronaut Tony England, W00RE, speaking from inside a space-station simulator at the Johnson Space Center. (WA6ITF photo)



7

Atlanta, Georgia—July: At the 1987 ARRL National Convention, Roy interviews League President Larry Price, W4RA. Filming large gatherings, such as the National, provided a broad cross-section of the ham population. We're just as diverse as the modes we operate! (KA1DTU photo)



8

Hollywood, California—August: Glad to be home at last, the crew is now faced with the formidable task of reviewing 60 hours of tape at CBS Television City.

A Field Guide to the ARRL License Manuals

Is your License Manual up to date? Here's how to spot the latest editions, and when they're scheduled to be revised.

By Bruce S. Hale, KB1MW
ARRL Assistant Technical Editor

The books in the *ARRL License Manual* series have been in the field for two years now. Response has been excellent; we receive a lot of mail from hams who have successfully used the *License Manuals* to upgrade their license class. With the advent of Novice Enhancement and VEC maintenance of the question pools, many people are wondering how the *License Manuals* are affected. We'll try to answer the most frequently asked questions in this article.

What Should I Study?

This is the question most often asked by potential test-takers. We have updated the *License Manuals* as new question pools were released by the FCC. These major revisions are designated new *editions* of the manuals. Minor updates, undertaken when our supply of manuals began to run out, are called new *printings* of the existing editions. Generally, a new printing of an existing edition does not make the older printings of that same edition obsolete. A new edition usually *does* make older editions obsolete, however. The edition number of the book is shown on the spine, and the printing information can be found at the bottom of the copyright box, on the page facing the foreword at the front of the book.

Which *License Manual* editions are the latest *right now*? See Table 1. The most current *Technician/General Class License Manual* is the *Third Edition, Second Printing*. Some dealers may still be selling Third Edition First Printing books; the Second Printing contains only very minor corrections of typographical errors.

The Third Edition of the *Tech/General License Manual* is a major revision. As part of the Novice Enhancement proceeding, the FCC directed that the Element 3 question pool be divided into two separate pools; one for the Technician license (Element 3A) and another for the General license (Element 3B). Only the Third Edition of the *Tech/General License Manual* contains

Table 1
Current License Manuals

License Element	License Class	Current License Manual*
2	Novice	<i>Tune in the World with Ham Radio</i> , Seventh Edition
3A	Technician	<i>Tech/General License Manual</i> , Third Edition Second Printing
3B	General	<i>Tech/General License Manual</i> , Third Edition Second Printing
4A	Advanced	<i>Advanced Class License Manual</i> , Second Edition Second Printing
4B	Extra	<i>Extra Class License Manual</i> , Second Edition Second Printing

*Minor updates, undertaken when our supply of manuals began to run out, are called new *printings* of the existing editions. Generally, a new printing of an existing edition does not make the older printings of that same edition obsolete.

the two separate pools. All earlier editions are now obsolete.

For Advanced class license candidates, the current *Advanced Class License Manual* is the Second Edition, Second Printing. Extra Class candidates should be studying the Second Printing of the Second Edition of the *Extra Class License Manual*. Again, it's more important that you use the current *edition*, than that you have the most current *printing*.

The Novice study guide, *Tune in the World with Ham Radio*, has been revised significantly since Novice Enhancement. The Seventh Edition has a new chapter that covers the 100 additional questions that were added to the Element 2 question pool. The complete 300-question pool appears at the back of the book. The Seventh Edition book is clearly labeled as such on the spine, and the cover has a box that reads "Special Novice Enhancement Update." There is an older book that also has the cover box, but does not have the "Seventh Edition" on the spine. This older book, the "March 1987 Edition," is now obsolete.

The *Tune in the World* code-teaching program has also been completely revised. Instead of the single 60-minute cassette, *Tune in the World* now comes with two 90-minute cassettes; one tape teaches code, and the other provides practice text and

sample test QSOs. Response from users of the new code program has been very good, and we feel that the new program is a considerable improvement.

What About VEC Maintenance of the Question Pools?

The other major change in the license-testing program is VEC maintenance of the question pools. Until 1987, the FCC was responsible for updating each question pool once a year. Now, Volunteer-Examiner Coordinators are responsible for updating the question pools. At the VEC conference in Atlanta in July 1987, the VECs decided how this would be done. Instead of the FCC's one-year revision schedule, the VECs decided on a three-year cycle for revising each pool. The Extra pool (Element 4B) will be revised this year, followed by the Novice and Technician pools (Elements 2 and 3A) in 1988 and the General and Advanced pools (Elements 3B and 4A) in 1989. After the revision is complete and a given pool is released, publishers have nine months to revise their study materials before the new pool is actually used for tests. For complete details on the new VEC question-pool maintenance program, see "Question Pools: A New Look for an Old Program," following this article.

How Does VEC Maintenance of Question Pools Affect the License Manuals?

The present *License Manuals* will be current until the question pools are revised and the VECs begin to use the new pools on exams. This means that the editions shown in Table 1 will remain current until about six months after the new pool for that license class is released to publishers.

Because the Extra Class question pool will be revised first, a new edition of the Extra Class Manual should be out in August or September of 1988. Elements 2 and 3A will be revised next, with a new edition of *Tune in the World* out in August or September of 1989. The *Technician/General License Manual* will be

divided into two separate manuals at that time (one manual for Tech and a separate manual for General). Until then, the ARRL will continue to publish one manual containing both the Element 3A and the Element 3B question pools.

The Element 3B (General) and Element 4A (Advanced) pools are scheduled for revision in 1989. New editions of the corresponding *ARRL License Manuals* should be out sometime in August or September of 1990.

What Can I Do If I See a Mistake in a License Manual?

We welcome feedback on the *License Manuals*. Any book contains a few

typographical errors, no matter how carefully it was proofread. A feedback form is included at the back of each *License Manual* for your convenience in sending us comments. Most of the corrections we make to the Manuals have come from alert readers who pointed out errors or inconsistencies!

On their own or as part of a license-study class, the *ARRL License Manuals* are valuable tools for anyone studying to upgrade his or her amateur license. Thousands of people have used the manuals successfully—if you're thinking about upgrading, the *ARRL License Manuals* can help. □

Question Pools: A New Look for an Old Program

By Jim Clary, WB9IHH

Manager, Volunteer Examiner Department

This article takes the place of the Exam Info column this month.

The five pools of questions from which all Amateur Radio examinations must be designed will now be revised every three years. A subcommittee of VECs has been charged with developing and maintaining the question pools on behalf of all Volunteer Examiner Coordinators (VECs).

The initial three-year cycle began in August with the Extra Class pool. Work will be completed and the finalized pool distributed to all VECs and publishers of Amateur Radio training materials on March 1, 1988. The next elements to be overhauled by the committee will be the Novice and Technician class pools (Elements 2 and 3A, respectively). The work for these pools will begin February 1, 1988, with the product going out to VECs and publishers a year later, in February 1989. On this same date, the committee will start on the General and Advanced class pools (Elements 3B and 4A, respectively), with the revised pools going out in February 1990.

There are several tremendous benefits to this plan. First, the pools will take effect, ie the new tests will be implemented, on November 1 of the year the pools are released. In this way, candidates, instructors and examiners alike can now plan on a common implementation date that won't be repeated until three years later, rather than the four somewhat irregular implementation dates that the FCC used.

(In the past, when the FCC released a given pool, all VECs had up to six months to revise its distractors and answers, produce and distribute exams or exam designs, and put them into use. Typically, VECs put their new tests into use toward the end of the six-month period because of the enormous labor involved with developing a high-quality set of distractors, answers and exams.)

Second, with the pools released in February and March, but not put into effect until November, training materials will be "on the streets" in plenty of time for candidates and instructors to make good use of them while preparing for Exam Day. In fact, although the new pools will be put into use in November, seemingly at the height of the Novice class season, study guides for the newly revised elements should be available before classes start. With this new schedule, license candidates can opt to stay with their current study materials and license manuals and test before November 1, or can pick up revised materials and wait *until* November 1 (or later) to take exams based on the revised pool(s).

Third, each pool will be in force for three years, thereby reducing candidates' concern that the books they just bought at last month's hamfest may be out of date come test time.

Background

At the August 1986 VEC/FCC Conference in Washington, DC, the FCC announced that it had amended Section

97.521 to read, in part: "Each VEC must maintain a question pool for each written examination element," thus turning over the responsibility of maintaining the question pools to the then 27 VECs. With a project like this dropped in their laps, the VECs at the conference voted to establish a moratorium on changes to the four question pools except for correcting grammatical and typographical errors contained therein, and to maintain the moratorium until at least January 30, 1988.

(As part of the Novice Enhancement docket that took effect in March 1987, Element 3 [for both Technician and General class applicants] was separated into two pools, Elements 3A [Tech] and 3B [General]. No other changes were made to these two pools, however.)

Because wording of Section 97.521 implies that 27 different question pools could emerge for each element—there were, after all, 27 different VEC organizations—the FCC released a Public Notice in December 1986 that stated, "the VECs will cooperate in developing a common pool of examination questions" for each element. This translates to the requirement that all VECs must use the same pool of questions during the pool's term. The FCC also stated later that they would take enforcement action against any VEC that "deviated greatly in spirit" from a question pool that the VECs had collectively adopted.

The VECs' Part

The subcommittee mentioned at the

Table 1

Question-Pool Revision Timeline

Event	Elements 2 and 3A	Elements 3B and 4A	Element 4B
Solicit syllabus input*	February 1, 1988	February 1, 1989	August 7, 1987
Syllabus input due	April 1, 1988	April 1, 1989	September 15, 1987
Syllabus rough draft released	May 1, 1988	May 1, 1989	October 1, 1987
Syllabus reply comments due	June 1, 1988	June 1, 1989	October 15, 1987
Syllabus final draft released	July 1, 1988	July 1, 1989	November 1, 1987
Solicit question input*	February 1, 1988	February 1, 1989	August 7, 1987
Question input due	October 1, 1988	October 1, 1989	December 1, 1987
Questions rough draft released	November 1, 1988	November 1, 1989	December 15, 1987
Question reply comments due	December 1, 1988	December 1, 1989	February 1, 1988
Final pool released to VECs and Publishers	February 1, 1989	February 1, 1990	March 1, 1988
Question pool used on tests	November 1, 1989	November 1, 1990	November 1, 1988

*Input to the syllabus and its associated question pool are solicited on the same date.

beginning of this article was formed and its three members elected at the 1987 VEC Conference in Atlanta. The members are ARRL/VEC (chairing), Greater Los Angeles ARG/VEC and Western Carolina ARS/VEC. (W5YI Report/VEC is an alternate to the committee.) These three VEC's will gather and review all input, decide what changes to make (if any) and release the revised pools to the public.

How to Provide Your Input

By virtue of another FCC regulation, Section 97.517, all licensed hams who hold at least a Technician class ticket may

prepare questions and submit them to the question pool committee. Here are the basic license class requirements:

	<i>May submit input for:</i>
License/class	Technician/General Element 2
Advanced	Elements 2 and 3 (now 3A and 3B)
Extra	All written elements

If you have some input to submit and hold the appropriate license class, send your proposals to any one of the three Question Pool Committee members. Their addresses are: ARRL/VEC, Attn: Jim Clary, WB9IHH, Question Pool Com-

mittee, 225 Main St, Newington, CT 06111; Greater Los Angeles ARG/VEC, Attn: R. C. Smith, W6RZA, Question Pool Committee, 9737 Noble Ave, Sepulveda, CA 91343; Western Carolina ARS/VEC, Attn: Ray Adams, N4BAQ, Question Pool Committee, 5833 Clinton Hwy, Suite 203, Knoxville, TN 37912.

A final note: The question pools are now the responsibility of the VECs, but the VECs are made up of hams just like you, which means that you can have some impact on Amateur Radio licensing that may last for years. Give us your thoughts!

Strays



HOW TO BE AN EAGLE SCOUT—HAM RADIO STYLE

□ In an attempt to restore nesting eagles to areas where they have disappeared, the Sutton Avian Research Center in Bartlesville, Oklahoma, released five young bald eagles, our national symbol, in east-central Oklahoma. The eagles are carrying miniature radio-transmitters and left Oklahoma in late June. Three previous sightings of eagles released in earlier years suggest that they can be expected to spend the summer in the upper Great Plains, Great Lakes and southern Canada.

A researcher will be afield searching for the radio-carrying eagles and would appreciate help from hams who can receive 216 MHz and are willing to monitor the eagles' frequencies occasionally. Although the signal might be received at any time of the day, the most productive times to search will be during the heat of the day when the eagles might be soaring high or after dark when they will be roosting. The transmitters' batteries are expected to last 12 months. After October, the eagles will probably migrate back to the southern states.

The discrete frequencies for the transmitters are 216.040, 216.076, 216.274, 216.490 and 216.608 MHz. The transmitted signal is a pulsed continuous wave that sounds like short

(40-millisecond) beeps, which are regularly repeated 70-90 times/minute. Frequencies and pulse rates may vary slightly from those given, due to environmental conditions, as will signal amplitude.

Any ham hearing this type of signal on any of the listed frequencies is requested to contact promptly the Sutton Avian Research Center, tel 918-336-7778 collect Mon-Fri, 8 AM-4:30 PM Central. Messages can be left on a phone recorder at other times. The information needed is: name, address and phone number of the radio operator, and the frequency on which the signal was heard.

The Sutton Research Center is grateful for any help ARRL members can provide and will acknowledge such in our publications and publicity efforts.—Alan Jenkins, Assistant Director, Sutton Avian Research Center

QST congratulates...

□ the following radio amateurs on 50 years as ARRL members:

- John Scarvaci, W9GIL, of Milwaukee, Wisconsin
- George Wright, W2GW, of Townville, South Carolina
- Anton Varga, W9WIB, of Spring Hill, Florida

- Otto Kosa, W4MES, of Hartwell, Georgia
- Samuel Lapidge, K1ZED, of Monroe, Connecticut
- Frank Anderson, W4KAO, of Emporia, Virginia
- John Layton, W7GPS, of Seattle, Washington
- Woodrow Huddleston, K4SCL, of Largo, Florida
- Everett Worrell, W4WJJ, Disputanta, Virginia
- Kib Kiblinger, W4JTG, of Mineral, Virginia
- Harold Barber, W6GQK, of Cameron Park, California
- Ben Franklin, VE3NOL, of Stroud, Ontario
- Arnold Miller, W6PWH, of St Joseph, Missouri
- William Littlewood, W9HE, of Waukesha, Wisconsin

□ the following radio amateurs on 60 years as ARRL members:

- John Glauber, W4OB, of Zellwood, Florida
- Donald Fenton, W1JH, of Sun City West, Arizona
- John Montgomery, KB2IE, of McLean, Virginia
- William Hall, W1BMB, of Friendship, Maine

Elmers—They're Essential

By Curt Holsopple, K9CH

Assistant Director, Roanoke Division
818 Spotswood Dr
Harrisonburg, VA 22801

Newcomers to Amateur Radio need someone to serve as a mentor to help ease the transition from a new ticket holder to a confident operator. Here's our tribute to some role models, and an invitation for you to join the fun.

The personal touch from an expert is an important ingredient in bringing newcomers into any group, and Amateur Radio is no exception. ARRL Headquarters constantly receives reports about the fine work done by an Elmer, someone who helps another person grow into the hobby of Amateur Radio.

Elmers answer questions and offer advice. Sometimes they loan equipment and climb towers. Elmers seem to be available whenever they're needed. Elmers are also important for experienced hams who want to branch out into new areas of expertise. Ours is such a varied hobby that we're all still Novices in some fields. None of us ever outgrows the need for Elmers.

It's an impossible task to thank all Elmers individually for their help, but a few of the letters received at HQ do a better than average job of telling what an Elmer is and does. If you are an Elmer, thanks! If you're not, we hope the Elmers in this article will inspire you to help someone else get more fun out of Amateur Radio. If you are a newcomer in need of assistance, check the sidebar associated with this article for more information.

In the stories that follow a common thread becomes obvious: Help often comes from unanticipated sources. Conversely, you might be called upon to assist someone else when you least expect it.

Whistling in the Dark

When I was nine years old, I somehow connected two flashlight cells to a flashlight bulb with some pieces of metal. The lash-up generated light and heat from the poor connections. From that time on, I wanted to be an electrical engineer. I read every book about electricity and radio I could get my hands on, but progress came slowly. I lived on a farm 15 miles away from a small town, and no one else nearby shared my interest.

About the time I was 13 years old, someone gave me a few chunks of calcium carbide. I mixed it with some water and a match, which earned me a fast ride to the hospital 40 miles away. There they removed

the bits of glass from my face (the mixture had exploded), bandaged my eyes thoroughly, and put me in a room next to a heart-attack patient named Virgil Strahan. I forget his Amateur Radio call sign, but his son had the shortest possible call available in the mid-1950s—W5EEE.

Are You a Registered Instructor?

If you teach Amateur Radio courses, are interested in serving as an Elmer, or want to become a BSA Radio Merit Badge Counselor, we have some free material for you. ARRL registered instructors get a quarterly newsletter, *The ARRL Field Forum*, that includes articles geared to your needs.

It costs nothing to register as an instructor. We'll also list your ham radio classes in our computer data base.

Instructor/Dealers may get certain ARRL publications at dealer rates. To participate in this program, the instructor must purchase for 20 dollars a package of books that retails for 40 dollars. A tax resale identification number is also required. To register as an instructor and/or to find out more about the Instructor/Dealer program, write to: Instructor, ARRL Club Services, 225 Main St, Newington, CT 06111.

When Virgil learned of my interest in radio, he taught me the Morse code by whistling it to me! We were together in that hospital for only four days, after which I was home in a dark bedroom recovering for what seemed like forever. Alone without a ham-mentor once more, my progress into

Amateur Radio came to an abrupt halt until two years later.

My hospital roommate and I had stayed in touch, and at Virgil's invitation my parents allowed me to stay with him for a week. He and his son operated a radio/TV repair shop in his home, so I got to see a little hands-on electronic stuff and continued my training as a ham. When I went home after that week, I was on my own once again, but at least now I had an ARRL *Handbook*.

In 1959 I left home to attend Graceland College in Lamoni, Iowa. I befriended several good fellows in the college's W0YO ham club. From that point on, it was a miracle that I passed any of the regular college classes. I lived with an old paper-tape code-training machine kindly loaned by W0YO until I passed my Novice test. As KN0BCC, my first QSO was with an XYL in the same state, and I worked her husband a week later. I used a Viking Adventurer transmitter running 50 watts, and a Hallicrafters SX-28A receiver. The same day a QSL card came from the XYL-ham in Iowa, I also received an Official Observer notice for transmitting an out-of-band second harmonic! Ah, those were the days. What better way to start in Amateur Radio than working a rare female ham and an OO on my first contact as a radio amateur!

After more practice on W0YO's perf tape CW machine, and one trip to the FCC Field Office in Kansas City, I received my General class license, W4WKV (my home address was still in Florida). In the fall of 1961 I transferred to the University of Kansas at Lawrence and became active with the gang at W0AHW, the campus club station. One of the hams in the club was a PhD student who designed a 6-meter receiver. We built 10 of them, and had transmitter hunts all over campus. We



notified the campus police in advance, but I suspect everyone else wondered who the weirdos were that ran around campus in the dusk with headphones on and holding little loop antennas up in the air on wooden sticks! We had fun and learned a lot together, though.—*Myron A. Calhoun, W0PBV*

Some Elmers are Downright Sneaky

Many years ago I became interested in Amateur Radio. I was living in Southern California then and my neighbor was an active ham. It wasn't talking to the world that fascinated me, it was his equipment. My interest in Amateur Radio smoldered but didn't really light up until about 15 years later when I was stationed in West Germany for the US Air Force.

I studied for a couple of weeks and passed the Novice exam, but seven years later I was a civilian and still hadn't made my first contact. Bill, WA6IET, a coworker, gave me some good-natured badgering. He invited my wife and me to celebrate New Year's Eve. Naturally, Bill and I snuck out to the "shack" where Bill got on the air for a little while.

Bill was operating CW and contacted Ruth, WA7RVA, at around 11:30 PM. They were pounding brass so fast that I had no idea what they were saying. About 10 minutes into the QSO, Bill got up from his chair and announced, with a sly grin on his face, "Ruth, in Seattle, wants to talk to you."

What was I supposed to do, say no? Leave Ruth sitting there listening to static? She obviously had my call sign. Bill made it plain that he wasn't going back to the radio. He got comfortable clear across the room. To this day, I remember that long walk from my chair to the operator's position of Bill's rig. Finally, I sat down, looked at Bill and said something like, "Now what?"

Bill walked me through my first contact. He copied longhand right alongside me so that if I missed something, I could read his copy. Ruth was the perfect first contact for me; she sent slow enough for me to copy and gave me lots of encouragement. Both Bill and Ruth were very patient with me. Now I have the pleasure of encouraging someone else. How do you thank someone who helped you realize a childhood dream?—*Bud Webb, KA2IOO*

Persistence Pays Off

Living in a small mining town just south of the Yukon border often left me with a shortage of things to occupy my time, especially when the outside temperature was 50 degrees below zero! I am not one to just sit and knit away the hours.

In June of 1983 my husband and I needed some work done on our cabin. We found a man in town who was willing to come out and have a look at the place. I was standing by his truck and noticed some radio gear inside.

"Nice CB, but kinda big, isn't it?" I said. That's all he needed to hear, and I got the lecture on ham radio. After hearing what he told me, I thought about all of my spare time and figured this just might be the thing for me. John, VE7CWG, became my Elmer and brought me all the things I needed to get going. As he handed me books and tapes. I could see his little grin that said, "I wonder just how long she will stick with it?"

Need An Elmer?

If you need help, a local Amateur Radio Club is your best source of information and assistance. ARRL Club Services has a prospective ham package for newcomers. Prospective hams or hams who need to locate a nearby club can get an up-to-date printout of actively affiliated radio clubs, registered instructors and upcoming test sessions that are coordinated by the ARRL/VEC. Write: Prospective Ham Package, ARRL Club Services, 225 Main St, Newington, CT 06111.

John was very patient with my questions, although he never gave me any answers. After I researched my books thoroughly, we would sit down and discuss my questions. I'm grateful for his approach now, but at the time I could have choked him! Actually, I think he was just testing me just to see how much I wanted to get the license. By the time I got to the last chapter (on setting up a station), he finally figured I was serious about this. John came over just about every evening armed with his keyer, and he sent me the letters I was working on that day. Code practice just about drove me crazy because of local interference: my dog barking, my boys playing, the phone ringing and my OM going in and out of the kitchen for coffee.

By the time I was ready to go for my first exam, he was more nervous than I was. I went up to Whitehorse, Yukon Territory, and managed to pass. A year later I upgraded to the Advanced class ticket. John showed his enthusiasm at hearing the news—he even put it in the local newspaper!—*Mary Ryan, VE7CWJ*

An Unexpected Twist On Elmering

Being an Elmer can have some unusual rewards, but this is a real turnaround on the usual Elmer story. A friend of many years asked me if I would help him get his Amateur Radio license. Jeff had been interested in the hobby since he was a boy (he's now 37), but he never found the time or means to get started, I was pleased to teach him, and before long he was licensed as KA5VYV. While I was teaching Jeff the

code, my XYL was listening in. She picked up on it and decided to study it with him. Not only did Pat get her ticket, she has just upgraded to General!

Now comes the twist. During my recent unemployment, I had to keep my mind busy and spirits up. All of this tutoring got me to study, and I have just achieved something I thought was impossible. After nearly 22 years as an Amateur Radio operator, I have just upgraded to Extra! The rewards of being an Elmer are far greater than just having a good feeling.

By the way, if anyone wonders if the WIAW code practice sessions are important, just send your letters to me. The League's WIAW code practice was the *only* means I used to get my code speed up to pass the Extra Class exam. Thanks—it really helped!—*Mike Martin, WA5LNG*

Elmering Behind the Scenes


Most Elmers teach classes. They're up front a lot. But Herb Stephens, WB6GHN, is the one who does things without being seen unless you look more closely. He makes all of our posters to advertise club meetings and classes. He makes diagrams, maps and displays—anything of interest to hams and hams-to-be. He is quiet, but gladly answers questions on the spot and helps dig out answers.

When needed, he's there. He'll take over the class in a pinch, give encouragement, and help with antenna and repair work. He's behind the scenes most of the time, but he's an Elmer too.—*Mildred Strongman, WB6HXX/AE*

So What Is an Elmer?

An Elmer can be an active ham who teaches both Novice and upgrade courses four times a year, or an Elmer can be the passing acquaintance who answers just one crucial question. An Elmer can have a graduate degree in education or social psychology, or an Elmer can be a high school dropout who has an aptitude for explaining electronics.

An Elmer can be a veteran ham with decades of experience. But these stories show that newcomers can also provide valuable help. An Elmer may be a retiree, a housewife or a self-employed businessperson whose schedules may be more flexible. But many Elmers are overworked, underpaid 9 to 5ers who are scheduled to the hilt. Sometimes an Elmer is another newcomer who doesn't know any more than you do, but is willing to work with you to get answers and solve problems.

An Elmer is anyone who helps another. The next time you're at a club meeting or hanging around on the local repeater, why not keep your ears tuned for a call for help? You can be an Elmer, too, and your Amateur Radio Service will benefit from it. The most important part of being an Elmer comes in just being there, available when needed. The rewards? Why not find out for yourself? 

ARRL Files Comments in Call Sign Inquiry, PRB-3

The ARRL has filed comments in PRB-3, the FCC public notice that inquired if the private sector could establish a program to grant requests for specific amateur call signs. This notice contained the FCC criteria for the selection of a Special Call Sign Coordinator (SCSC) and established a pleading cycle for groups or organizations to file proposals to be an SCSC.

In our comments, we emphasize that the Commission should administer any call-sign program. *The ARRL strongly believes that the assignment of call signs is a governmental function, which should not be relinquished, or contracted away, by the FCC.* We conclude this section of our comments by saying: "Here is an opportunity for the Commission to undertake a program not presently performed, the cost of which can be offset by fees charged to those who choose to avail themselves of it, and which will result in satisfying a previously unmet demand. At the same time, the Commission's provision of the service will establish a continuing interest in amateur radio and promote, as a result of that expression of interest, a renewed incentive for self-regulation and administration of the Amateur Radio Service overall by amateurs."

However, if the FCC would not conduct such a program, then we would do so under

certain conditions. First, only a single entity must administer the program. In order to have multiple special call-sign coordinators (SCSCs), real-time coordination would be needed to prevent risk of duplication, thus increasing the cost of the system and increasing the possibilities for errors. *The ARRL is the logical choice to assume this exclusive role since it is the only national Amateur Radio organization.* It has a professional staff of more than 100 that works daily with the Commission for the promotion and advancement of Amateur Radio and is familiar with the amateur call-sign assignment system.

The cost of a special call sign as suggested by the League would be a \$25 initial fee, with a charge of \$10 upon license renewal. The special call sign would expire at the same time as the license of the amateur. The renewal fee would ensure that the program would continue to function and be self-supporting after the initial rush of call-sign requests is filed.

Another condition of ARRL participation is that the liability of the SCSC must be limited to the fee charged and the Commission must clearly establish there is no entitlement to the use of a particular call sign, even if it was previously held. There can also be no liability to anyone arising from the denial of a particular call sign.

In order to assure fairness, all licensees must be informed of the program. Our comments recommend a one-time mailing by the FCC to all licensees announcing the program. The ARRL, as SCSC, would provide the material for this mailing as well as provide publicity via the amateur press.

In conclusion, our comments state: "The demand for specific call signs in the Amateur Radio Service is significant; a special call sign program is an amenity which should definitely be provided. It is proper that the Commission should provide this service, on a cost-reimbursed user fee basis. Should the Commission nevertheless determine that the assignment and issuance of call signs... be delegated, then the League should be the sole entity involved in the non-FCC portion of the program."

A number of other organizations and companies have also filed with the FCC to be an SCSC. These include: Acadiana Computer Systems, Association Headquarters, Brown and Schwaninger, Buckmaster Publishing, Callsign Inc (Gordon Girtan, W6NLG, president), Central Alabama VEC Inc, DeVry VEC/Diamond Systems Inc, Forest Industry Telecommunications, Frederick Maia, W5Y1 VEC (5th call area only) and the Radio Amateur Callbook Inc.

CALL FOR BOARD REPRESENTATIVES IN THE DAKOTA DIVISION

No petitions were received for the office of Dakota Division Director prior to the August 20 deadline. Also in the Dakota Division, the incumbent Vice Director has declined re-nomination, so new petitions for these offices are now being resolicited for the 1988-1989 term. From now until November 20 at noon, League Headquarters will accept nominating petitions signed by 10 or more Full members of the Dakota 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 (EC) to determine the eligibility of a candidate in accordance with the Articles of Association and Bylaws, and a statement of not more than 300 words setting forth the candidate's qualifications. The candidate may also submit a recent photo of him/herself. This determination of eligibility will be made by the EC within a few days, so candidates should make sure their information form arrives at Headquarters as early as possible and in any event no later than November 20. (It is in the candidate's best interest, obviously, to get the nomination in early. If there is to be a mid-November nomination for some unavoidable reason, the candidate information, 300-word statement and photo 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

If there is more than one candidate for either office, ballots will be sent to all Full members of the League in the Dakota Division who were in good standing as of December 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than January 1, and, to

be valid, must be received at HQ by noon February 20.

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 candidate for Vice Director from this division for the 1988-1989 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.

ARRL FILES SUPPLEMENTARY REPLY COMMENTS IN 87-14

On July 31, the ARRL filed over 30 pages of supplementary reply comments in FCC Docket 87-14, the proposal to remove 220-222 MHz from the Amateur Service.

Our comments concentrated on a discussion of why other amateur band allocations were not suitable or available substitutes for 220-222 MHz.

Section 97.86(d) of the FCC rules limits auxiliary operation to frequencies above 220.5 MHz, and exempts 431-433 and 435-438 MHz from such use to avoid interference

to satellite and weak-signal operations. Amateur bands on HF and 50-54 MHz are not available to reaccommodate the auxiliary operations that would be displaced because ionospheric propagation makes them unsuitable. The 144-148 MHz band is completely saturated and could not in any event accommodate displaced 220-222 MHz auxiliary operations.

The next band above 220 MHz is the 420-450 MHz band. This band is allocated in the US on a primary basis to the Government Radiolocation Service and only secondarily to amateurs. It is also saturated in many areas of the country. Part of the band, 420-430 MHz, is not available above Line A within 50 miles of Buffalo, Cleveland and Detroit. In some portions of the US, amateurs are limited to 50 watts to protect military radar. Because of the amateur's secondary status and its complex allocations, "there is no solace to be found for potentially displaced 220-222 MHz amateur stations at 420-450 MHz."

Lastly, the 902-928 MHz and higher amateur bands are discussed. Through the use of graphs, we show that propagation limitations above 450 MHz preclude the use of those amateur bands for applications such as intercity high-speed data links. Additionally, the 902-MHz band is also allocated on a secondary basis to the amateur service, and there is also a complex allocations system there. In large portions of Texas, New Mexico, Colorado and Wyoming, the band is not available at all.

Our comments conclude: "Thus, it is apparent that the 220-222 MHz band is unique, and that the amateur uses conducted therein are uniquely suited to it. It is not possible to simply move these stations to a different frequency band. . . it is not possible, given the extent of FM repeater operation at 222-225 MHz to consolidate all existing uses at 220-225 MHz into the 3 MHz segment proposed to be left to amateurs. The amateur uses at 220-222 MHz will, for the most part, be lost entirely, and with them the amateur packet operation and repeaters supported by those stations."

In other 220 news, the Chief Counsel for Advocacy of the US Small Business Administration has written the FCC concerning this proposal. In the letter, he says that this proposal will obsolete the non-FM equipment supplied by many small manufacturers and this equipment cannot be modified for use on the other amateur bands. He urges the FCC to consider the impact of the proposal on the small manufacturers of amateur equipment and suggests allocating the 218-220 MHz band, or accommodating the land mobile requirements in existing bands at 30-50 and 150-174 MHz, instead.

VEC CONFERENCE

The 1987 conference of Volunteer Examiner Coordinators (VECs) was held July 10 in Atlanta, just prior to the ARRL National Convention. Thirteen of the 20 certified VECs attended this year's conference, representing about 93% of the nation's VE testing. Two publishers of Amateur Radio training materials, Ameco and Gordon West's Radio West School, also sent observers. ARRL's First VP Jay Holladay, W6EJJ, Counsel Chris Imlay, N3AKD, and ARRL West Gulf Division Vice Director Tom Comstock,

Goldwater Scholarship Fund Contributions

The following have contributed \$25 or more to the Senator Goldwater Scholarship fund: In memory of William Maurits, W9KWW, from the Clinton ARC; Bolingbrook ARS; Henry Marcy NF1W; South Jersey Radio Assn; D. R. Webster K6WM; Central Arizona DX Assn in memory of Ron Flowers, N7RR, James Hill, K7JVR and Clair Mineau, NB7O; Michigan Amateur Communications System in memory of Thelma Schrontz, WA8ENW.

N5TC, along with ARRL VEC Manager Jim Clary, WB9IHH, and Assistant Manager "Mac" McGrath, KZ1A, attended. Ralph Haller, N4RH, Deputy Chief of the FCC's Private Radio Bureau and John Johnston, W3BE, Chief of the FCC's Personal Radio Branch, were also present.

At the beginning of the Conference, the ARRL pointed out that since the FCC appoints VECs on a regional basis, VECs should be allocated votes at the Conference in the same manner. Thus, each organization should have one vote for each region in which it is certified as a VEC and in which it coordinates examination sessions. Since there are 13 regions, organizations certified in and performing in all 13 should each have 13 votes (out of a total of 59 votes). Smaller VECs, who coordinate sessions in only one or two regions, would have a proportionate number of votes. (ARRL coordinates the majority of examinations administered nationwide, but under its proposal would have had only 22% of the voting control on VEC issues.)

The proposal was defeated, and the participants voted to allow one vote per organization. As the ARRL VEC could not accept these voting arrangements, it abstained from voting on all subsequent issues for the remainder of the day. The ARRL VEC did, however, continue to participate fully in the Conference.

The main topic covered at the Conference concerned maintenance of the question pools for each license class. (VECs now handle the revision of all written examination questions.) The Conference participants adopted a three-year revision cycle. Jim Clary, WB9IHH, of the ARRL VEC was selected Chairman of the Question Pool Committee, which oversees question pool revisions. Other members of the Committee are Ray Adams, N4BAQ, of Western Carolina VEC, and R. C. Smith, W6JZA, of Greater Los Angeles ARC. Fred Maia, W5YI, of W5YI VEC, is an alternate.

Conference participants voted to submit a petition for rulemaking to the FCC to relax the wording of Section 97.21(b). The present wording requires the code test message to contain *all* letters, numerals 0-9, various punctuation marks and prosigns. The Conference wishes to relax the wording so that the code test message would contain at least 90% of these characters. Ray Adams, N4BAQ, of Western Carolina VEC, was appointed to prepare the petition.

The next VEC Conference will be held in conjunction with the 1988 ARRL West Gulf Division Convention in Dallas/Ft Worth, Texas in early June.

ELEVEN CLUBS TO RECEIVE 50-YEAR AWARDS

The following ARRL affiliated clubs will be receiving their 50-year affiliation certificates this year: Palo Alto ARA (CA), Palomar RC (CA), Pueblo Ham RC (CO), Newton ARA (IA), Kalamazoo ARC (MI), Tu-Boro RC (NY), Greater Cincinnati ARA (OH), Black Hills ARA (SD), Ogden ARC (UT), Four Lakes ARC (WI) and Manteca ARC (CA). These clubs have represented ARRL and Amateur Radio in their communities since 1937. Congratulations!

FCC LEVIES \$2000 FINE

Joseph Franowsky, KA9SKZ, 18, has been reported identified as the source of deliberate interference to the Orland Park, Illinois, Police Department. According to an FCC Public Notice, Franowsky had allegedly programmed an amateur transceiver to operate on a frequency used by the Orland Park police. The Public Notice also states Franowsky impersonated a police officer, harassed police with profanity and made false fire-alarm calls.

According to the FCC, Franowsky was charged with operating an unlicensed station and causing deliberate interference to police communications. He was fined \$2000 by FCC and may have his amateur license suspended.

BRUCE WILLIAMS, WA6IVC, NEW HQ AD MANAGER

The ARRL is pleased to announce the appointment of Bruce O. Williams, WA6IVC, as the new HQ Advertising Manager, effective August 31. He replaces Lee Aurick, WISE, who is retiring.

Williams was first licensed as WA6IVC in 1959 and joined the ARRL staff in 1985 as an Assistant Technical Editor. He has conducted the Product Review column and the New Products column. He has been the handling editor or author for numerous *QST* technical articles. He is also well-known as the designer of the SIMPLEceiver. Prior to coming to the League, Williams worked for 30 years in the electronics and aerospace industry. Many amateurs would be interested to know that he also served as VP and General Manager to Swan Electronics Corporation in 1964-65, then the manufacturer of a line of popular amateur transceivers.

ARRL FILES COMMENTS WITH SOUTHERN REGION OF FOREST SERVICE

In our last issue, we reported that the Southern Region of the US Forest Service had joined several other regions in proposing new rental fee schedules for the various radio and TV services, including amateur, that rent US Forest Service land sites. On August 14, the ARRL filed comments against the proposal with the Southern Region. This region had proposed site fees by state from \$300 to \$1200. Using similar comments that we had previously filed with other US Forest Service Regions, we emphasized the noncommercial nature of Amateur Radio and noted that all out-of-pocket expenditures were paid by amateurs, and there was no way to recoup these expenses. Since 90% of the repeater owners pay nothing for the use of their sites, the fair market value that the Forest Service should charge "is nothing, or at most a nominal fee."

We conclude that the Forest Service should

recognize the valuable public service and emergency communications rendered by amateurs, together with the nonpecuniary nature of Amateur Radio, and provide electronic site space to amateur repeaters free or at nominal cost.

FCC GRANTS STA REQUEST

In our last column we reported that the FCC had announced that the ARRL STA request had been granted. For a six-month period, approximately 58 amateur packet stations are permitted to conduct unattended automatic operation while transmitting third-party traffic on frequencies below 50 MHz.

HQ has now received the letter from the FCC giving special temporary authorization (STA). This letter is signed by Michael Fitch, Chief of the Private Radio Bureau. In the STA, Fitch noted that the FCC did not authorize automatic control on amateur HF frequencies because of the heavy use and higher possibility of station interference on these frequencies. However, in the Order, the FCC did say that organized projects conducted by a manageable group of amateurs could be helpful in determining any rules necessary to prevent interference to and from other amateur operation.

Fitch stated that the ARRL's request was consistent with the Commission's suggestion, and that "Section 97.80(b) is waived to the extent that these stations may be operated under automatic control while retransmitting third-party traffic under the same conditions as permitted by stations retransmitting digital packet communications on frequencies above 50 MHz."

Fifty-eight amateur stations are listed in the STA. Fitch noted that the STA "would also apply to any additional amateurs' stations joining the project during the period of the STA, provided the ARRL submits an amended list and individuals' requests."

AMSAT TECHNICAL JOURNAL AVAILABLE

The first edition of the *AMSAT Technical Journal*, containing articles from around the world on the subject of Amateur Radio satellites, tracking and telemetry, is now available from AMSAT HQ. The cost is \$10 plus \$2 shipping. AMSAT's address is: PO Box 27, Washington, DC 20044.

FCC NOTICE ON EXTENDED FREQUENCY RIGS

Can your 2-meter handheld transmit on nonamateur frequencies? Many of the 2-meter transceivers on the market can easily be modified for operation from 140-150 MHz. Some manufacturers are even offering conversion kits!

The FCC has issued a Public Notice clarifying its rules on equipment primarily intended to operate on amateur frequencies, but which can also operate on adjacent frequencies in other radio services.

The Commission said that in most of the licensed radio services, such as the Private Land Mobile and Maritime Services, all equipment used must be type accepted for that service. Thus, if a piece of equipment is primarily intended for use in such a service, it must be type accepted. In the Amateur Radio Service, there is no type acceptance. All transmitters must comply with certain technical standards, however.

The FCC reminds amateurs that it is a

violation of its Rules to market an Amateur Radio Service (ARS) transmitter that is intended to operate on frequency bands outside of the ARS, CAP and MARS bands without type acceptance. It is also a violation even to operate such a transmitter when it has not been type accepted in that radio service or to transmit on a frequency without the appropriate FCC-issued license.

FCC BEGINS INQUIRY INTO ADDITIONAL TRUNKING IN LAND MOBILE SERVICES

The FCC has begun an inquiry to explore the possibility of permitting additional trunking in the private land-mobile radio services.

"Trunking" is the process whereby a computer automatically gives a user the first available channel or places the user in a waiting line to be served in turn. Without going into details, this system results in doubling spectrum efficiency, according to FCC.

Trunking is currently allowed only in the 800- and 900-MHz bands, and the Commission is now asking if trunking technology should be expanded to the lower private land-mobile bands.

The Commission noted that the private land-mobile radio services represent the largest group of licensed radio users regulated by them. The news release said that "frequencies are extremely congested, especially in the major urban areas," and noted that the Commission had allocated a portion of the 900-MHz band to the service and had proposed two additional MHz of spectrum from the amateur 220-MHz band.

ROMANIA ON 160 METERS

HQ has been informed that Romanian amateurs now have 160-meter privileges. They may operate between 1.810 and 1.850 MHz. This leaves Albania as the only European country that does not allow 160-meter operation.

NORWEGIAN AMATEURS ON 6 METERS

HQ has been advised that Norway has now allowed its amateurs use of 50-52 MHz on an experimental basis. Amateurs are limited to 25 watts output, or 60 watts ERP, and 65 feet of antenna height.

F. GEORGE DUPONT, WA1SVY, SK

ARRL HQ is saddened to report the passing of ARRL Foundation Treasurer F. George duPont, WA1SVY, 74. He was a Life Member of ARRL and active in several Amateur Radio clubs in his home state of Connecticut. He brought extensive business experience to his nine years as Treasurer and also served on the ARRL Foundation's Long Range Planning and Scholarship Committees.

The preservation and enhancement of the Mystic Seaport in Connecticut was of personal interest to George, and his family asks that in lieu of flowers, contributions in George's memory be sent to the Mystic Seaport, Mystic, CT 06355.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, Louisiana, North Carolina, Pacific, San Diego, South

Dakota and Virginia sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page eight 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 the ARRL Headquarters, but are not required. The following is suggested: (Place and date)

Field Services Manager, ARRL
225 Main Street, 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 December 4, 1987.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before January 1, 1988. Returns will be counted February 23, 1988. SMs elected as a result of the above procedure will take office April 1, 1988.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 1988.

If no such petitions are received for a Section by their specified closing date, such Section will be resolicited in January 1988 QST. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER APPOINTMENT

In the Connecticut Section, Pete Kemp, KZ1Z, has been appointed to complete the term (until September 30, 1988) of John T. Ronan, K3ZJJ (resigned).

In the Eastern Massachusetts Section, Barry Porter, KB1PA, has been appointed to complete the term (until December 31, 1988) of "Luck" Hurder, KY1T (who has accepted the Deputy Field Services Manager's position at HQ).

SECTION MANAGER ELECTION RESULTS

Balloting results: In the Colorado Section, William "Bill" Sheffield, Jr, KQ0J, received 678 votes and J. Trenton "Trent" Hays, WB0HZZL received 251 votes. Mr Sheffield was declared elected. His term of office begins October 1, 1988.

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.

ON NOVICE ENHANCEMENT

□ It has been great fun working Novices and Techs on 10-meter phone. Having taught Novice classes for years, I know what the newcomer to phone is going through and I try to put them at ease.

QST should run an article on the art of QSLing and on the RST system for these newcomers. Since the 10-meter phone section has been made available to them, I have sent out in excess of 300 QSL cards.

Eight out of 10 cards I receive do not have the time expressed in UTC, or if it is in UTC, it is an hour off because of daylight savings time or one day off because operators forget to change to the new day at 0001 UTC. One card had the time listed as "Eastern Standard Daylight Time." Another used a picture postcard and thanked me for the QSO, but listed no date or time, listed no band and gave no name or address, although he did put his call on the card.

Don't get me wrong; I love working in the Novice/Tech subband, otherwise, you wouldn't find me on that section of 10 meters. I try to help new operators with my comments and patience. I have received quite a few notes on QSLs thanking me for not letting them give a signal report and run. Instead, I got them into a conversation so that these operators will be more confident next time they are on the air.—*Les Taylor, WA0QIT, Duluth, Minnesota*

Many of us can relate similar stories. No ham is automatically an expert on proper operating procedures. We must all work to become better operators. A series of three articles in the Novice Notes section of *QST* (May, June and July 1987) provides a good overview, and the new 684-page ARRL *Operating Manual* will answer questions on operating.—Ed.

□ In 1968 I tried to upgrade from Novice to General. After breezing through the code, I handed my written exam to a secretary at the FCC office. As she graded it she said, "did you study at all?" I did, and knew I couldn't have done any better. My confidence was shattered. That day was terrible, and I wondered if I would ever be a ham again. My Novice license had just expired and I had just failed my General. I went home and sold my Novice gear and left ham radio behind. At the time, Novice licenses were good for one year and were nonrenewable. Oh, how I missed my hobby, but I was scared that I would never pass the theory, so Amateur Radio was put in the "future project" box.

For years I would tell people, "I used to be a ham, and one day I am going to get back into it." About a year ago as I was finishing this sentence to a local ham, he said, "Hey, Tim, did you know that you can get your Novice ticket again, in fact, you can keep it forever and never upgrade if that is what you want." He went on to tell me about the license manuals from ARRL, and about the changes which have taken place in Amateur Radio since I was a Novice back in 1968. After our

conversation ended, I thought I could pass the theory this time. I bought a *Tune In the World* book that afternoon and received my Novice license two months later. Meanwhile, I entered a General class and I passed the exam. After 19 years I am now a General!

I am very proud to be a General class ham. I thank the ARRL for working with the FCC to encourage the growth of ham radio as well as writing excellent study guides. Had it not been for the changes which have taken place in Amateur Radio since my loss of license in 1968, I would not have had the confidence to try again. In addition, I would like to thank the local members of our club and all the hams around the country who have continued to encourage others to enter our exciting hobby.

Now, on to the Advanced ticket!—*Tim McCullough, N5KEL, Lafayette, Louisiana*

THANKS, VEs

□ As I recently upgraded from General to Extra, I wish to applaud the generous hams in the Motor City Radio Club.

I am grateful to those VEs who cheerfully give of their time and of themselves so that we amateurs may have an opportunity to obtain and to upgrade our amateur licenses. They were always friendly and gave encouragement to all. The testing session was very well organized and all time frames were met. I say "thank you" to all the VEs out there who give of themselves to help others.—*Steve Sorrell, WB8SFF, West Bloomfield, Michigan*

CONTESTING AND QUICK EXCHANGES

□ Perhaps I am being a stuffy old purist, but I believe that there is more to contest activity than merely having an exchange of call signs. The signal reports exchanged are intended to provide information. While I no longer participate on a seriously competitive basis in contests, I still like to get into the contesting fray to work some of the rare ones and to see how I will compare.

It is ludicrous to hear only 59 reports given to every contact with no exceptions. It is apparent that the report is a standard one when the station I am trying to work asks me to repeat his signal report several times.

I do not expect to receive 59 reports with my present antennas. The tendency seems to make logging simple, high speed and untruthful. So, why not abandon the exchange of strength and readability reports during contests and adopt some other means of acknowledgment?—*Matthew M. Bell, W8KST, Sarasota, Florida*

WHY WE'RE CALLED "HAMS"

□ Previous explanations of the derivation of the word "ham" lose some credibility when one tunes across each of the amateur bands

and listens to the performance of some Amateur Radio operators. One gets a strong feeling that the term "ham" may very well have arisen descriptively and by association. One often hears hams "hogging" a frequency. Others think nothing of acting like "swine" in a DX pileup, not waiting their turn or interrupting the smooth flow of QSOs by jamming their "snouts" in the "trough." On the VHF repeaters, "salty" language fit for the "smokehouse" can be heard. Consideration for others is the only "cure" for this "half-baked" behavior. There are "thick-skinned" hams who "wallow" around in the middle of a net in progress, blithely ignoring the pleas of "Please, this frequency is in use."

Well, so much for the origin of the term "ham." I'd stop here except for the fact that if I don't say the following, someone else will: Yes, my shack looks like a "pigpen" and I'm still in "hock" for my rig. That ought to stop the "beefs" for a while!—*John A. Robertsen, KA0OSC, Minnetonka, Minnesota*

IT SEEMS TO US: ON OBSCENTY

□ This is in reference to the article entitled "FCC Reverses Hildebrand Ruling" in the Happenings column of July 1987 *QST*.

In addition to Part 97.119 of FCC rules which pertain to the airing of obscene, indecent or profane material, other laws are even more forceful for the amateur. Title 18 Section 1464 of the *United States Code* states: "Whoever utters any obscene, indecent or profane words by means of radio communications shall be fined not more than \$10,000 or imprisoned not more than two years, or both." The Communications Act of 1934 defines radio communication as "the transmission by radio of writing, signs, signals, pictures and sounds of all kinds." This includes Amateur Radio! Clearly, the US Department of Justice may prosecute violators of Section 1464 independently of the FCC if it so chooses. Thus, the law transcends both the Communications Act and the FCC's rules.—*Maurice E. Shelby, KJ1U, Amherst, Massachusetts*

□ I would like to take the opportunity to thank the ARRL for the action taken several years ago in filing the brief with the FCC stating the ARRL position concerning obscenity on the ham bands in the Hildebrand case. I for one do not need to hear obscene, indecent or profane language over the air.

There is always the possibility that visitors will be in the shack who are children. People may not be impressed with amateur operation when they hear such language. Among other things, Amateur Radio is a fraternity. Since I wish to remain proud of being a part of the fraternity, I support the highest standards of conduct. I applaud the ARRL in its action and I am glad that I renewed my membership after several years of lapse.—*Cameron C. R. Bailey, KT3A, Mt Wolf, Pennsylvania*

SP5EKY/VK2EKY/ZK2EKY

Early in the '70s, one of the most European-active hams you could find was Zbigniew Frank Murdzia. However, in December 1981 Zbig left Poland to live permanently in Australia. (He was able to obtain that SP call again on a later visit to Poland in 1984.)

As VK2EKY, he has had over 8000 contacts in over 200 countries. Zbig has been active in many contests, and in April of this year made a solo DXpedition to Niue Island as ZK2EKY—an operation that proved very popular with the brethren! While on Niue he worked 9000 stations, close to 200 countries and 39 CQ zones. (The warmth of his reception on Niue will ultimately lead him to a return visit.) Within about six months Zbig hopes to take another Pacific jaunt, this time to Manihiki (North Cook), as ZK1EKY.

This fine active ham is a member of the Wireless Institute of Australia and always returns QSLs. If you still need his card, please use: Zbigniew F. Murdzia, VK2EKY/SP5EKY/ZK2EKY, PO Box E450, Sydney, NSW 2000, Australia. (A very special thanks to WA3HUP for updating us on popular SP5EKY.)



VK2EKY/SP5EKY



A large part of the Bangkok RAST gang (l-r): HS1s FAR BV AMH FAS JN YL AMT, Suchant P. Sakhol (ex-Dir General of the Thai PTT), NN8R.



NN8R operating RAST station HS0B in Bangkok last May.

Radio Amateur Society of Thailand (RAST) has sought and won permission to operate the club station HS0B every weekend. Permission was granted in mid-January, and a dipole was immediately strung up at the QTH, located in central Bangkok on property belonging to the society's first vice president, Yongyuth Napasab, HS1DS. Although the station is on his property, it is very much a part of RAST, and all competent members who pass a subcommittee screening will be permitted to operate while a senior member is present. (Permission to operate both phone and CW is from 2300Z Thursday until 1700Z Sunday.) The club call is HS0B, and RAST hopes it will become more apparent as more and more Thai members become familiar with operating and coping with the pileups. The antenna used is a TH6DXX about 60 feet high, and dipoles for 40 and 80. The transceiver is a TS-930S, donated to the society by the Japanese Ham UNICEF Club. This new club station complements the society's club contest station HS0A, at the Asian Institute of Technology.

Happily, RAST enjoys an excellent relationship with the Thai PTT, which is now in the process of finalizing a draft to govern Amateur Radio with three classes of license, and to allow

foreign amateurs to operate (if from countries with reciprocal operating permits). The Society has some 300 members, and HSIAMH predicts a strong HF presence in the future. However, he adds that it will be a while yet before Thailand can expect to see private stations operating from homes. Club stations are envisaged as the first step by the PTT in the latest version of its draft regulations. In the meantime, and until the regulations are finalized and enacted into law, this demonstration station can be operated by any RAST member who has received permission from a committee member.

Anyone requiring further information may write to RAST at PO Box 2008, GPO, Bangkok 10501, Thailand. (Please include an SAE and sufficient IRCs for return postage.)

END OF AN ERA

On June 26, the legendary W6AM antenna farm came to an end. The ten 140-foot poles, five 95-foot poles and seventeen 70-foot poles came down. All told there was 17 miles of no. 8 Copperweld in the air! N6AW is compiling information for a series of articles and a book about W6AM. If you have a story to tell about Don Wallace, jot it down. If you have pictures of Don or his station from past years, please make a copy (costs reimbursed). Please contact Jan D. Perkins, N6AW, 6200 E Ocean Blvd-No. 7, Long Beach, CA 90803.

NCJ

DX and contest types will be happy to learn of the ARRL-National Contest Journal partnership and its goal of covering the DX and contest world. NCJ gets better and better, and you'll want to learn more about it. Check with editor Randy Thompson, K5ZD/3, PO Box 11439, Pittsburgh, PA 15238, or, for subscription information, ARRL HQ.

THE CIRCUIT

☐ KH4: NP4JV active on Guam mid-August anticipates Midway operation Oct 23-29. Cards via N2AU.

☐ NEDXCC: October 10 commemorates the 35th anniversary of this noted DX group. To



Past NEDXCC Banquet Chairmen (see second Circuit item) include (l-r): Front, W1DOH W1HZ W1HH W1HX W1JZ; Rear, K1MEM K1MM W1VRK W1OO W1YRC K1ST. (W9KNI photo)

AMATEUR RADIO IN THAILAND

[Earlier this year, professional photographer Ray Grob, NN8R, was on a working tour of Thailand and brought back enthusiastic comments about the country, its ham radio and the charm of its citizens. Thanks to Ray and HSIAMH for the following Thai update.]

Thailand is back on the air on a regular basis, writes Tony Waltham, HSIAMH (G4UAV), from Bangkok. He reports that after a long and still-ongoing dialog with the authorities, the



The venerable CN2AQ near Tangier. Sjoerd is often heard on 80 and works CW with a straight key (thanks DK7PE)

celebrate this benchmark year, the annual meeting (2 PM) and banquet (6:30 PM) will be held on that date at the Masonic Lodge in downtown historic Concord, Massachusetts. Highlights of recent African DXpeditions and audio-visual coverage of 3Y1 are slated for the program. Contact Joe Poges, W1EED, 144 Broadway, Wakefield, MA 01880. Past chairmen (see photo) include outstanding hams in the

1st call area: W1s DOH HH HX HZ (1st Chairman) JZ OO VRK YRC, K1s MEM MM ST.

□ **TG9:** W2JGR planned to operate sideband and teletype on all HF bands Sep 21-28. QSL to Jules Freundlich, W2JGR, 17 Nassau Blvd, Malverne, NY 11565.

□ **Aruba:** This month marks the 30th anniversary of the Aruba Amateur Radio Club. The AARC will issue a special award for working at least 3 Aruba hams during October (any band/mode). The application with \$5 (award, postage) must reach the club by Dec 31, at Box 273, San Nicolas, Aruba.

□ **8P9HR:** Look for the K3KG Georgia team to operate multi-single for CQWW SSB this month as 8P9HR. They'll be on before the contest on CW, licensed for the new WARC bands. Other calls to be used include 8P9HQ and 8P9HS. K4BAI will go single op from the same location in the November CW event as 8P9HT. All confirmations via K4BAI.

□ **Madeira:** AA4VK and WA4TLI will be signing /CT3 for the CQWW phone, operating Oct 19-25; 160-10 meters.

□ **LU4M/MEE:** LU1MPM now manages these cards. QSL to Sergio Grinberg, LU1MPM, Box 382, 5500 Mendoza, Republic of Argentina.

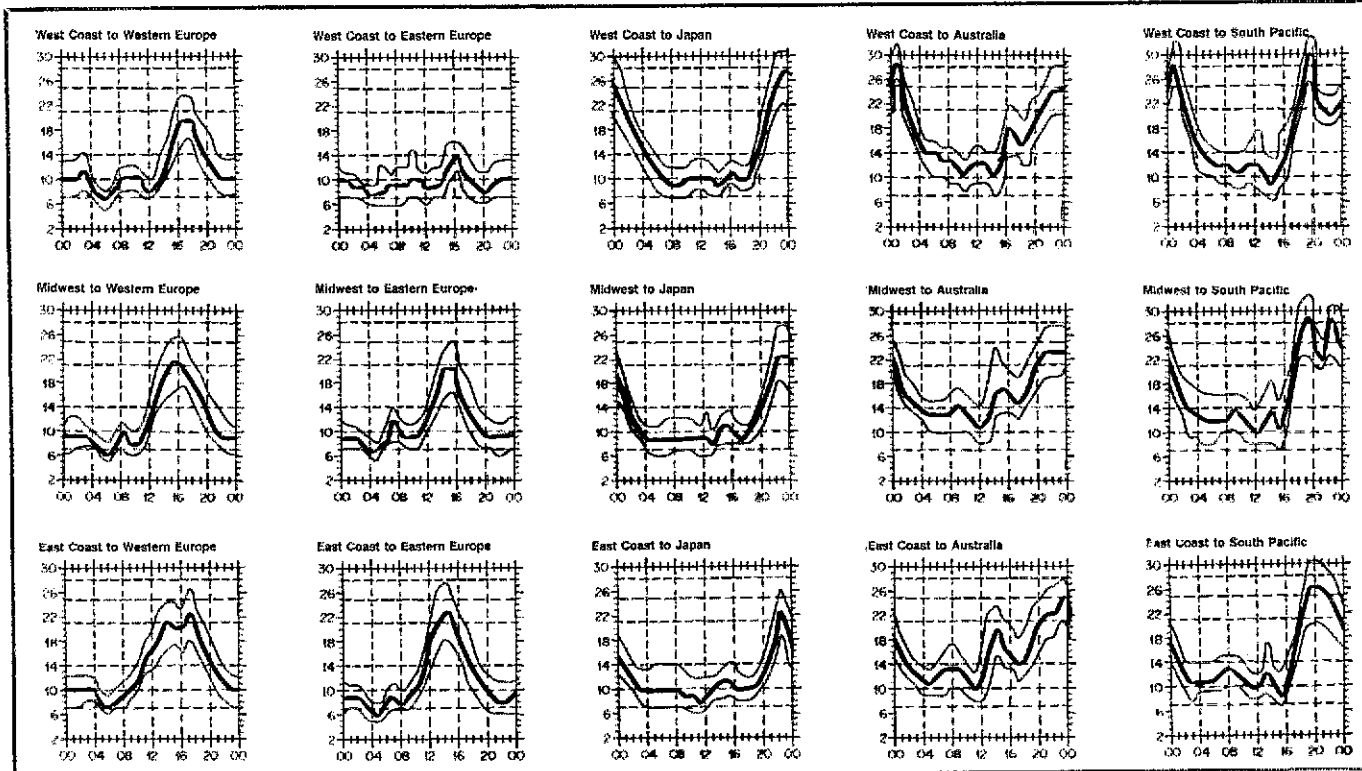
□ **Geoff Watts:** As a reminder, the legendary Geoff Watts (editor and publisher of the trusted *DX News Sheet*, 1962-1982) produces a radio amateur prefix-country-zone list and Countries Guide. Each of these outstanding references requires \$2, which includes return airmail postage.



K6IR with the globe-trotting Colvins at Dayton.

Write: Geoff Watts, 62 Belmore Rd, Norwich NR7 0PU, England.

□ **DXCC:** W1MO reminds us that the DXCC started pre-WWII, even though the award was reformulated following the war days (not allowing new credits to be added to the old ones). The initial concept has proven the test of time and many pre-WWII award holders restarted with the new award, called the Postwar DXCC. John continues to add to his country totals even



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing 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 month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

though he disagreed with the start-again philosophy. Hundreds of DXers are finding it fun chasing countries for their Golden Jubilee DXCC. How are you doing?

☐ **QSL Service:** DX QSL Associates is now providing DX QSL tips, worldwide postage stamp availability and supplies. Full info is available from WV4V, DX QSL Associates, 434 Blair Rd, NW, Vienna, VA 22180.

☐ **Turks & Caicos:** The Turks & Caicos Amateur Radio Society notes that the following calls represent valid licenses for 1986 through April 29, 1987: VP5s AB AP AT BAM BD BIL DG DM EE EN FEB GBS GLS GT HM HS.

☐ **Mauritania:** DL1VJ's 5T5XX Nov-Dec '86 CW-only trip gets confirmed via Bernd Laenger, DL1VJ, Schlossbergstr 3, D-6603, Sulzbach, Saar, West Germany.

☐ **ZS3VB:** WA2PJC is looking for some clues. The 1983 address for this station was shown as Private Bag 1035, Otavia 9240, Namibia. If you've any suggestions, contact R. J. Johnson, 2311 Country Club Rd, Eadwell, NY 13760-3150.

☐ **9N1MC:** Krishna notes that he did not work 40-meter CW on March 10, 11 and 16, and that the handful of stations who sent him cards appear to have worked a pirate. He is practicing the code and hopes to be QRV soon.

☐ **V31A:** This May multi-single WPX CW operation by K5RX and KR0Y took place from Amergris Caye, Belize. Additionally, K5RX operated as V31ET and KR0Y as V31JS during

the week before the contest. QSL to K5RX for all 3 calls.

☐ **Help!** W7DJB/6 is looking for a routing for John, 9G1KB, worked on 20 sideband August 1980. Any tips go to L. J. Burnett, W7DJB/6, 8696 Jackie Dr, San Diego, CA 92119.

☐ **28 MHz:** Contest pro K7JA notes that several hams had JA runs of 100+ on 10 meters in the AA phone. *Arigato*, Chip-San!

☐ **XF4DX:** This 15-minute VHS video of the Revillagigedo DXpedition is available for purchase (\$20 postpaid) from Don Daso, WA8MAZ, Rte 1, Box 246, Mt Holly, NC 28120.

F00FB HL9BK KA2IJ LU4MEE LU4M LX5ORL P4/N1CIX	(WB6GFJ) (K2KSY) (W6CNA) (LU1MPH) (LU1MPH) (LX1DA) PO Box 855, Newington, CT 06111 (IK8AUC) (NA2K) (KC4NC) (DL7LL) (PY1ECL) (AKIE) (F6AJA) (LA7ZO) Now has logs (4S7PVR) (W1XX) July 17-19, 1987 CQ VHF WPX Contest only.	4U1UN (NA2K) 4X6TT Amir Bazak, PO Box 36411, Tel Aviv 61363, Israel. Mike Smedal, Box 7121, Nicosia, Cyprus. 1987 CB address is incorrect. 5B4TI (SM0EAI) 5H3BH Geita 5H3GI Ingemar, Box 1059, Dodoma, Tanzania. 5T5EV (DL3KCE) 9Q5DA (KC4NC)
SU1SK TL8KH TL8TG XX9LL ZY0ZPH 3C2A 3C2CR 3Y1EE		
4S0AA 4U1UN		

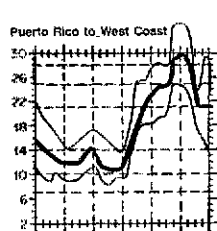
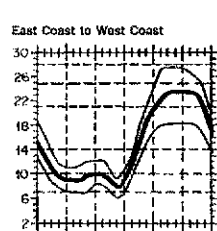
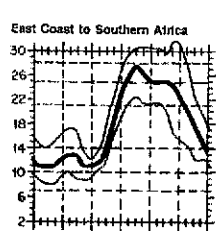
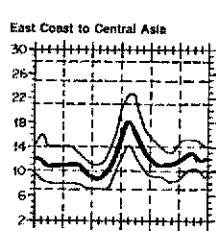
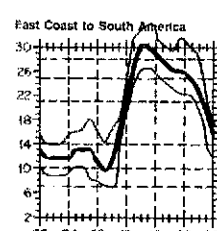
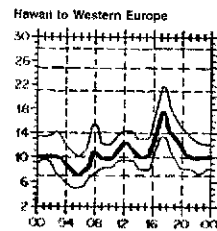
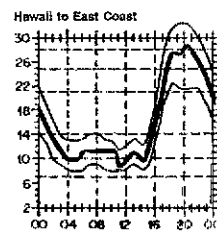
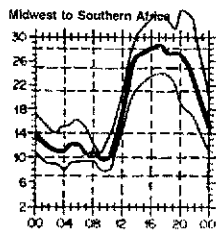
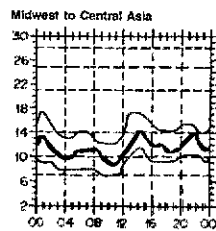
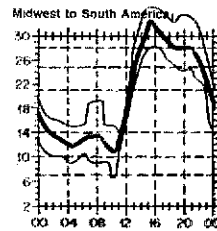
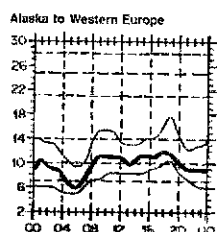
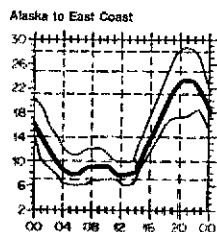
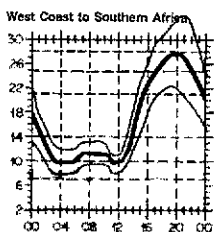
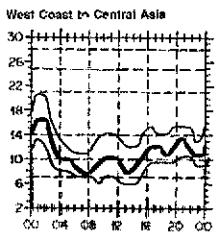
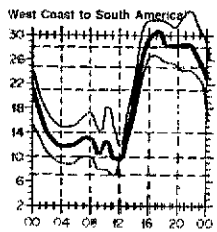
QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who 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.

Special Notes

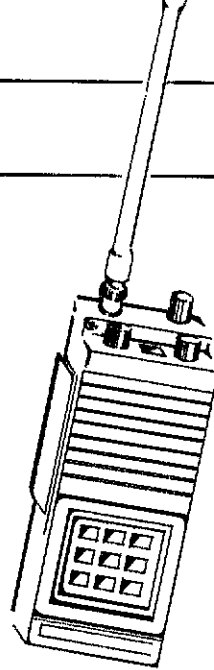
☐ N4ENR is not the manager for 4X6TT.
☐ QSL Corner, June 1987 QST, page 55, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, Sep 1987 QST, page 63, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 QST, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and items of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for October 16 to November 15, 1987, assume a sunspot number of 38, which corresponds to 2800-MHz solar flux of 93.

How to Beat the

Repeater Blahs



Are you tired and listless from listening to your favorite repeater? Does your favorite repeater need a shot in the hardline? Well, if you want to breathe a little life into your machine up on the hill, then read on and find out how some folks are making their machines shake, rattle and roll. Maybe their stories will inspire you to do something about the state of your machine and maybe someday soon your repeater's output frequency will be the priority channel programmed into all of the local scanners!

Keeping on Top of What's Happening

When I received my first ham radio license in 1972, the first band I operated was 2-meter FM. One of the first things I learned was that a repeater was only as good as its monitors. Even today, I still try to monitor a repeater or scan several so I can hear calls or assist someone in need.

So what makes a repeater a good repeater to listen to? Obviously, interesting QSOs, but also information about what's going on. The Air Capital Amateur Repeater Association, Inc (ACARA) operates three repeaters with the W0KA 146.22/146.82 repeater near Hutchinson, Kansas, being the flagship machine. Located at the 1200-foot level on the KWCH television tower, the machine has very good range. As Director of Information Services for ACARA, it is my job to help keep information flowing on the repeater. We've got the interesting QSOs—so, how do we keep our repeaters' users informed about ham radio happenings?

The Westlink Amateur Radio News is aired each Sunday at 8 PM and repeated on Mondays at 12 noon and 9 PM. Additionally, special 10-minute QSTs on topics solely of interest to Amateur Radio operators are aired each Tuesday at 12 noon and 8 PM. These interviews cover a wide range of topics including the Dayton HamVenture®, AMSAT, packet radio and the 20-meter beacon system, just to mention a few.

The information services don't stop there. Six nights each week at 9 PM local time (Sunday through Friday), the repeater hosts the "Traffic and Information Nets." These nets provide an opportunity for hams to list or receive traffic and to participate in a different net nearly every evening. In the beginning, participation was light, but soon hams started checking in on a regular basis. Today, the nets average 30 or more check-ins each session. Here is a rundown of our evening Traffic and Information Nets:

- Sundays, the ACARA Weekly On-Air Net provides information on club activities.
- Mondays, the general information net features the third of three airings of Westlink plus announcements concerning activities from area clubs.

- Tuesdays, the Boeing Employees Amateur Radio Society weekly on-the-air net is held.

- Wednesdays, the weekly net of the Sunflower Chapter of the QCWA meets.

- Thursdays, the Kansas FM-ARES net is conducted.

- And, Fridays, the ACARA swap net closes out the week.

Hams in central Kansas have come to depend on the 22/82 repeater to provide them with the information they need to know about the Amateur Radio hobby and their friends in the hobby. Through services like these, those who use and monitor the machine get the best of both worlds—good rag chewing and the latest on ham radio happenings. If you are ever in the range, check in or put out a call.—*Steve Bauer, KC0HF*

WHAT'S SHAKING ABOVE AND BELOW THE ETHER

The W6FXN repeater (145.46 MHz) near Covina, California, is again generating new interest by hosting its official Seismic Discussion Net at 10:30 PM (local time) on Thursday, while continuing to hold informal nets at the same hour as geological activity randomly dictates. This informal activity is known as the Micro-SDN.

Seismic Discussion Net Contacts

All individuals who are interested in the Seismic Discussion Net (SDN) are asked to include a business-size SASE, with 22 cents postage, when requesting information from the SDN members listed below. If schematics or plans are requested, please include one dollar to help cover duplicating and handling expenses. Thank you for your interest.

A) Dewitt Lancaster, WA6MDF
1955 Greenfield Ave
Los Angeles, CA 90025

- 1) Schematic of an interface to decode statewide USGS seismic detector VHF signals for output to various plotter devices.
- 2) Description of ultrasound detectors and superheterodyne receiver to detect signals in the 38- to 42-kHz range.
- 3) Sensitivity tilt meter.

B) Jim Skinner, WB6NVO
PO Box 173
Mira Loma, CA 91752

- 1) Software information for various personal computers for calculation of seismic displacement activity data.

C) Keith Higgins, WA6IYL
PO Box 306
Lakewood, CA 90714-0306

- 1) General correspondence regarding SDN activity.

The On Line Mailbag

Every month I receive new product announcements and letters from people asking for information. Let's look at a few of the items that have come in this month.

EVERYTHING YOU WANTED TO KNOW ABOUT THE ETHER

HAM HELP is an MS-DOS™ program written by Ray Isenson, N6UE. Using the data transmitted hourly by WWV, the program calculates the MUF for any path between two locations selected by the user. The program presents its calculations in tabular form and calculates great-circle azimuth, antenna azimuth, optimal antenna elevation, path length, estimated radio signal attenuation and estimated propagation conditions as a function of the existing electromagnetic environment. The table shows all these variables in 30-minute increments. Optionally, if the distance between the two locations is greater than 4000 km, the program calculates the exact times of sunrise and sunset at each location, checks for any unusual propagation possibilities such as gray-line or long-path openings, and recommends preferred paths with good or bad polar-cap propagation phenomena taken into consideration.

MS-DOS HAM HELP is available at a nominal price from the Heath/Zenith Computer Users' Group (HUG) in St Joseph, Michigan or through the Heath Company order desk (HUG part number 885-6010-37).

THE ARRL OPERATING MANUAL

The ARRL Operating Manual is hot off the printing presses. I just finished perusing my copy and was surprised to find it full of items of interest to amateurs using computers for hamming. Here is what I found.

Amateur Radio Software—Chapter 4, "Antenna Orientation" by Jerry Hall, K1TD, contains a BASIC program for determining antenna bearings and distances. Chapter 7, "Contests" by Clarke Greene, K1JX, contains a BASIC contest dupe sheet program and BASIC logging programs for the ARRL International DX Contest, the CQ Worldwide DX Contest, the IARU HF Championship, the ARRL Sweepstakes Contest, the ARRL VHF contests and the CQ WPX VHF Contest. Chapter 12, "VHF/UHF Operating" by Michael R. Owen, W9IP, contains a BASIC grid location program.

Coverage Of Computer-Oriented Modes—Chapter 9, "RTTY Communications" by Larry Wolfgang, WA3VIL, covers Baudot, AMTOR, ASCII and computer-based message-system operation plus RTTY graphics. Chapter 13, "Satellites" by Dick Jansson, WD4FAB, contains computer-based satellite-tracking information. Chapter 16, "Image Communications" by Bruce Brown, WA9GVK, covers fast-scan and slow-scan television and facsimile operation. (Chapter 10, "Packet Radio" was no surprise, since I wrote it!)

The influx of computers into Amateur Radio is evident from this publication; in addition to the computer-oriented items, the gorgeous full-color photographs of 85 different Amateur Radio operating awards in Chapter 8 are worth the price of admission.

NEWSLETTER FOR AMIGA AMATEURS

Amigan Beacon is a newsletter that provides hams who own Commodore Amiga computers

with a means of disseminating information and public-domain software for their favorite computer. To obtain a copy of the newsletter, send an SASE to the *Amigan Beacon* editor, Kathy Wehr, WB3KRN, RD 1, Box 193, Watsonstown, PA 17777.

HELP WANTED

I would like to get in touch with...

- the Florida ham operating FAX who wished to swap FAX software for a Radio Shack® Color Computer, DMP-105 printer and AEA

PK232, using the system described in March 1986 *QST*. I gave you my address, but lost your call sign; I have the software for you. Jerry Swartzlander, KG8Y, 120 S Granville Blvd, Fremont, OH 43420.

• anyone who has interfaced a Heath SS-9000 transceiver with a Heath H-89 computer running HDOS. Mike Abbott, KA1ASF, PO Box 484, West Warwick, RI.

• anyone who has packet-radio software for the Texas Instruments TI-99/4A® computer. Åke Olsson, SM5FU, Musserongån 89, S 13534 Tyresö, Sweden.

AMATEUR RADIO LANDLINE BBSs

The following is our latest compilation of ham radio-related landline bulletin-board systems (BBSs). The Parameters column indicates the BBS data rate (3 = 300, 12 = 1200 and 24 = 2400 bit/s) and the number of character bits, parity and stop bits (8N1 = 8 character bits, no parity, 1 stop bit). Unless noted otherwise, the BBSs operate 24 hours a day.

Location	Name	Telephone	Parameters	SYSOP	Note
CA, Los Angeles	CompuLink Fido	805-494-3350	3/12/24	KA6VZA	1
CO, Boulder	Space Environment	303-497-5000	3/12	—	—
GA, Atlanta	Flagship Express	404-934-4515	12/24 8N1	KC4ME	—
LA, Patterson	Bit-By-Bit	504-395-5655	3/12/24 8N1	WB3ABN	—
MA, Boston	Cul-de-Sac BBS	617-429-1784	—	—	—
MA, Mashpee	CapeNet BBS	617-477-2369	—	KA1KF	—
NM, Las Cruces	Timex Sinclair	505-522-7081	—	—	2
NY, Syracuse	Random Access	315-697-3996	3/12 8N1	W2ZOJ	—
NC, Charlotte	Teacher's Pet	704-547-4185	3/12	W4GHV	3
OH, central	Ham BBS	614-457-4227	3/12 7/8N1	N8EMR	—
OH, Cleveland	AMCON	216-524-6494	3/12/24 8N1	WA8AJG	—
ON, London	Hamline	519-473-9877	3 8N1	VE3ZK	4
ON, Toronto	Humber College BBS	416-231-0669	3/12 8N1	VE3OOZ	—
PA, Harrisburg	Radio-Line BBS	717-558-8211	12 8N1	N3ELM	—
TX, Dallas	Datalink RBBS	214-340-5850	3/12	N5ITU	—
TX, Houston	Houston Area Packet	713-955-7564	—	—	5
VA, Vinton	Blue Ridge Connection	703-344-0857	—	WD4KDN	—
WA, Seattle	Downspout	206-325-1325	12/24	KA7WNA	—

Notes

¹Fido net 102 node 603

²Fido net 15 node 6

³Fido net 18 node 9; 1700-0900 local time, weekdays; all hours, weekends

⁴1800 local time Fridays through 0700 Mondays; all hours, holidays

⁵linked to packet radio operation on 145.01 MHz

PX: BASIC Programs For Apples, Ataris and Commodores

Hank Hagman, W1OKU, submitted two programs for the Apple IIc computer that are modifications of programs originally written for the Apple II by VE2FNF. Program 161 is a CW reception program for the Apple IIc and Program 162 is an RTTY reception program for the Apple IIc.

Program 163 is a CW reception program for the Atari 800XL computer written by Ken Woods, WB6HTY/DU7.

Program 164 is a CW keyboard program for the Commodore C64™ computer written by Bob Davis, K0FPC.

David Radomski, KT0H, wrote a set of programs for the Commodore C128™ computer that provide logging, sorting and QSLing functions. The whole set may be obtained by requesting Program 165 and including 73 cents postage on your SASE.

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 165 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.

The New Solar Cycle

Those who were around for the peak of Solar Cycle 21 fondly recall the sometimes fantastic conditions it produced. For several years, beginning in the fall of 1978, the months from October through April provided legendary 6-meter openings. Many accomplished WAC. In the West and Midwest, Japanese and South Pacific stations boomed in. Much of the country had a crack at the few South Africans and many South Americans that fired up on the band. A few stations operated from Europe, some legally and some not. Among the legal ones, ZB2BL Gibraltar, and EI2W, EI6AS and EI9D in Ireland were widely worked. Also fairly active was Icelandic station TF3SG, later changing his call to TF3T. Occasionally, a station would appear that could be classified as rare DX on any band. One such was 5B4AZ on the Mediterranean island of Cyprus. This conductor was one of those lucky enough to snag that elusive catch. It represented my only Asian on the band and enabled me to complete WAC. What made working 5B4AZ all the more memorable was the fact that it was done with only 10 W. My amplifier was down at the time. A couple of stations in the north-east US and eastern Canada worked India and a number in south Florida worked Japan via the long path. These are only a few examples of these exciting times.

The reason for lapsing into this bit of reminiscing is because improved F2 conditions like those we witnessed from 1978 through 1982 are on the way back—and, I believe, they will be here sooner than most realize. For those who may be unfamiliar with what F2 is, it refers to the highest layer of the ionosphere which is known to affect radio waves. It is this layer that is primarily responsible for the DX on the higher HF bands, 20 meters and up. The E region, which is considerably lower, is the layer that propagates 80- and 40-meter signals, especially during the daylight hours. The F2 region, being considerably higher, about 250 miles versus the E-layer's 60 miles above the earth, is capable of greater distance on each hop roughly 2500 miles compared with about 800 to 1200 miles for single E-layer hop. The amount of ionization in the F2 layer is highly dependent on the quantity of ultraviolet radiation from the sun. Thus, during years of high solar activity, it is capable of reflecting higher frequencies than it is during low activity years such as we have been experiencing recently. The kind of skip we have been having on 6 meters, as well as on 2 meters, during the past few months is due to E-layer reflections. Especially during the summer months, the E layer occasionally becomes much more heavily ionized than normal. Since this phenomenon is rather infrequent and difficult to predict, it has been termed "Sporadic E," or E_s. The super 6-meter DX referred to in the first paragraph was due to F2 reflection. It has been absent on 6 meters over the past few years and not too frequent on 10 meters. But, it is on the way back as solar activity increases.

It is too early to predict whether the new cycle will be as good to us as the last one but,

even it falls short, some F2 openings are certain to return to 6 meters over the next few years. Yes, by almost anybody's estimate, it seems sure that we have seen the bottom of the solar cycle and are on the way up the curve. The NOAA Space Environment Laboratory in Boulder, Colorado estimates that the minimum of the cycle, and hence the end of Cycle 21 and the birth of Cycle 22, took place in September 1986. Looking at their data, as published in the weekly report entitled "Preliminary Report and Forecast of Solar Geophysical Data," I believe that the low point was reached three months earlier than that, in June. The reason for this view is that all of the measures of solar activity were lower during June than during September, although admittedly not greatly so; and the monthly averages were the lowest since mid-1976 when Cycle 21 began. The sun was absolutely spotless between June 9 and July 3 and the 10-cm radio-flux did not exceed 70 for the entire month. It was in the high 60s during September also, just touching 71 one day, September 15. However, its average value was about a point higher during September. In addition, the official sunspot count was more than three times as high. The reason for the difference in estimating the minimum is because NOAA uses a 13-month running average to calculate a smoothed number for each month and then uses that number to define beginnings and peaks of solar cycles. You may remember what kind of conditions we had February 8, 1986. One of the most massive auroras in years hit the entire earth. The month saw 10-cm radio-flux readings approaching 100, contrasted with the high 60s and low 70s typical of the low part of the solar cycle. Sunspot counts were also up, dramatically. As long as numbers from February were being used in the running average, they tended to pull up the result. Once February was dropped from the calculation, the result dropped. Thus the smoothed averages from September come out lower than those for June, even though the monthly averages for the two months are lower for June.

No matter which estimate for the beginning of Cycle 22 is correct, we are a year or more into it, and climbing. NOAA states in their report for 17 June 1986 that the average time between the minimum and maximum is about four years. At the time, they were predicting the minimum to be about February 1988 and were estimating that the maximum for Cycle 22 would occur in mid-1991. However, since the minimum was most likely either June or September 1986, the maximum will probably occur sometime in 1990. But we shouldn't have to wait until then for 6-meter DX to return. Scattered 6-meter F2 openings began to appear in October 1978, only two years after the beginning of Cycle 21. Based on this reasoning, there is a chance we may encounter some 6-meter F2 about a year from now.

In addition to elevated F2 maximum usable frequencies, or MUFs as they are termed, other propagation modes should come in for improvement. Some of these will affect the higher VHF bands in addition to 50 MHz. Transequatorial propagation, or TEP, should

begin to pick up for those closer to the earth's magnetic equator. Recall that 2-meter openings between the Caribbean and southern South America, as well as between southern Europe and southern Africa and Japan and Australia, were quite common during the early evening hours a few years ago. Contact was even made between Puerto Rico and Argentina on 220 MHz. It has been shown that frequencies as high as 432 MHz can be propagated via this mode, although a two-way contact is yet to take place on this band. When it does, it will represent a new terrestrial world DX record.

Another effect of the rising solar cycle should be a pick-up in the frequency of auroras. The buzz mode has been pretty scarce lately, just as we should expect during the low solar activity years. There is evidence, from curves published by NOAA, that geomagnetic activity is greatest during the rise and fall of the cycle and reduced during both minimum and maximum years. Thus we can begin looking, right away, for an increase in the frequency of auroras.

A more immediate effect should be an improvement in 40-meter conditions. This should prove a boon to Novice and Technician class licensees who can now operate SSB between 28.3 and 28.5 MHz. The return of better 10-meter F2 propagation should also give 6-meter operators a chance to get together on the established liaison frequencies, 28.885 and 28.385 MHz.

The bottom line—better conditions are coming, and quite soon.

ON THE BANDS

6 Meters—The super E_s conditions that visited us during May and June continued through July and right up to the beginning of August. Here are only a few examples of the many reports received. VE1YX says that July 21 was a big day for him. Bob arrived home from work about 10 minutes after the band opened and immediately worked GW3NYY at 1851Z. Over 4½ hours later, he made his last contact of the evening, a 6-to-10 crossbander with F9LT. Over that period he worked 160 Europeans in G, GW, GI, GM, GJ, GU, EI and LA on 6 meters and added crossband contacts with F, DJ, HB and PA. VE1BNN reports a like number of 6-meter two-ways and even provides a list of all of the stations worked. Reg also mentions that he and VE1YX are looking for a rig to send to CO2CB. Anyone who can help are asked to write either of them at their *Callbook* address.

W4OO passes along a note from G4GLT who he worked July 17. It says that among several 1s and 2s heard following the contact with W4OO, Dave also reports hearing WB8KRY at 2053Z with a 5 x 5 signal. This jibes with information from WB8PAT Oberlin, OH who says that he completed 11 contacts in G and GW between 2039 and 2123Z the same day. John also received an SWL card from Holland. His 150 W to 7 elements produced reports from S4 to S9. He said that the Gs ran between S3 and S7. This is the first instance of a W8 working into the UK via E_s to come to my attention. I do have reports, however of N5JHV New Mexico being heard over there during the June Contest. Apparently the G could not get Dave's attention through the contest QRM. It is now

Microwave Standings

Listings are call, state, US states worked, call areas worked, grids worked and best terrestrial DX worked in miles. Call areas are the 10 US call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. To ensure that the stations listed possess a true capability to work over meaningful distances, future listing will require a minimum of 5 grids or best DX as indicated for each band. Those not supplying such information are asked to do so prior to the next deadline. In order to make the standings a true reflection of stations currently active on the bands above 902 MHz, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked additional states or grids in order to remain in the standings or be reinstated, merely an indication of continued activity and interest. Compiled August 10, 1987. Deadline for next update is February 5, 1988.

902 MHz (93 cm)

Minimum best DX 150 miles

W1JR	MA	9	4	16	377
W1RIL	MA	7	3	6	---
AF1T	NH	6	3	---	300
W1EJ	NH	6	2	---	---
WB2NPE	NJ	9	5	19	396
W2PGC	NY	6	6	8	478
N3CX	PA	8	5	14	400
WS4F	GA	3	1	3	165
VE3LNX	ON	3	3	12	360

1240 MHz (23 cm)

Minimum best DX 150 miles

W2SZ/1	MA	17	8	34	---
K1FO	CT	15	7	21	468
W1JR*	MA	13	9	33	655
K1PXE	CT	13	5	---	448
WA1OUB	NH	12	7	24	496
W1RIL	MA	14	6	21	450
W1EJ	NH	8	4	---	---
K1LPS	VT	7	5	---	288
W1QXX	MA	6	3	---	260
K2UYH*	NJ	25	32	---	770
WB2NPE	NJ	17	8	42	756
WA2LTM*	NJ	17	6	---	770
W2PGC	NY	12	8	22	960
K2YCO	NY	11	8	---	---
N2BJ	NY	11	35	17	---
W2VC	NJ	16	7	26	537
K2EVJ	NY	10	6	---	426
WA2FUJ	NY	5	3	---	125
WA3AXV	PA	16	7	29	698
WA3JUF	PA	14	5	20	300
W3IP	MD	13	7	22	369
K3HZO	MD	13	6	25	---
WA3NZL	MD	11	7	---	780
K3HZO	MD	9	---	12	---
KB3QM	DE	7	---	7	---
K4QIF*	VA	22	25	---	790
WB4NXY	KY	17	7	29	730
WS4F	GA	9	3	13	625
W3IY4	VA	7	5	---	481

*Some stations worked via EME.
---Information not supplied.

WA4OFS	FL	7	2	17	1042
K4NTD	FL	4	2	---	847
WB5LUA*	TX	26	24	83	1280
W5HN	TX	14	5	44	1140
W5DPU	OK	13	6	34	1000
W5RCI	MS	13	4	29	---
WB5AFY	TX	11	2	43	685
W5ASH	TX	10	6	28	1066
KD5RO	TX	9	3	35	650
K5SW	OK	8	4	22	---
W5VJB	TX	8	5	---	1140
W5HMK	TX	8	2	15	740
W0RBY/5	OK	5	2	11	285
W5ATJ	TX	5	3	18	1112
K5DHU	TX	4	1	12	---
W5NZS	OK	5	---	20	---
W5HPT	TX	4	1	---	571
W5LBT	LA	3	2	---	---
N5BBO	TX	2	2	3	1042
W5UKQ	LA	2	1	---	365
W5ASDBY	TX	2	1	---	---
W5TBE	TX	1	1	---	571
W5GVE	TX	1	1	---	368
N6CA	8	10	30	2472	
K6ZMW	4	3	---	402	
W6KGS	3	2	---	362	
W6XJ	2	3	---	250	
K6QXY	2	2	---	2358	
KC6A/6	1	1	---	130	
N6TX	1	1	---	112	
N6NB/7	UT	4	2	---	295
W5TCC/7	AZ	2	2	2	403
WA7JJO	NV	2	1	---	---
W8VIO	MI	20	12	45	950
W8TXT	OH	18	9	25	820
N18O	OH	18	8	48	---
K8WV	OH	16	7	32	448
WB8KC	MI	15	7	33	650
W8IDU	MI	5	4	---	---
WB8PAT	OH	4	3	---	405
W9ZIH	IL	24	9	---	790
WB9SNR	IL	14	8	27	760
W99FW	WI	8	3	8	---
W9UD	IL	5	4	---	760
W0UC/9	WI	3	2	4	---
WB9DRL	KS	21	6	75	1100
W0RAP	IA	14	5	48	678

WA0TKJ	KS	13	5	40	1100
W8OHU	MN	12	5	20	814
K0TLM	MO	12	4	28	---
K0BQR	NE	8	2	17	430
K0ALL	ND	6	2	---	283
KX00	CO	4	2	4	653
W0YZS	MO	4	2	---	425
W0PW	CO	3	2	3	97
W0ZJY	KS	3	1	---	170
W0BY	KS	2	2	4	170
W0FT	KS	2	2	3	---
W0MDL	MN	2	2	---	340
W0VB	MN	2	2	---	290
KH6HME	2	2	---	2472	
VE3LNX	10	6	32	425	
VE4MA*	8	14	22	800	

3300 MHz (9 cm)

Minimum best DX 100 miles

WB5LUA	TX	3	1	11	185
WB5AFY	TX	3	1	10	285
WB5LUA/5	AR	3	1	6	288
W6OYJ	CA	1	1	2	214
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	---	115
K0RZ	CO	2	1	5	---

5600 MHz (5 cm)

Minimum best DX 100 miles

K5PJR	OK	6	2	29	331
W5ICW	OK	5	2	21	242
WSUGO	OK	5	2	20	210
W6OYJ	CA	1	1	2	214
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	---	115
K0RZ	CO	2	1	5	---
WSUGO/0	NE	1	1	1	331

2300 MHz (13 cm)

Minimum best DX 100 miles

W2SZ/1	MA	6	3	10	---
W1JR	MA	5	2	4	257
W1RIL	MA	3	2	3	---
WA3AXV	PA	9	6	11	671
N3CX	PA	6	4	9	250
WA3JUF	PA	5	3	10	---
W4HHK*	TN	9	7	11	582
WB4NXY	KY	4	4	6	360
WS4F	GA	2	1	2	147
WB5LUA*	TX	11	5	26	939
W5DFU	OK	4	2	10	---
WB5AFY	TX	4	1	15	285
W5RCI	MS	3	2	4	---
W5VJB	TX	3	1	13	185
W5UC	TX	3	1	12	163
W5HN	TX	3	1	10	230
KD5RO	TX	2	1	35	940
W5NZS	OK	2	1	4	---
W5ASDBY	TX	1	1	1	65
K5PJR	OK	1	1	1	271
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	---	115
W8VIO	MI	10	8	18	940
W8TXT	OH	4	4	5	291
W9ZIH	IL	9	4	---	470
WB9SNR	IL	6	4	7	---
WB0DRL	KS	2	1	3	---
VE3LNX	ON	3	3	5	296

10 GHz (3 cm)

Minimum best DX 100 miles

W6OYJ/6	CA	1	1	5	444
W6SFJ/6	CA	1	1	4	414
N6GN/6	CA	1	1	3	414
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	---	115
K0RZ	CO	2	1	6	---

24 GHz (1.25 cm)

Minimum best DX 50 miles

WA3RMX/7	OR	1	1	5	115
WB7UNU/7	OR	1	1	---	115

47 GHz (0.6 cm)

Minimum best DX 10 miles

WA3RMX/7	OR	1	1	2	14
WB7UNU/7	OR	1	1	---	14

All higher bands—10 miles

clear that trans-Atlantic Sporadic E is not a game only for the East Coast and the need for a DX window, enabling more a chance to participate, should be evident.

A perspective on the July 17 opening comes from the other end of the path. G4UPS, otherwise known as ZD8TC and C30DAW, reports working WB8KRY at 2040Z, K8MFO at 2050, WB8PAT at 2053, WA1OUB at 2108, WB8IGY at 2111, VE3NPB at 2114, W9IP/2 at 2122 and K1TOL at 2145. Ted notes that the 8s were particularly strong and the others less so. G4UPS says that July 21 was another fine day beginning at 0700Z with crossband contacts with DL, HB9 and F. Later, beginning at 1820, K1JRW was worked with S9 signals each way, followed by WA1OUB, KA1ZX, K1TOL, K1GPI, KIRSA, W2BXA, VE1YX, VE1BNN, KA1MFA, KA1PE, W1JR and K2MUB. VE1YX was worked again from 2315 to 2324Z. Both he and VE1YX noted noise from a solar flare at 2139 which appeared to give the signals a fluttery effect for about 10 minutes. Ted says that as C30DAW Andorra, he worked some 200 UK stations including G, GI, GJ, GD, GM and GW plus EI, 9H1 and CT, not to mention WA1OUB and K1TOL.

In other overseas events: There's good news and bad news. The good news is that Norwegian hams now have full use of 50 to 52 MHz although their power, like that of the British, is

severely restricted. The bad news is that the French have begun the allocation of subscription television, with several of the stations right in the 50-MHz band.

From the West Coast, N7DB near Portland, OR says that the July 17 and 18 openings were good for him too. Dave worked KH6IAA at 0154Z for his first KH6 in some years. Then the next morning, after working a number of single- and double-hop stations beginning about 1320Z, at 1531Z he worked KP4A followed by VP5D and KV4AD. He notes that these were his first Caribbean contacts in five years. Since conditions were so good, Dave decided to put out a CQ DX, in the hope of raising CT4KQ. Instead, he got HH7PV for another new country.

2 Meters—This band has been as wild as its lower-frequency cousin during the past summer. Some 2-meter operators were even treated to a taste of international DX supplied by VP5D. Bob reports working a string of 31 stations, mostly 4s in Georgia, the Carolinas, Tennessee, Alabama and Kentucky, between 2000 and 2115Z July 13. In addition to these, he worked KA9CFD Illinois, WA0SJR Missouri and N5HVJ Louisiana. Bob notes that most of the contacts were more or less on a line between him and Missouri. The rig on 2 meters is either 25 or 350 W to a 28-element array. On 6 meters he has either 100 or 500 W to 6 elements and on

70 cm he runs 100 W to a Boomer. He has begun beacons on 50.022 with 10 W to a vertical dipole and 144.222 also with 10 W and a dipole.

WB9MSV characterizes the E_s opening of July 17 as one of the best he has experienced. Larry supplies a grid map and detailed log to illustrate his point. His two-dozen contacts stretch from the Maritime provinces to Arizona over a 4-hour period from 2000 to 2315. KD7IY is another who thought the July 17 opening was among the best. Mac came up with 62 contacts in 20 grids and 7 states—Kansas, Oklahoma, Texas Louisiana, Arkansas, Missouri and Tennessee—during the 2½-hour opening.

There are a couple of new developments concerning the Hawaii to West Coast tropo path. It was reported that KH6HME has worked state number 3 by hooking up with ND7M in Nevada on June 29. This is a distance of 2528 miles. Then, just at deadline, NY7C called the answering machine to report a contact with KH6HME from Cascade Head in Oregon. Dave was running 10 W to a 15-element beam. I'll have more information on this long-sought contact next month.

The Higher Bands—There has been a flurry of activity on the microwave bands but, unfortunately, there is not sufficient space to cover it properly this month. I'll try to give it priority next time. □

Microwave Dummy Loads

Dummy loads are fairly easy to construct for use on the HF bands, but they become increasingly difficult to build as frequency rises. One reason for this is that at microwave frequencies, the size of the load starts to approach the wavelength of operation. This factor produces a variety of problems in trying to keep the load's impedance constant at 50 ohms over a wide frequency range.

The 1988 ARRL Handbook shows construction details of a 1-kW dummy load that is good through 1.3 GHz. This project, designed by Dick Jansson, WD4FAB, starts on page 34-26. Above 1.3 GHz, it is hard to come by good designs or even surplus equipment. Fortunately, high-power loads are not usually necessary at frequencies above 1.3 GHz, since most of us can't generate that much power! Where can we find a load that will operate on the higher bands? You probably have one lying around the shack somewhere, even if you don't know it.

One of the constant problems facing those who work on the microwave bands is finding low-loss coaxial cable for power transmission. This is because most coaxial cable has a relatively high attenuation at microwave frequencies. While high loss is undesirable from a transmission viewpoint, it is just what you need for a good dummy load! A length of lossy cable makes an excellent dummy load. You can even find coaxial cable that is designed to have high attenuation (RG-21A/222); here is a perfect application for it. In addition, a coaxial-cable connector provides the ideal transition between your transmitter and the load.

Table 1 gives attenuation values per 100 feet and maximum rated input power for some suitable cables. The power handling capacity of cables is governed by three factors: size, attenuation characteristics and materials of construction. Cables employing Teflon® or similar materials as dielectric can operate at higher temperatures than those using polyethylene and thus are rated for higher input power.

How much attenuation do you need for a dummy load? Assume that attenuation is independent of the SWR on the cable. (It isn't. Actually, attenuation goes up with SWR, but we will take a worst-case situation.) Also assume that the cable has an open circuit at the end remote from the transmitter. Now the following relationships apply.

$$SWR = \frac{1 + \rho}{1 - \rho} \text{ and } \rho = \sqrt{\frac{P_r}{P_f}}$$

where

- ρ = the reflection coefficient
- P_f = the forward power
- P_r = the reflected power

Using these equations, we can estimate the SWR at the transmitter for a given cable attenuation. Take, for example, 100 W of power and a 10-dB-loss length of cable. By the time the signal reaches the open end of the cable, it is attenuated to 10 W. At the open circuit, all of the power is reflected. By the

Table 1

Attenuation (dB/100 feet) and Maximum Power Rating of Coaxial Cables at Microwave Frequencies

Cable	1 GHz	3 GHz	5 GHz	10 GHz
RG-21/21A/222	44 dB 38 W	87 dB 15 W	— —	— —
RG-58C	20 dB 50 W	41 dB 17 W	— —	— —
RG-8/213	9 dB 190 W	19 dB 95 W	28 dB 65 W	47 dB 37 W
RG-188/188A/316	30 dB 160 W	58 dB 80 W	79 dB 57 W	133 dB 30 W
RG-282	18 dB 160 W	34 dB 80 W	48 dB 57 W	80 dB 30 W

RG-282 is a 54.5-ohm cable

RG-21 and 21A are 53-ohm cables

RG-58C/188/188A/213/222/316 are 50-ohm cables

time it reaches the transmitter end again, it is attenuated to 1 W. Thus, the condition at the transmitter end of the cable is 100 W out, 1 W back. This gives a reflection coefficient of 0.1 and an SWR of 1.22:1. A similar calculation for a 5-dB-loss length of cable gives an SWR of 1.92:1.

If some kind of dummy load is used to terminate the cable instead of leaving it as an open circuit, the SWR measured at the transmitter will be even lower. (No matter how bad the dummy load is, it can't be worse than an open circuit!) As an aside, it is evident that measuring the SWR at the transmitter end of a lossy transmission line may be a poor indication of the conditions at the other end. Judging the match of your microwave antenna should be done by measuring the SWR at the antenna, not the transmitter.

Of course, the preceding analysis is highly simplified. It assumes that the cable and connector are truly 50 ohms and that the impedance of the cable is constant over its

length. It also assumes that the attenuation of the cable is constant with temperature and SWR. None of these are exactly true, but they can be assumed to be so for rough calculations.

The next time you need a microwave dummy load, take a look around the shack. You never know—you might just find one.

NORTH TEXAS MICROWAVE SOCIETY ANTENNA MEASUREMENTS

Table 2 shows highlights of antenna-gain measurements made by the NTMS earlier this year. The data is from FEEDPOINT, the NTMS journal. I should add here the usual rider that goes along with antenna measurements. Absolute gains are very difficult to measure to an accuracy of a 10th of a dB, but it is quite easy to measure relative gains to this accuracy. Thus, while the results of any antenna-measuring event may be internally consistent, differences of a few dB between measurements made at different events may not be significant.

Table 2

NTMS Antenna Gain Measurements

Frequency	Gain (dBi)	Call	Description
5.76 GHz	28.8	WB5LUA	31-in, 0.38 F/D dish with circular feed horn
	25.2	WA5VJB	24-in, 0.3 F/D dish with backsplash feed
	23.7	KA5UQC	Andrew SR No. 4 ridged horn, 12 x 9 x 24-in with lens
	21.4	WA5VJB	10 x 8 x 18-in horn (used as the reference antenna)
10.3 GHz	8.5	WB5LUA	multi-octave log periodic
	34.8	K5ZMJ	29- x 27-in, 0.36 F/D military dish with backsplash feed
	29.9	WA5VJB	18-in, 0.4 F/D spun dish with WR-75 waveguide backsplash feed and transition
	28.4	WB5LUA	18-in homemade fiberglass dish with foil surface and backsplash feed
	27.3	K5ZMJ	17- x 12-in, 0.32 F/D military cosecant dish
	25.5	KA5UQC	Andrew SR No. 4 ridged horn
	23.1	WA5VJB	7 x 5.5 x 14-in PC board horn
	22.4	WA5VJB	19- x 13-in military cosecant dish with backsplash feed
	20.8	WB5LUA	31-in dish (This is the 5.76-GHz dish and feed, retested at 10.3 GHz.)
	19.5	WA5VJB	The 5.76-GHz reference horn, retested at 10.3 GHz
	18.8	WA5VJB	Gunnplexer horn with a dielectric lens

Peter Roussel, K5JCC: From the Public Eye to Private Citizen

Peter Roussel not only communicates for a career—having served as Deputy Press Secretary to President Reagan—but also as a hobby, starting as an shortwave listener, then as K5JCC, a call he's had for 30 years. "My parents encouraged me. They said it was an educational hobby and one that would keep me off a motorcycle! That way they'd know where I was—behind a mic or key." His list of Amateur Radio activities shows that indeed he did keep mic and key humming with activity: BPL, WAC, WAS, DXCC, Sweepstakes and DX contests section winner, ORS, ARRL Public Service Award, among others. His favorite activity? "I still am a dyed-in-the-wool fan of 15-meter SSB."

As a Distinguished Communications Alumni from the University of Houston, Peter Roussel's career has reflected his outstanding ability in this field. Professionally, Peter has held the following positions: press secretary, campaign secretary and personal press officer to Vice President George Bush, when Bush was a US Congressman and later the US Ambassador to the United Nations; White House Staff Assistant to President Gerald Ford; assistant to Chief of Staff Donald Rumsfeld; and Special Assistant to National Campaign Director James Baker III. In September 1981, he was appointed Special Assistant to the President and Deputy Press Secretary, and remained in that position until early this year. Moving to the private sector, Peter currently works as a public relations consultant and is writing two books.

What were your duties as President Reagan's Deputy Press Secretary?

To brief the White House press corps on issues of foreign and domestic import in which the White House was engaged; and to assist the principal Deputy Press Secretary in his daily briefing of the White House press corps; to transmit the President's foreign and domestic policy goals to the American public by working with members of the White House press corps representing print and broadcast organizations.

Facing the White House press corps was a rigorous experience. They're sharp and really keep you on your toes. Before meeting with them, I'd say, "O Lord, make my words tender and sweet for tomorrow I may have to eat them!"

Who is the most inspiring political figure you met while serving in the White House and/or United Nations?

I have had the good fortune to serve with, and know, a number of outstanding public servants and prominent Americans during my governmental and political experiences of the past 20 years. However, Supreme Court Justice Sandra Day O'Connor holds a special place. On my first day as Deputy Press Secretary, I received notice to go to Phoenix, Arizona. My duties called for handling the announcement from there that President Reagan would make in Washington the next day of her appointment to the Supreme Court. While [Justice O'Connor and I were] driving from the outskirts of Phoenix to her office downtown, I snapped on the radio, but only in time to hear the tail end of the President's announcement. Being a lady with a sense of humor, she laughed, took it in stride and held a news conference when we finally

arrived. But, I will never forget being caught in a traffic jam in downtown Phoenix with Sandra Day O'Connor at the moment her appointment was announced. The whole time in Phoenix with Justice O'Connor and her family remains a special experience for me, and I'm proud to have been involved with this historic moment.

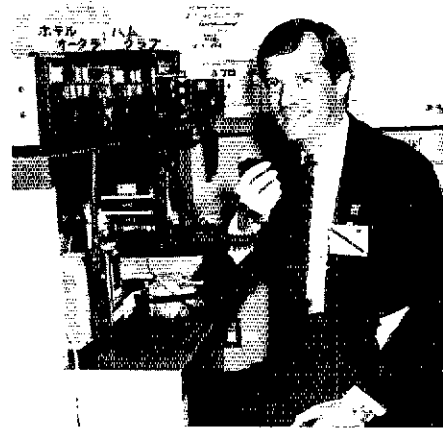
Any interesting anecdotes about life at the White House you can share?

I was press spokesman on duty during a trip to Augusta, Georgia in October 1983, when three major news stories developed in rapid succession. First, a gunman seized hostages (including a White House staff member) in the pro shop at the Masters (Augusta National) course while the President was playing. Fortunately, the incident was resolved without injury. Late that night (actually, early morning), we received word that 250 Marines had been killed in Lebanon. The President determined that we should return immediately to Washington in the early hours. Then, several days later, the Grenada rescue mission occurred.

With your busy schedule, did you have much time for operating or being in contact with other hams?

Not too often, but I did operate some during trips abroad. At the Bonn, West Germany summit meeting in 1985, I hammed until some of the press telephones came down with RFI. And at the 1986 economic summit meeting in Tokyo, I was offered the use of a club station—which happened to be in our hotel on the floor above the presidential suite.

As far as other hams, I frequently saw John Crawley, K14LU, who's a member of the uniformed division of the Secret Service. At his desk in the West Wing lobby, I could see



Peter Roussel, 7J1ACF/K5JCC, mixes pleasure with business while attending a 1986 economic summit in Tokyo.



K5JCC

Twenty years earlier, Peter sits in a familiar shack—his Houston, Texas QTH.

John with his HT and reading *QST*. In fact, that's how he got interested in ham radio. He picked up a copy in my office, read it and became a ham.

What are your current plans?

To fire up the rig and start chasing that elusive DX on 15 as soon as time permits, to write and to reenter the private sector and thereby once again participate in the American free enterprise system.

WD8MEV Wins 1986 Anniversary Party Corcoran Award

WD8MEV—Shirley Hooper, 1986 Corcoran Award for combined CW and SSB scores, USA. Amateur Radio is an important part of Shirley's life. When OM George, WD8AGC, became licensed, she had yet to develop an interest in radio. "When he was on the air, it seemed like CW would travel to all corners of the house at all hours of the day and night. I used to think it was a terrible noise; even the alarm clock seemed to reverberate. However, having my OM talk in this 'strange language' that I couldn't understand soon got the better of my curiosity. Of course, this was helped along by George refusing to let me in on what he was sending or receiving. His favorite statement was, 'If you study for your ticket, then you will understand!'" This was all Shirley needed to study for her license and, ironically, CW became her favorite mode of operation. She now holds an Extra Class license.

Sons George, Jr, KA8JNG and Christopher, N8GUI, have embarked on careers inspired by lessons first learned as amateurs. One has become an electronics technician, and the other will study computer science. Two other children, Charles and Kathie are currently preparing for their Amateur Radio examinations. "The hobby has given our family so much that when the opportunity presented itself to give something back, George and I were eager to do so. We have been Volunteer Examiners for two years and really enjoy providing a means for others to become licensed and/or upgrade."

Although Shirley is a registered nurse in charge of pediatrics at South Haven Community Hospital, she finds time to participate in the YL contests, chase DX and ragchew. She has served on the YLRL Vice President's committee, is past editor of TASYL's *Tattler* and assisted with emergency communications during the 1980 tornado that struck Van Buren and Kalamazoo counties. She has taught radio classes and continues to be an avid CW Field Day op.

Shirley frequently tells people that becoming an amateur was one of the best presents she has given herself. "It is still as great a thrill for me to make contacts now as it was when I first became licensed because the most exciting thing about Amateur Radio is that the best adventure is the one just around the corner."

N2EVZ—Nancy Fontana was first licensed in 1981. Four years later, she placed third in YLAP's CW contest. Since then, she has been "hooked" on contesting, particularly the CW segments. Nancy is a member of YLRL, SAYLARC and the Rookies, a local radio club based in her home QTH of Elmira, New York. Among her many awards are YLCC, WAC-YL and DX-YL. She and OM, KS2L, are currently working on WANCA, Worked All Norwegian Communes.

WD5FQX—Darleen Magen, licensed since 1969, has a lengthy list of contest accomplishments. In the NA/DX YL contest, she has been the top winner, either in CW or SSB, six times as well as a multiple winner with her



N2EVZ: Winner CW Gold Cup



WD5FQX: Winner SSB Gold Cup

HC2YL call. She is a regular contender in the YL/OM contest and in 1974 scored seventh World High as a Single Op/All Bands in the CQWW DX contest. Currently she is YLRL's DX Chairperson, which keeps her busy corresponding with approximately 250 YLs as well as writing *YL Harmonic's* bimonthly column.

THE 16th JLRS PARTY CONTEST

SSB: 0300Z Sep 26-0300 Sep 27, 1987
CW: 0300Z Oct 3-0300Z Oct 4, 1987

Eligibility: All licensed men and women operators throughout the world are invited to participate.

Procedure: OMs call "CQ YLs," YLs call "CQ Contest," CW: "CQ Test."

Operation: All bands and all modes may be used in accordance with operator and station licenses. Crossband operation is not permitted. All contacts must be made from the same location. Net contacts and contacts with mobile stations or club stations will not count.

Exchange: OMs: RS or RST and QSO number starting with 001; YLs: RS or RST and QSO number starting with 2001; JLRS members: RS or RST and QSO number starting at 5001. (Separate consecutive QSO numbers must be

1986 YL Anniversary Party Results

Phone		CW	
NA YL	DX YL	NA YL	DX YL
WD5FQX Gold Cup	DJ1TE	N2EVZ Gold Cup	CT1YH
K6KCI 2nd Place	YT3YL	WD8MEV 2nd Place	DF2SL
KU7F 3rd Place	4X6KT	K8ONV/4 3rd Place	YT3YL

Combined SSB and CW Scores

WD8MEV	Corcoran Award
YT3YL	DX World Wide Hager Award

CW Scores

N2EVZ 1470*	WA6UVF 544	W3CDO 96*
WD8MEV 1188*	KA5GIS/1 540*	W0PCD 88*
K8ONV/4 990*	WA2NFY 480*	W8KLZ 70*
KM8E 866*	JA1AEQ 375*	WA2DDD 56*
VE7YL 808*	G4FRK 344*	JA7PCH 36
CT1YH 680*	VK3KS 275*	KA0BAT 20*
DF2SL 619*	KA0MX 208*	KA9SUS 20*
YT3YL 581*	ZL1LS 160*	VK4BSQ/MM 2*
KA6SOC 574*		

SSB Scores

WD5FQX 8635	VE3MRS 2464	N1DJU 816
K6KCI 7938	VK3KS 2156*	DL2ZBM 735*
KU7F 7905*	KD8SC 2145*	N4ODI 701*
WD8MEV 7633*	KA6SOC/M 1938*	WA1JYO 698*
KM8E 7252	WA2DDD 1906*	G4FRK 675*
WA1UVJ 6808	DK6FM 1880	WA8EBS 638*
N2EVZ 6355*	WA6UVF 1830	W5MWW 638*
DJ1TE 6090	K11F/7 1568	N7HAT 561
VE7YL 6038*	NY4H 1440*	JA7YAL 544*
W2GLB/7 5160*	W0PCD 1380*	ZL1BIZ 540*
VE1BP 5100*	WD5CPO 1378	N5HBK 500*
KE5UO 4386	K88RT/7 1350*	G10AZA 488*
KD2EN/1 4375*	GM4YMM 1260*	DF2SL 440*
YT3YL 4579*	ZL1ALK 1260*	W2JZX 403*
4X6KT 3744	4X6DIW 1105*	KA9SUS 368*
WA3HUP 3663	VE7LQH 1093*	VK3DVT 200
KD5MD 3586	JA1AEQ 1068*	K8M2T 150
KA5ONE 3106*	G4EZI 1041*	WB1EHS 130*
DL3LS 2784	KA0OMX 998*	VK4ASK 90*
K6DLL 2700*	WD8IKC 998*	CP5LE 80
WA2NFY 2588*	KA0BAT 971*	JA7PCH 38*
N5GAP 2592	K0EPE 879*	

*Low power multiplier

Check logs: ZL2QY, SM0HNV, OH3GD, NM7N.

used in phone and CW contests.)

Scoring:

1) Phone and CW will be scored as separate contests. Submit separate logs for each contest.

2) Each contact with the same station on different bands will be counted.

3) OMs: Score 1 point for each contact with a YL and 5 points for each contact with a member of JLRS.

YLs: Score 1 point for each contact with OM and 5 points for each contact with YL.

4) Multiply the number of contact points by the total number of different prefixes worked in each band.

Logs: Copies of all phone and CW logs must show claimed scores, band, mode, RST, call signs worked and power transmitted, be signed by the operator and be postmarked not later than Oct 20, 1987. Be sure your log is legible. Please print or type. Send logs to the Contest Custodian, Chizue Yamada, JA1EYL, 5-28-4 Nakano, Nakano-ku, Tokyo 164, Japan.

Certificates: All participants will receive a Certificate of Contest Participation and a list of the results of the contest. Stickers will be added to the certificate at every participation for 10 years from the issue of the original certificate.

Suggested Frequencies: Phone 14,160, 14,280, 21,280, 28,600 kHz; CW: 14,060, 21,060, 28,060 kHz.



CRRL Officers and Directors

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO
Treasurer: William Loucks, VE3AR
Honorary Vice President: Noel B. Eaton, VE3CJ

Directors:

Ron Hesler, VE1SH
Claude Brunet, VE2ZZ
Raymond W. Perrin, VE3FN
William A. Gillespie, VE6ABC
David Fancy, VE7EWI
Counsel: B. Robert Benson, QC, VE2VW
Suite 1600, 2020 University Ave
Montreal, PQ 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

New Bands Now Available

On July 29, DOC contacted CRRL to say that effective immediately, Canadian amateurs could begin operating on the 17-metre (18.068-18.168 MHz) and 12-metre (24.89-24.99 MHz) bands. Subsequent discussions with DOC brought out the following points:

For Canadian amateurs, there are no mode subbands. Holders of the Amateur Certificate may operate A1 (CW) and F1 (FSK modes: RTTY, AMTOR and packet radio) on any part of the new bands. Holders of the Advanced Amateur Certificate may operate A1, F1, A3 (single or double-sideband phone, with or without carrier), F3 (narrowband FM phone), A4 and F4 (facsimile or slow-scan television), and A5 and F5 (fast-scan television) on any part of the new bands.

Even the most casual reader will notice two anomalies. Nowhere on the other HF bands are holders of the Amateur Certificate allowed to operate F1 without a "six-month endorsement." Fast-scan television typically requires 4-6 MHz bandwidth and would be a little difficult to squeeze into a band 100 kHz wide. We telephoned DOC and asked if there was some mistake. They checked and replied no, that this was part of their policy of "opening things up," and that, in any event, there would be a subsequent regulation limiting all emissions to a maximum bandwidth of 6 kHz. So if you can figure out how to put a fast-scan television signal into 6 kHz of the 12- or 17-metre band, DOC will not stand in your way.

With no mode subbands specified, some guidelines are in order. CRRL asks all Canadian amateurs to follow the IARU band plans which recommend the following:

Frequency (MHz)	Mode
18.068-18.100	24.890-24.920 CW only
18.100-18.110	24.920-24.930 CW/FSK modes
18.110-18.168	24.930-24.990 CW/phone/SSTV

TOWER BATTLE BEGINS

"Stop the Tower. We Have Rights Too." That's how placards read when angry neighbours of Ken Mangaroo, VE3NCM, of Burlington, Ontario, demonstrated against the erection of his 72-foot tower.

Ken first planned the tower in 1986. In compliance with Section 12(1) of the Radio Regulations, Part 2, he requested and received permission from DOC. Business commitments prevented Ken from beginning his project until this year. Shortly after beginning, he received a visit from a by-law enforcement officer. Burlington has no by-laws that attempt to regu-



Some people work DX and some people visit it. Roy Parrett, VE7TG, admires an ORARI mobile club station while on a recent visit to Indonesia. (VE7TG photo)

late the height or placement of antenna towers, but building permits are required for towers over 55 feet. These are given automatically, recognizing that towers come under federal jurisdiction. Ken got a building permit.

After that, Ken did just about everything possible to head off further trouble. He had already chosen a brand of tower that was CSA-approved. Now he had an engineer prepare a report testifying to the structural integrity of his proposed installation. He had the soil at the base of the tower tested. He even had the hole for the base inspected by municipal authorities before pouring the concrete.

On July 27, Ken received an order to appear in court on the following morning. Unprepared for this sudden turn of events, he called on local club officials and CRRL. He was advised to get legal counsel as soon as possible and stall for time. The hearing was postponed to August 12. Over the next two weeks Ken found that it was not easy to find a lawyer to take his case. Eventually, Ken settled on a lawyer recommended by CRRL, a lawyer whose firm had successfully appealed the conviction of an amateur taken off the air under a municipal antinoise by-law some years ago.

The August 12 hearing went fairly well. No injunction, not even a temporary one, was granted. The judge did grant a 10-day stay of proceedings to allow counsel for the 18 families in Ken's neighbourhood to prepare a case. Ken voluntarily agreed not to do further work on his tower during that time.

Ken appears to be in total compliance with the law while his neighbours appear to be having trouble finding a basis for their case. Nevertheless, those neighbours remain adamant. They are not only calling for a halt to construction of the tower; they are threatening a \$250,000 suit if the tower goes up. We'll have more next month.

SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Maritimes-Newfoundland Section: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Name of the incumbent appears on page 8 of this QST. A petition, to be valid, must carry the signatures of five or more Full members of the League residing in the Maritimes-Newfoundland Section. It is advisable to have more than five signatures. Photocopied signatures are not acceptable. Petition forms, FSD-129-C, are available from CRRL Headquarters 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 Full members of the League residing in the Maritimes-Newfoundland Section, 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 time of nomination.

Petitions will be received at CRRL Headquarters until 1600 EST 1987 December 04. If only one valid petition is received, the person nominated will be declared elected. If more than one valid petition is received, a ballotted election will take place. Ballots will be mailed from CRRL Headquarters on or just before 1988 January 01. Returns will be counted after 1988 February 19. A Section Manager elected as a result of these procedures will serve for a two-year term beginning on 1988 April 01.

If no valid petition is received, the Maritimes-Newfoundland Section will be resolicited in 1988 April and May QST. You are urged to take the initiative and file a nominating petition immediately.

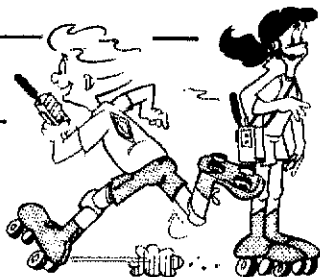
Harry MacLean, VE3GRO
CRRL Secretary

NOTES FROM ALL OVER

The CRRL Board of Directors did meet in Toronto on August 28-30. We'll have full details next month.

Unfortunately, amateurs only have secondary status on 430-450 MHz, and Canadian amateurs are starting to feel the pressure as Siledas systems and Doppler-shift radars used to detect wind-shear at major airports appear on the band. CRRL did discuss the problem with DOC at a

(continued on page 73)



Ham Radio In The Tetons

This is Scott's last "Making Waves" column. Since he joined the League family in 1985, he has been a voice for young people and their particular concerns in Amateur Radio. After spending his summer as an Amateur Radio instructor at the Teton Valley Ranch Camp in Wyoming, Scott is spending his Senior year of high school in Finland. We look forward to hearing about his adventures there.

A common question among hams is, "Why aren't there more young kids involved in ham radio?" The answer is generally quite simple. Kids are unaware of ham radio: what it is, what it can do and what it is good for. Fortunately, however, there are programs across the country that are increasing the public's, and specifically young people's, ham radio knowledge.

Stuart Palmer, WB7AXX, and Matt Montagne, WA7GHW, direct the Teton Valley Ranch Camp in Jackson Hole, Wyoming. They know the importance of ham radio, and over the years have developed a program designed to introduce kids to ham radio.

The camp is located 15 miles from Jackson, with the Teton Range providing a beautiful backdrop. The camp season is divided into two five-week sessions, one each for boys and girls. Campers ranging in age from 10 to 17 attend each session.

The camp has a Western theme with horseback trips and backpacking trips into the Tetons every day. These trips provided the original reason for hiring a ham radio operator. The amateur went along on trail rides into the wilderness areas to provide



The ham radio class watches N7DDM (not in picture) demonstrate the right way to string an antenna. (The "right way" is to let someone else climb the tree!)



The class was fascinated with my 2-meter hand-held. Matt, WA7GHW, and Stuart, WB7AXX were on the other end of the conversation.

a communication link back to the ranch. Stuart, WB7AXX, also told me that the operator used to double as a trail cook!

I didn't have to cook, but I did introduce the campers to the history of ham radio, the camp station and Morse code. Stu and Matt helped me out, giving demonstrations of 2-meter capability. As a reward for working diligently, campers witnessed a contact from the camp station and occasionally operated the rig themselves. We didn't snag any rare DX, but the kids had a lot of fun listening to folks around the country ragchew. Other projects, such as building code oscillators, were also available to campers who continued to participate actively in the ham radio program.

Campers worked on ham radio projects every other day. The group consistently numbered at least five, with a maximum class size of eight. After two weeks, two campers had learned the code and were working on the theory with hopes of becoming licensed while at camp or shortly thereafter.

The campers showed much enthusiasm in the radio classes. An introduction to the hobby piqued their interest in learning more. The small classes allowed everyone to get a "hands-on" opportunity with the rigs and plenty of personal attention.

I am participating in a student exchange program to Finland this year and after that will be going to college. I do hope, though, to write an article from Finland. I have enjoyed writing this column and hope you enjoyed reading it as well! I'll see you on the air.



N7DDM came along on trail rides and overnight trips. The view was so great, I forgot to call CQ.



The kids tune the bands to find interesting QSOs. Such experiences contributed greatly to the interest the course generated.

63

Where to Get OSCAR Information

In recent months, we've been expanding our satellite knowledge in specific areas. We've learned the basics of satellite operating and how to establish a station. Most recently, we've examined some of the activities that occur on the OSCARS. I introduced the theme of Techno-Sport to denote a fun-type activity that has a strong learning component involved. For example, in the ZRO-Receive Sensitivity Test, I explained how participants in this Techno-Sport "contest" garnered awards for superior station performance. They proved they could hear better

than most other stations in a realistic on-the-air test. Later, I introduced the Radio-Location Techno-Sport, an activity planned to commence later this year. Additional details on this exciting new aspect of Techno-Sport, which has obvious parallels in the COSPAS-SARSAT search-and-rescue satellite area, will follow in this column.

I thought it appropriate to provide an "information handle" in this month's column, since it's my experience that the hardest part of getting started in any new activity is knowing *where* the appropriate information spigots are,

and how to turn them on. Once they're turned on, we can ask the right questions to get the information we need to get on the air. So, here are some suggestions of places to find information on operating OSCARS.

First, and perhaps easiest to access at no cost whatsoever, are the on-the-air nets (see Table 1) that AMSAT and its overseas partners sponsor. Some of these nets are over a decade old; others are new-starts. In any case, you'll find them a treasure trove of current information and helpful hints. Most net-control operators are quite knowledgeable and willingly reply to questions from the net.

An extensive list of packet-radio bulletin boards, numbering several hundred around the world, carry AMSAT News Service bulletins. These bulletins are carried by many voice-net stations as well, but far more packet BBSs carry the bulletins. The BBS list is too long to publish here, but is available from me for a business-size SASE.

AMSAT Area Coordinators are an excellent source of information, too. There are more than 120 Coordinators across North America, and most are glad to help get you going. Perhaps one near you can provide just the helpful hint to break that OSCAR QSO logjam you've encountered. You can send me a business-size SASE for a list of Area Coordinators.

Written OSCAR information abounds—if you know where to look. AMSAT North America (AMSAT-NA) is the largest of nearly two-dozen affiliated AMSAT organizations around the world; AMSAT-NA publishes several periodicals. Its newsletter, *Amateur Satellite Report*, is a member service published biweekly. *QEX* is a monthly publication offered jointly by ARRL and AMSAT, and designed to appeal to the more technically inclined amateur. More and more satellite and advanced technology articles are appearing in *QEX*.

The Satellite Experimenter's Handbook published by ARRL is clearly the best all-around book in its field. Its comprehensive and authoritative approach make it required reading for the serious student of OSCAR and weather satellite work.

The most advanced topics are covered in AMSAT's *Technical Journal*. Here are presented professional engineering level papers accessible to advanced amateurs. *ATJ* is aperiodic and available from AMSAT HQ.

Helpful guides are provided in AMSAT's *Beginner's Manual* and the *Phase III Operations Manual*. The former takes novitiates from ground zero through their first OSCAR contact. The latter provides a thorough how-to-do-it for working the high-flying OSCARS such as AMSAT OSCAR 10 and the soon-to-be-launched Phase IIIC.

Just as it takes a good recipe to bake a good cake, it takes the right information to work OSCAR easily and consistently. Make use of the aforementioned information sources, and soon you'll be up there with the rest of the proficient OSCAR satellite users.

Information about AMSAT can be obtained by sending a business-size SASE to: AMSAT, PO Box 27, Washington, DC 20044. *The Satellite Experimenter's Handbook* and *QEX* are available directly from ARRL. All the publications mentioned are available from AMSAT.

Table 1
AMSAT Information Services Worldwide
(Updated as of June 1, 1987)

Service Area	Day	Time	Freq (MHz)	NCS (Primary)	Notes
<i>International</i>					
International	Sunday	1900 UTC	14.282	WD0HHU	1
International	Sunday	1900 UTC	21.280	WD0HHU	1
South Pacific	Saturday	2200 UTC	14.282	W6SP	2
South Pacific	Saturday	2230 UTC	21.280	W6SP	13
<i>Southern, Central and Eastern Africa</i>					
Eastern Africa	Sunday	0900 UTC	14.280	ZS6AKV	
"	Sunday	0900 UTC	7.080	ZS6AKV	
"	Sunday	0900 UTC	3.718	ZS6AKV	
"	Sunday	0900 UTC	3.665(AM)	ZS6AKV	
<i>National</i>					
Australia	Sunday	1000 UTC	3.685	VK5AGR	8
England	Sunday	1015 local	3.780	G0AUK	
England	Mon + Wed	1900 local	3.780	G0AUK	
Sweden	Sunday	1000 local	3.740	SK4TX	
<i>Regional</i>					
US East Coast	Tuesday	2000 local	3.840	WA2LQQ	3
US Central	Tuesday	2100 local	3.840	W0CY	3
US West Coast	Tuesday	2000 local	3.840	N6TE	3
<i>Sub-Regional and Local</i>					
England/Brighton Area	Sundays	1915 local	144.280	G6ZRU	
Scotland/Paisley	Daily	0900 local	144.625	GM1SXX	
South Africa/J'Burg	Sunday	0900 UTC	145.650	ZS6AKV	9
South Africa/J'Burg	Thursday	1830 UTC	145.650	ZS6AKV	
South Africa/Cape Town	Thursday	1730 UTC	145.750	ZR1KE	
South Africa/Durban	Thursday	1730 UTC	145.650	ZR5JJ	
South Africa/Pieter	Thursday	1730 UTC	145.750	ZR5JJ	10
South Africa/Pretoria	Thursday	1830 UTC	145.775		
South Africa/Pretoria	Thursday	1830 UTC	3.718		
South Africa/Pretoria	Thursday	1830 UTC	3.665		
South Africa/Port Eliz	Thursday	1830 UTC	145.775	ZR2FK	
<i>US</i>					
CA Los Angeles	Wednesday	2000 local	144.144	W6SP	
CA Los Angeles	Daily	0730 local	144.144	W6KAG	
CA Los Angeles	Saturday	2200 UTC	144.144	W6SP	5
CA Los Altos	Tuesday	2000 local	147.150	WB6GFJ	4
CA San Diego	Wednesday	1930 local	145.660	WB6LLO	
CO Denver	Wednesday	2000 local	147.225	AA0P WD0FVV/R	11
GA Atlanta	Wednesday	2130 local	145.410	W4BIW W4PME/R	
IL Chicago	Wednesday	1930 local	146.880	WD9IIC K9GFY/R	7
MI Detroit	Wednesday	2000 local	224.460	WD8CIK K8OCL	12
NY Warwick	Tuesday	2000 local	144.280	WA2LQQ	6
TX Houston	Tuesday	2200 local	145.450	WA5ZIB WB5RDK/R	
TX Dallas	Wednesday	2000 local	146.610	WB5PMP ???/R	

Voice Notes

- ¹This net may return to 21.280, summer 1987 propagation conditions permitting.
- ²This net may return to 21.280, summer 1987 propagation conditions permitting.
- ³Interim frequency; frequency is ± 10 kHz.
- ⁴WA6YCZ/R; additional links on K6GW/E/R, 443.525; W6OA/R, 146.655; KU6A/R, 223.720 MHz.
- ⁵Two-meter simulcast of South Pacific HF net by W6SP.
- ⁶Two-meter simulcast of 75-meter East Coast net by WA2LQQ.
- ⁷PL 1B required for access.
- ⁸Back-up frequency is 7.064 MHz.
- ⁹Two-meter simulcast of 20-meter net by ZS6AKV.
- ¹⁰From Pietermaritzburg.
- ¹¹Alternate NCS is WD0HHU.
- ¹²Also linked via 147.22, 443.00, 443.55 and 1288.99 MHz.
- ¹³Trial basis for spring 1987. See note 2.

Hot Springs ARC Museum Display Attracts New Club Members

George MacDonald, KC9S, submitted the following information and photographs.

WA5BRF



HOT SPRINGS AMATEUR RADIO CLUB
OPERATING FROM THE MID-AMERICA MUSEUM
400 Mid-America Boulevard
Hot Springs National Park, Arkansas 71913



Hot Springs National Park, Arkansas

The station and attached antique wireless radio/television museum is located at Mid-America Museum.

The station is sponsored and is operated by the club members and is available to all licensed amateur radio operators who follow the F.C.C. and club regulations.

The public can operate demonstration equipment and listen to the station communications.

An amateur radio school is also conducted at the museum.



Hot Springs ARC's demonstration/exhibit kit used in science classes at the local schools.

Many of our new members come from Novice classes that we conduct each Saturday at the museum. Several have come after seeing our station in operation. Our club provides volunteers to talk to the public about how Amateur Radio benefits the local community. We let visitors to our display at the Mid-America Museum talk over our equipment—this fuels their interest in learning more about hams. We then provide them with club information and our objective. Each day at least one person asks for more information.

Interested prospective hams, after seeing

our museum display, have said, "A free Novice class instructor right in the museum close to the station equipment makes studying for the exam more interesting; I have always wondered what a ham radio operator is. Now I have seen the equipment and talked to many of the operators—sounds great!"

Our demonstration/exhibit kit has attracted attention as we provide hand keys for the public to use. Science teachers have even requested that we demonstrate Amateur Radio in the local schools. They are interested in showing their students how electronics has progressed. And we get Novices!

Welcome SSCs!

The following clubs have demonstrated their zeal for enhancing enjoyment of Amateur Radio and going the extra mile in serving their local communities. These clubs were granted Special Service Club status after demonstrating effective programs in six areas: (1) Public Relations, (2) Emergency Communications, (3) Training, (4) Technical Advancement, (5) Operating Activities and (6) ARRL Membership Recruitment. The number in parentheses is the number of club members. Welcome aboard!

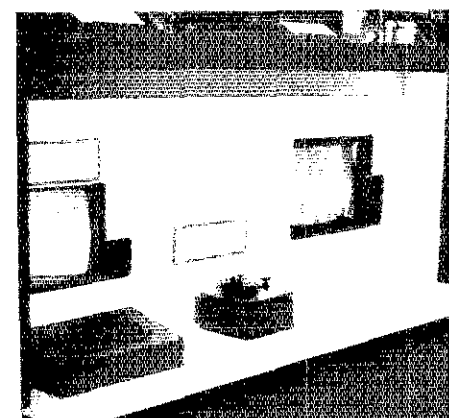
Metro Atlanta Telephone Pioneer ARC, Norcross, GA (154)
Peoria Area ARC, Peoria, IL (150)
Sam Houston Amateur Radio Klub, Cleveland, TX (58)

Falmouth ARA, Inc, West Falmouth, MA (113)
Fort Wayne RC, Inc, Ft Wayne, IN (243)

The following renewing Special Service Clubs have reaffirmed their commitment:

Amateur Radio Club of El Cajon, El Cajon, CA (190)
Allen County Amateur Radio Technical Soc, Hometown, IN (161)
Ausable Valley ARC, Fairview, MI (36)
Baton Rouge ARC, Baton Rouge, LA (323)
Bill Gremillion Memorial RC, Newman, GA (71)
Birmingham ARC, Birmingham, AL (328)
Butte ARC, Butte, MT (57)
East River RC, Bluefield, WV (57)

Framingham RC, Framingham, MA (135)
Garland ARC, Garland, TX (156)
Hastings ARC, Hastings, NE (48)
Johnson City RA, Inc, Gray, TN (71)
Mahoning Valley ARA, Poland, OH (62)
Marin ARC, San Rafael, CA (166)
Milford ARC, Cincinnati, OH (49)
St Charles ARC, St. Charles, MO (68)
Southern Maryland ARC, Upper Marlboro, MD (139)
Stamford ARA, Stamford, CT (122)
Triple States Radio Amateur Club, Adena, OH (700)
Wellesley ARS, Wellesley, MA (89)
Willmar Area Emergency ARC, Willmar, MN (64)



Open area of the museum display with keyboard and hand key for public operation. Note the videotape about our club activities; we also use ARRL videotaped programs.

Coming Conventions

KANSAS STATE CONVENTION

October 10-11, Wichita

The 1987 Kansas State ARRL Convention and Hamfest will be held at the Broadview Ramada Hotel in downtown Wichita. Doors will open at 9 AM both days. Preregistration: \$5, at the door \$6. Features: Indoor flea market, Saturday night banquet and Sunday morning breakfast. Talk-in on 146.22/82. Preregistration and dealer information: Vern Heinsohn, WAØZWW, c/o Wichita Amateur Radio Club, 707 N Main St, Wichita, KS 67203, tel 316-264-2796.

TENNESSEE STATE CONVENTION

October 24-25, Chattanooga

The 9th annual Chattanooga Amateur Radio and Computer Convention will be held at Grand Central Station at the Chattanooga Choo-Choo complex. Highlights include licensing exams on both days, free parking, lodging facilities and various forums. For further information, write HAMFEST CHATTANOOGA, PO Box 3377, Chattanooga, TN 37404. For exhibitor information, call Barbara Gregory, WA4RMC, at

October 2-4 Pacific Division, San Jose, CA	October 24-25 Tennessee State, Chattanooga
October 3-4 Virginia State, Virginia Beach	October 31-Nov 1 Central Division, St Charles, IL
October 9-11 Southwestern Division, Scottsdale, AZ	ARRL NATIONAL CONVENTIONS
October 10-11 Kansas State, Wichita	Sept 9-11, 1988—Portland, Oregon
	June 2-4, 1989—Dallas/Ft Worth, Texas

615-892-8889. For flea-market information, call Garland Eubanks, KB4RTM, at 615-622-8467 after 6 PM, or Joe Duncan, W4ECW, at 615-698-2147.

CENTRAL DIVISION CONVENTION

October 31-Nov 1, St Charles, Illinois

The 1987 Central Division Convention is sponsored by Fox River Radio League is having

their Hamfest/Convention at Norris Sports Center just off Rte 64 in St Charles, Illinois. 8 AM-2 PM both days. Sellers setup 7 PM-9 PM Friday or 6 AM Sat and 7 AM Sun. Talk-in 145.47 and 145.21. Tickets are \$3 advance, \$4 at the door. Features include indoor flea market, commercial exhibits, forums, seminars, technical demonstrations and exams. For further info: Phil Fors, N9FXQ, 104 May St, West Chicago, IL 60185, tel 312-231-8841.

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.

Arizona (Sierra Vista)—Oct 3. Sponsor: Cochise ARA. Place: South Moson Rd, intersects 90 5 miles east of 90/92 junction. Features: Refreshments. Talk-in: 146.16/76. Tables: No charge for tailgaters. For more info: Jacquie Kelly, KD7DZ, 602-458-4107 or CARA, PO Box 1855, Sierra Vista, AZ 85636

Connecticut (Poquetanuck)—Oct 31. Sponsor: Tri-City ARC Auction. Time: 10 AM, Dealers 9 AM. Place: St James Parish Hall, 1½ miles E of Rte 12 on Rte 2A. Features: Auction, food. Talk-in: 146.52. Admission: Free. For more info: WA2RYU, 203-464-6555 or Bob Dargel, KA1BB, tel 203-739-8016 (H), 203-446-7325 (B).

Connecticut (Waterbury)—Oct 4. Sponsor: Waterbury Amateur Radio Club. Time: 9 AM-3 PM. Place: Connecticut Higher Education Center (Waterbury State Tech) exit 18 off I-84. Features: VE testing, food and drink. Admission: \$2. Tables: \$10, tailgaters: \$5. For more info: Gary Kieb, 589 Hamilton Ave, Watertown, CT 06795, 203-274-1246.

Georgia (Warner Robins AFB)—Oct 10-11. Sponsor: Central Georgia ARC. Time: 9 AM-4 PM. Place: Warner Robins Recreation Center.

†ARRL Hamfest

Features: Forums, testing. Talk-in: 146.25/85. Admission: Free. Tables: Free public and vendors. For more info: Cliff Warrick, N6DLA, 712 Hill St, Warner Robins AFB, GA 31098 or Central Georgia ARC, Box 2585, Warner Robins AFB, GA 31099, tel 912-929-2951.

Indiana (Fort Wayne)—Nov 8. Sponsor: Allen County ARTS. Time: 8 AM-4 PM, vendors 5 AM-7 AM. Place: Allen County Memorial Coliseum. Features: Computers, flea market, forums, exams. Talk-in: 146.28/88. Admission: Advance \$3.50, door \$4, children under 11 free. Tables: \$10, premium \$25. For more info: AC-ARTS, PO Box 10342, Fort Wayne, IN 46851 (SASE).

Massachusetts (Framingham)—Oct 25. Sponsor: Framingham ARA. Time: 10 AM, sellers 8:30 AM. Place: Framingham Civic League Bldg, 214 Concord St (Rte 126). Features: Flea market, exams. Talk-in: 147.75/15. Admission: \$2. Tables: \$10. For more info: Tables, Jon Weiner 617-877-7166. Exams, \$4.35 ARRL/VEC to FARA, PO Box 3005, Framingham, MA 01701.

Michigan (Kalamazoo)—Oct 25. Sponsors: Southwest Michigan ART, Kalamazoo ARC. Time: 8 AM-4 PM. Place: Kalamazoo Central High School, 2432 N Drake Rd; US131 to M43 east, Drake Rd north to school. Features: Walk-in VE testing. Talk-in: 147.64/04 and 146.52. Admission: Advance \$2, door \$3. Tables: \$6. For more info: Jim Hastings/Kalamazoo Hamfest, 1813 Greenbriar Dr, Kalamazoo, MI 49008.

Minnesota (Minneapolis)—Oct 31. Sponsor: Twin City FM Club. Time: 7:30 AM-3 PM. Place: Hennepin Technical Center/North

Campus, 9000 Brooklyn Blvd, Brooklyn Park. Features: Guest speaker, CW contest, FCC exams, parking, flea market, seminars, commercial booths, food and much more. Talk-in: 146.16/76. Admission: Advance \$3.50, door \$4.50. For more info: Hamfest, Minnesota & Computer Expo, Box 726, St Louis Park, MN 55426.

Missouri (Grandview)—Oct 25. Sponsor: Southside ARC. Time: 9 AM-5 PM. Place: MO Hwy 71 to Grandview exit at Main St east ¼ mile to High School. Features: Food and drink, testing, forums. Talk-in: 147.72/12. Admission: Free. For more info: Linda McLeod, KAØSEU, 1603 Richmond, Pleasant Hill, MO 64080, tel 816-987-3936.

New York (Selden)—Nov 8. Sponsor: Radio Central ARC. Time: 9 AM-4 PM. Place: Suffolk County Community College. Features: Food, VE exams, technical workshop. Talk-in: 145.150 PL4Z. Admission: \$3. For more info: Andrew Feldman, WB2FXN, 3 Walton Way, Tanglewood, NY 11727, tel 516-928-3868.

New York (Syracuse)—Oct 17. Sponsor: Radio Amateurs of Greater Syracuse. Time: 9 AM-6 PM. Place: I-90, I-81, I-690 all lead to the fairgrounds. Features: Forum, speaker, flea market, women's program, breakfast. Talk-in: 147.90/30 and 146.31/91. Admission: Door \$4. For more info: RAGS Hamfest, Box 88, Liverpool, NY 13088.

New York (Queens)—Oct 18. Sponsor: Hall of Science ARC. Time: 9 AM-3 PM. Place: Hall of Science parking lot at Flushing Meadow Park, 47-01 111 St. Features: Films, tune-up clinic,

museum, exhibit station, food. *Talk-in:* 144.300 simplex, 223.600 repeat, 445.225 repeat linked. *Admission:* Buyers \$3, sellers \$5 per space. *Tables:* Outside. *For more info:* Stephen Greenbaum, WB2KDG, tel 718-898-5599 or Arnie Schiffman, WB2YXB, tel 718-343-0172.

†**North Carolina (Maysville)**—Oct 11. *Sponsor:* Maysville Hamfest. *Time:* 9 AM-3 PM. *Place:* 70 south to Maysville, right at spotlight, two blocks on left. *Features:* Tailgaters, FCC exams. *Talk-in:* 146.685 Grifton repeater. *Admission:* Free. *For more info:* JoAnn Taylor, WD4JUR, Rte 1, Box 80-36, Swansboro, NC 28584.

Ohio (Lima)—Oct 11. *Sponsor:* NOARC. *Place:* Allen County Fairgrounds, 1 mile east of I-75, exit 125A on Rte 309 or 117. *Features:* Exams. *Talk-in:* 146.17/67 and 146.52. *Admission:* Advance \$3, door \$3.50. *Tables:* Full \$6, half \$3.50. *For more info:* SASE to NOARC, Box 211, Lima, OH 45802.

Ohio (Marion)—Oct 25. *Sponsor:* Marion Amateur RC. *Time:* 8 AM-4 PM. *Place:* Marion County Fairgrounds Coliseum. *Features:* Food. *Talk-in:* 146.52 or 147.90/30. *Admission:* Advance \$3, door \$4. *Tables:* \$5. *For more info:* Ed Margraff, KD8OC, 1989 Weiss Ave, Marion, OH 43302, tel 614-382-2608.

Oklahoma (Kingston)—Oct 24-25. *Sponsor:* Texoma Hamarama '87. *Time:* Sat 8 AM-5 PM, Sun 8 AM-noon. *Place:* Lake Texoma State Lodge, Kingston. *Features:* Speaker (NASA),

banquet, dance, breakfast, flea market, dealers. *Talk-in:* 146.52 (simplex). *For more info:* Joe Blair, Texoma Hamarama Assn, PO Box 610892, DFW Airport, TX 75261.

Pennsylvania (Carlisle)—Oct 18. *Sponsor:* 4th Annual Cumberland County Hamfest. *Time:* 7 AM-3 PM. *Place:* Carlisle Fairgrounds. *Talk-in:* 145.27, 145.52 and 433.3. *Admission:* \$3, XYLs, children free. *For more info:* SASE, C-CARS, PO Box 448, New Kingston, PA 17072.

Tennessee (Eastview)—Oct 31 and Nov 1. *Sponsor:* McNairy ARS. *Place:* Eastview Civic Center. *Features:* Flea market, women's activities. *For more info:* Cathy Wilson, N4INV, Rte 2, Box 586, Selmer, TN 38375, tel 901-645-9887.

†**Tennessee (Gray)**—Oct 17. *Sponsor:* Johnson City and Kingsport ARC. *Time:* 8 AM-5 PM. *Place:* I-181, between Johnson City and Kingsport. *Features:* CW contest, packet, 10-10, OSCAR, MARS. *Talk-in:* 146.37/97 and 146.16/76. *Admission:* Advance \$3, door \$4. *For more info:* Wendell Messimer, KA2HK, PO Box 3682 CRS, Johnson City, TN 37602.

†**Tennessee (Memphis)**—Oct 10-11. *Sponsor:* MARA. *Time:* 8 AM-4 PM, dealers 6:30 AM. *Place:* National Guard Armory, 2610 Holmes Rd East, 1 mile east of Airways and 2 miles south of airport. *Features:* Special programs, food, parking. *Talk-in:* 146.28/88, backup 146.25/85. *Admission:* \$5 per family. *Tables:* Indoor \$20,

outdoor \$10, own tables and tailgaters \$5. Deposit on indoor tables 25%. *For more info:* Tommy Holbrook, W4WBQ, 4780 Bowen Ave, Memphis, TN 38122, tel 901-685-1796.

Texas (Lubbock)—Oct 3-4. *Sponsor:* Lubbock Hamfest. *Place:* Holiday Inn, Casa Grande-Tahoka Hwy and Loop 289, Lubbock. *For more info:* Ron Ashmore, WB5DUQ, 6124 35th St, Lubbock, TX 79407, tel 806-799-2639.

Texas (Odessa)—Nov 7-8. *Sponsor:* West Texas Amateur Radio Club. *Time:* 8 AM-5 PM Sat, 9 AM-3 PM Sun, 4 PM-12 PM setup Friday. *Place:* Holiday Inn, 5901 E Hwy 80, off loop 338. *Features:* Forum, MARS, exams. *Talk-in:* 147.62/02 or 146.10/70. *Admission:* Advance \$5, door \$6. *Tables:* \$7. *For more info:* West Texas ARC, Box 7033, Odessa, TX 79762 or O. E. Brasfield, tel 915-366-0203 (D), 915-366-8364 (N).

West Virginia (Huntington)—Oct 3. *Sponsor:* Tri-State ARA. *Time:* 9 AM-4 PM. *Place:* Huntington Civic Center. *Features:* Flea market. *Talk-in:* 146.16/76. *Admission:* \$4. *Tables:* \$4. *For more info:* Paul Patton, NT8M, PO Box 652, Huntington, WV 25711.

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



MEMORIES OF SELDEN HILL

□ A great amount of pioneering radio work was done on Selden Hill in West Hartford, Connecticut. This location also served as an unofficial League residence for many HQ staffers over the years, and those who lived there came to regard it as home. Rilla Selden, the owner, became almost a second mother to the hams who resided there, and stories were written about the hill in early *QST*s. We are sorry to inform those who follow ham history of the death of Rilla Selden on July 29, 1987. 89 years old, she had lived in her family's home on Selden Hill all her life.

For further reading about the hill and for *QST* articles based on radio works accomplished there, here is a list: "The Legend of Selden Hill," Aug 1944, p 46 and Jan 1982, p 65; Hull, "Airmass Conditions and the Bending of UHF Waves," Jun 1935, p 13 and May 1937, p 16; Hull and Rodimon, "Plain Talk about Rhombic Antennas," Nov 1936, p 28; Hull and Bourne, "Radio Control of Model Aircraft," Nov 1936, p 9; and first transatlantic VHF ham contact, World Above 50 Mc., Jan 1947, p 50.

ATTENTION HAMFEST AND CONVENTION SPONSORS

□ ARRL HQ maintains a register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the Hamfest and Convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned Hamfests and Conventions. This must be done by your Division Director for Sanctioned Hamfests and, additionally, by the Executive Committee for Conventions. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541.

SAFETY FIRST

□ There are reasons for accidents involving radio gear, but never *good* reasons. Take no chances with electricity. Even a low-voltage shock can be serious—sometimes fatal.

Heed the ARRL safety code: While there's no reason for you to be involved in a ham-related accident that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

- 1) Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.
- 2) Never allow anyone else to switch the power on and off for you while you're working on equipment.
- 3) Don't troubleshoot in a transmitter when you're tired or sleepy.
- 4) Never adjust internal components by hand. Use special care when checking energized circuits.
- 5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.
- 6) Never wear headphones while working on gear.
- 7) Follow the rule of keeping one hand in your pocket.
- 8) Instruct members of your household how to turn the power off and how to apply artificial

respiration. (Instruction sheets on the latest approved method can be obtained from your local Red Cross office.)

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

10) Do not install antennas at levels that permit humans or animals to come in contact with them. Not only might the victim sustain a serious RF burn, he or she could run into the antenna and be injured.

11) Do not operate high-power UHF or microwave gear that has inadequate shielding against radiation. Similarly, do not look into or stand near microwave antennas when transmitter power is being fed to them.

12) Do not install antennas near electrical power lines.

13) Don't drink alcoholic beverages when working on equipment or installing antennas.

Take time to be careful. Death is permanent.

WOUFF HONG INITIATION

□ What is the Royal Order of the Wouff Hong? When does it meet? How can I join?

The ROWH is a secret society of radio amateurs who are members of the ARRL. The Order of the Wouff Hong can be conferred only at a National, Division, State or Section ARRL Convention. Each inductee receives a certificate of membership to be displayed prominently in his or her shack.

The ceremony is not conducted at every League convention, so you'll have to watch the convention writeups in *QST* or publicity mailings to determine whether it is one of the scheduled events at a convention in your area. Then, with proof of League membership in hand, register to be one of the inductees into the great, secret fraternity of Amateur Radio, the Royal Order of the Wouff Hong.

It is with deep regret that we record the passing of these amateurs:

KA1AGR, Norman N. Ridley, Everett, MA
 AA1B, Herbert L. Whitehead, Narragansett, RI
 KA1BMZ, Patrick J. Curran, Sanford, ME
 W1HRX, James A. Millen, North Reading, MA
 W1MDH, Donald S. Greene, Wakefield, MA
 K1MRF, Stanley J. Majka, Lowell, MA
 *KA1ON, Thomas W. Little, Jr., Groton, MA
 W1QFN, Alexander J. Vezina, Fall River, MA
 W1SEJ, Virgil E. Thompson, Auburn, ME
 WA1SVY, F. George duPont, Fairfield, CT
 WA1VUW, Terrance E. Clark, Meriden, CT
 NA2C, John Bonar, Syracuse, NY
 W2DPF, James J. Welsh, Jr., Sea Bright, NJ
 W2IAZ, Allan W. Porsch, Seneca Falls, NY
 WB2IUF, Robert C. Wetzel, Rutherford, NJ
 KA2KDL, James A. DeMarony, Sr., Gilboa, NY
 W2MVH, Gilbert H. Shavaler, Baldwinville, NY
 KA2SCJ, John E. Everson, Williamstown, NY
 *WB2SHL, Monroe M. Broad, Jamaica, NY
 W2UOE, Thomas J. Coonce, Seneca Castle, NY
 KB2VL, Harold Hollenbeck, Flat Rock, NC
 WA2WOO, Philip Santangelo, Bradenton, FL
 W3DBK, David V. Irvin, Raleigh, NC
 W3GTK, H. Thomas Newman, Jr., West Pittston, PA
 *WA3KXC, Donald R. Austin, Hatboro, PA
 W3MLK, Henry R. Kaiser, Pittsburgh, PA
 W3RFN, Stewart F. English, South Williamsport, PA
 K3WJW, Frank J. Arra, Broomall, PA
 W3ZIJ, Charles V. Ritzert, Chicora, PA
 W4BVZ, Needham C. Crowe, Raleigh, NC
 WA4CPJ, Jack D. Peters, McMinnville, TN
 W4CP, David Alton Worsley, Temple Hills, MD
 K4CVR, Bessie M. Foss, Oklawaha, FL
 N4DI, Charles F. Matheson, Georgetown, SC
 W4DJF, Oliver K. Nixon, Augusta, GA
 K4FGZ, Glenn A. Pattee, Fort Myers, FL
 W4GEH, Lonnie L. Blackwell, Jackson, TN
 WA4GJE, Kenneth A. Thompson, Bradenton, FL
 KB4GKT, Evan H. Davies, Sr., Oak Lawn, IL
 EB4GOG, G. R. McCahan, Jr., New Brockton, AL
 W4HZ, Gifford Grange, Jacksonville, FL
 K4IPO, Earle W. Wesch, Winter Haven, FL
 KF4KJ, John Thomas Codnere, Black Mountain, NC
 W4LD, Joe L. Stern, Sandston, VA
 *W4LPG, James C. Craig, Riva, MD
 WB4PEJ, Robert G. Caniff, Gainesville, FL

WB4SVZ, Joseph M. Murphy, New Port Richey, FL
 KD4TE, John Russell, Brooksville, FL
 WA4THV, Henry Guyton, Sulligent, AL
 K4UA, Henry P. Gilbert, Clinton, SC
 WA4VTB, Dennis M. Kirby, Riverdale, GA
 K4YFP, William P. McLaughlin, Lantana, FL
 KA5AFX, C. Otis Jett, Bella Vista, AR
 K5BOH, Merton Schmolke, Albuquerque, NM
 WA5CGW, Paul L. Kuhn, Abilene, TX
 W5GSL, A. W. Nichols, Liberty, TX
 W5HNA, William L. Harrison, San Antonio, TX
 WASTJC, Richard C. Banghart, Albuquerque, NM
 *W5UR, Willie E. Petty, Albuquerque, NM
 A15V, C. R. Luallen, Alexandria, LA
 W5VEQ, William C. Stevens, Las Cruces, NM
 KA5WPI, Gary J. Grimes, Carriere, MS
 N6ALV, Larry Shretler, Rohnert Park, CA
 AH6CT, Paul Smith, Captain Cook, HI
 *W6DK, T. Duncan Stewart, Newport Beach, CA
 K6GPH, Louis J. Weber, Thousand Oaks, CA
 KA6ITW, Carl J. Santos, San Leandro, CA
 W6KAE, Robert P. Gerisch, Torrance, CA
 W6KA, John J. McCarthy, Stockton, CA
 W6MHP, Denney Moore, Paradise, CA
 KE6QG, Claude F. Grant, Torrance, CA
 W6QQE, Ralph Challinor, Fresno, CA
 W6RAT, Charles F. Dondro, Los Osos, CA
 K6VCA, James B. Riley, Mesa, AZ
 W7APE, Roy W. Cox, Winslow, AZ
 W7CWU, Raymond G. Bradley, Port Orchard, WA
 *K7LTKO, Allen Bianco, Anchorage, AK
 N7HYT, Steve R. Mendoza, Henderson, NV
 W7LQK, George L. Abrams, Canby, OR
 W7TK, Gerard S. Vergeer, Bremerton, WA
 K8AQG, Edward A. Bulmer, Charlotte, MI
 K8BPR, Harry Markowitz, Southfield, MI
 W81VH, Paul A. Lokinski, Columbus, OH
 KD8KR, Paul C. Snyder, Columbus, OH
 *W8NKK, Norman L. Parker, Lexington, MI
 WD8PPN, Fred McMillen, St. Clairsville, OH
 W9BHL, Lawrence R. Topp, Webster, WI
 N9ELZ, Donald R. Martin, Connersville, IN
 W9HLI, Frank Peat, South Holland, IL
 KD9PS, Kenneth A. Ellis, Evansville, WI
 K9QHJ, Mildred L. Vaughn, Harvey, IL
 K9QIE, Anthony J. Sweeney, Jr., Palatine, IL

WA0VZR, J. Ernest Breeding, Norwalk, IA
 W0DWL, Lloyd F. George, Pueblo, CO
 NA0E, Earl Van Beers, Arnold, MO
 *WB0FBY, Charles L. Taylor, Overland Park, KS
 WD0FSD, Norman L. Fees, Fremont, NE
 N0GCC, Leonard Sollars, Salina, KS
 WD0HWK, Glenn T. Crump, Bingham, IL
 W0IPW, Robert M. Hart, Bismarck, ND
 KA0LDR, John F. Keuhn, Burlington, IA
 W0LFF, Max R. Otto, Iowa City, IA
 KA0PCR, Marshall J. Grabosch, Lawrence, KS
 WB0SGB, Ray T. Howerter, Omaha, NE
 WA0VGR, Glenn M. Keller, Iowa Falls, IA
 WB0ZSA, Gordon Juvel, Zumbrota, MN
 VE1EE, Murray W. Doull, St. John, NB
 VE3ATM, Geoffrey H. Hervey, Copper Cliff, ON
 VE3BRF, Neal Boyle, Barrie, ON
 VE3IAL, Patricia Chappell, Goderich, ON
 VE3IN, Ed H. Degrey, Eganville, ON
 VE3JLO, Lawrence Blais, Winchestr, ON
 VE3MZD, Mike Trusz, Cochrane, ON
 VE3NM, Ralph B. Dierlam, Welland, ON
 VE3OHO, Don Warden, Stayner, ON
 VE7HC, William J. Couch, Richmond, BC
 VE7RQ, William Adams, Surrey, BC
 VE7SX, Raymond L. Hickey, Victoria, BC
 GIKEE, Patrick D. Elsom, Williamsville, NY
 OE1AD, Adolf R. Dimsink, Vienna, Austria

*Life Member, ARRL

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. Canadian reports should be sent to the CRRF HQ address on p 9.

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

October 1937

- Inspired by a visit to the soaring contest at Elmira, N.Y., several of the Hq. crew led by Ross Hull are experimenting with radio control of a model sailplane. An experimental escapement converts the rubber-band motor torque into rudder motions. A receiver with superregen detector triggers the relay stepping the escapement.
- Short-wave broadcast station W1XAL in Boston is starting another in its series of basic radio courses for the public. Several thousand amateurs have already profited from the courses, heard on 6040 kc. evenings with 20 kw. of power.
- W1DF calls his five-band transmitter unit an "exciter," but its respectable 40-watt output can serve as a complete rig for most of us, especially with the convenience of stage switching and simple plug-in coils.
- Enroute to Roumania to represent Canadian and U.S. amateurs at the international technical radio meeting, VE2AP and W1AL stopped in several European countries to solidify relations with their respective I.A.R.U. societies' officers.
- The voice sub-band on 10 meters is now 28,500-30,000 kc. instead of the former 28,000-29,000 kc., a change made by F.C.C. in response to a League request.
- W2UK was top W/VE scorer in the 1937 DX competition, breaking most contest records including the working of 71 different countries during the fray.
- Upon the theory that radiation from a half-wave antenna comes largely from the middle quarter-wave portion, W1QP and W8CPC decided not much

energy would be wasted by turning back each end. Presto!—a square half-wave loop which is rotatable because of reduced dimensions.

- If you copy W8DPY's design of a versatile emergency transmitter, you know it comes from experience—he was chosen winner of the Paley Award for his outstanding performance in the March, 1936, flood emergency in northern Pennsylvania.
- Plans are under way for the appointment, by Section Communications Managers, of an Emergency Coordinator in every city with a population of over 25,000.
- Perennial band-planner W2AOE's current proposal includes abolishing 160-meter 'phone and using the band for League traffic nets, abolishing the Class A license, and alternating voice and c.w. exclusive operation in 80, 40 and 20 meters by changing the authorized mode each month!

25 Years Ago

October 1962

- The challenge of two-meter moonbounce drove W1ZIG and K1HMU to build an antenna with sixteen 30-foot Yagis in phase, with crossed elements fed so that they can be used for either right or left circular polarization.
- The heterodyne exciter is not a new idea, but W1RF's deluxe version carries the concept one step farther by crystal-controlling all frequency-generating circuits, a true frequency synthesizer.
- Always eager to develop simple and economical gear for the Novice/beginner, W1ICP this month describes an easy-to-build five-element two-meter beam with a total outlay of \$1.50.

□ Using old honeycomb coils of up to 1500 turns, W3QY built a near-replica of his 1920 receiver and reminiscenced by copying the famous NAA signal now on 14.7 kc.—yes, kc.

□ By combining the features of phasing and filter types of carrier and sideband suppression, VK2AC finds that more complete suppression is obtainable in practice with less critical adjustment of either section.

□ W4KFC made the single-op high score in the c.w. section of the 1962 DX contest, while HC1AGI copped honors among foreign participants.

□ The League has once again asked FCC to relieve the dual-identification requirement for RTTY operation. An earlier request was denied because of complications it would have caused in the Commission's monitoring branch.

□ The 1962 version of the All-Woman Transcontinental Air Race was again backed with extensive amateur supporting communications, appropriately enough largely consisting of YL operators.

□ If you were first licensed in 1912—and can prove it—the Golden Anniversary of Licensing celebration, part of the forthcoming Hudson Division Convention, will award you an appropriate plaque.

□ W3FQB has some useful thoughts on power supplies, e.g., dividing the VR-tube dropping resistor into two sections will improve filtering and reduce peak rectifier current, as well as providing a certain amount of overload protection for the rectifiers.

□ W1OOP finds the new silicon power varactors useful in high-efficiency doubling or tripling on u.h.f. without vacuum tubes or power supply.

□ The Correspondence Section this month has several bouquets tossed at W6ISQ for his humorous feature stories. His current effort spoofs the mania over certificate collection by proposing WASP—Worked All State Parks!—WTRW

Reventador Defines Disaster in Ecuador

REVENTADOR: [*Spanish n*] 1: one who bursts, explodes, pops or smashes. 2 (*figurative*): tough job, heavy work, enough to kill a horse 3: a steep slope, a hard climb 4 (*proper noun*): an active volcano in Ecuador over two miles high whose earthquake and eruption on March 5, 1987, took an estimated 1000 lives and cost over \$1 billion in economic losses.

At ten till nine on that Thursday evening, I was still at the dining room table conversing with my wife when we felt a tremor. I immediately went to my Amateur Radio and tuned to the national emergency frequency, 7060 kHz, to listen to hams around the region. In the first half hour, only minor damage such as electrical and phone failures were reported. I checked into the net, reporting only a light shock and no damages here in the southernmost part of the country, Loja Province.

Within a few hours, however, we were worried. No reports had been received from Ibarra even though there is a healthy population of hams in that city, 60 miles north of Quito. A little later, Fedrico, HC1GG, who was 20 miles out of Ibarra, informed us that the "White City," as it's called, was in a total blackout including phones, but a 2-meter emergency network had assessed local damages as moderate. The town clock tower in the central plaza had fallen over along with half the cathedral. A high school was extensively damaged, and most of the structures in that city were affected. Fortunately, no deaths and few injuries were reported.

Then, about midnight, we heard the anguished voice of Matts Gunnarsson, HC7SK. He's a Swedish missionary affiliated with HCJB who was working in Santa Rosa de Quijos, about 15 miles south of Reventador Volcano. The building that had housed his shack had completely collapsed. The studios of Radio Interoceanica, a short-wave broadcast station that was his pet project, were destroyed. Matts conveyed that almost all the buildings in his small town were leveled and survivors were spending the night out in the rain.

On Friday morning, Matts relayed a message from his town council requesting emergency aid, medical assistance and helicopters to evacuate other small towns in the area. It seemed that not much notice was taken of this plea for help because of the small size and remoteness of the towns. Help was still a long time coming. At midday, electricity and phone service were restored to most of Ibarra, and the Friday night news referred to the quake as strong, but no major damage or deaths resulting. Matts, however, was passing news much to the contrary.

Marco Ricaurte, HC1DK, director of Cadena HC, the national traffic net, had been

on the air for 24 hours continuously when he moved the emergency net to 7055 kHz and scheduled net control stations for the next twenty-four hour period. This move left 7060 kHz clear for the Civil Defense organization, many of whose stations have fixed frequency transceivers.

I volunteered to be net control station from 2200 on, and by 1700 I could see that it would be a reventador (see definition 2). A lot of health-and-welfare traffic was rolling in along with a fair share of official notices. The big problem was interference from contesters from abroad who were operating on split-frequencies. Most of our net controls don't understand English, and many are not familiar with how split frequency operation works. I spent hours with my 100-watt rig trying to clear frequencies, and later began working across the band enlisting stronger stations that could hear me to help. Language problems, propagation conditions and the sheer number of contesters were unbelievable hindrances.

My turn as net control station rolled around, and I was met with an ongoing emergency and headphones full of QRM! My position was futile. I closed the net shortly after midnight after most HC stations had dropped out. My ears were ringing.

Saturday was all bad news—as we began to hear about the real damage. Whole neighborhoods and bridges were washed away when the earthquake unleashed landslides that joined forces with flashfloods. Whole mountain ranges were left bare while rampaging rivers washed away countryside, villages, farms and forests. Twenty miles of the oil pipeline, Ecuador's economic jugular vein, was wiped off the map, as was an equal stretch of the only road in the zone.

By Monday, the news services were broadcasting the story worldwide. By Wednesday, help was still slow to arrive. HCJB and their affiliated Vozandes Hospital brought in tents, food and a medical team. The Civil Defense was getting its gears rolling, and HC1DK was taping messages by the thousands off the emergency net for rebroadcasting on HCJB's national coverage stations. The net operated sixteen hours per day for two weeks after the first shocks. I was gratified to be control station for 25 hours during that period. Many stations devoted full time to the job, and we received help from stations in the Amazon region. A repeater was set up to link the disaster area to Quito via two meters. Airplanes and canoes carried supplies to the vast areas that were isolated by the Reventador quake. Civil Defense and even the armed forces were using the Amateur Radio net to route traffic. When the First Lady, Maria Eugenia de Febres Cordero visited the disaster zone, someone showed her to the micro-

phone, and she had a good word to say about all the radio amateurs of Ecuador right on the frequency.

Overall, the amateurs of Ecuador did an outstanding job. All worked together harmoniously, and the network flowed in an orderly manner. I was glad to be part of such a fine group.—Curtis E. Hoffman, HC3NCH

RECOGNITION OF EMERGENCY FREQUENCIES

For the Amateur Radio Emergency Service (ARES) and the National Traffic System (NTS), an emergency is the culmination of all its preparatory efforts. When an emergency requires medium and long-distance communications, the NTS takes on an emergency complexion for the express purpose of handling the related traffic. Certain NTS nets are activated, as required, at section, region or area level. Transcontinental Corps (TCC) may also be activated, depending on the extent of the emergency and communication needs.

How are these emergency nets and information circuits set up and recognized? Established emergency frequencies become the focal point for relaying emergency messages and related information. In the US, the ARRL Field Organization and NTS has established such frequencies. The leadership officials closest to the scene of the emergency are in the best position to determine what Amateur Radio nets are best to activate.

FCC Rule 97.107 describes the Commission's role in recognizing emergency frequencies. Here are relevant excerpts:

In the event of an emergency disrupting normally available communication facilities in any widespread area or areas, the Commission, in its discretion, may declare that a general state of communications emergency exists, designate the area or areas concerned, and specify the amateur frequency bands, or segments of such bands, for use only by amateurs participating in emergency communications within or with such affected area or areas. Amateurs desiring to request the declaration of such a state of emergency should communicate with the Commission's Engineer-in-Charge of the area concerned.

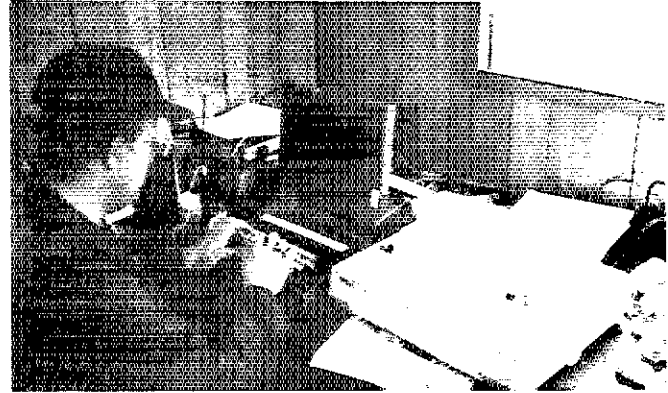
The Commission may designate certain amateur stations to assist in the promulgation of information relating to the declaration of a general state of communications emergency, to monitor the designated amateur emergency communications bands, and to warn non-complying stations observed to be operating in those bands.

IN SERVICE . . .

□ Palo Alto, CA—Jun 7, 1987. ARES/Southern Peninsula Emergency Communications System provided communications support for the 14th Annual Sequoia Century Bicycle Tour. More than 2500 bicyclists rode routes of 25, 63, 100 or 125 miles in length. Radio operators were provided for two lunch stops, 13 sag wagons and at the base of operations for the tour. ARES



N3DOS (center) was among the 100 radio amateurs who provided the communications network for the Pittsburgh Marathon. More than 3000 runners participated in the event.



N3CVL sends messages via packet radio during the 1987 Pittsburgh Marathon on May 3. The ARES of Allegheny County responded to the invitation to furnish communications for the marathon. A construction trailer was provided for net control operations, and packet radio was utilized to support medical communications. (N3DOK photos)

provided assistance at seven major injury accidents that required paramedic or helicopter ambulance support.—*Ed Mitchell, WA6AOD, AEC, Palo Alto, CA*

□ Lynchburg, VA—Jul 10. Members of the Lynchburg Amateur Radio Club provided a much needed line of communication during a potential emergency situation. Early that morning a bulldozer severed a telephone cable and cut off all telephone service to a nearby retirement and nursing community that houses 360 older adults. Lynchburg club members were notified of the situation, and they provided emergency communications until telephone service was restored several hours later.—*Paula K. Jones*

□ Salina, KS—Jul 11. Winds between 100 and 112 miles-per-hour hit this area at 3:30 AM. Part of the roof of a new shopping mall was torn off, and another mall suffered roof damage as well. A week later, another storm of similar nature hit at about the same time. ARES members were called out on storm watch in case another storm or even a tornado warning was given.—*C. Steve Schultz, W0CHJ, SEC, Kansas*

□ Roseburg, OR—Jul 18. A forest fire started in the Days Creek area, a few miles south of Roseburg. ARES members and members of the Umpqua Valley Amateur Radio Club were alerted by the Emergency Coordinator. Radio amateurs furnished a generator to an area that needed electricity and relayed several health-and-welfare messages. Coverage was provided to the Red Cross.—*Bill Gibson, N7FXJ, President, Umpqua Valley ARC*

□ Burlington, NJ—Jul 29. Around 10:30 PM, N2EAV and her husband, N2DTT, observed an automobile being driven in an erratic manner on US Route 130. This route is one of the heaviest traveled highways in the state. After following the vehicle for several miles, they felt the police should be alerted. WB2YGO was contacted on the 220-MHz repeater, and he, in turn, telephoned the Delran Township police. The police intercepted and stopped the erratic vehicle and apprehended the driver. A further check with the police department confirmed that the driver was highly intoxicated.—*Jose A. Alvarez, K2KMO, President, Willingboro Area Repeater Group.*

SPOTLIGHT ON SERVICE

Amateur Radio Follows Race Around the World
Amateur Radio provided communications for

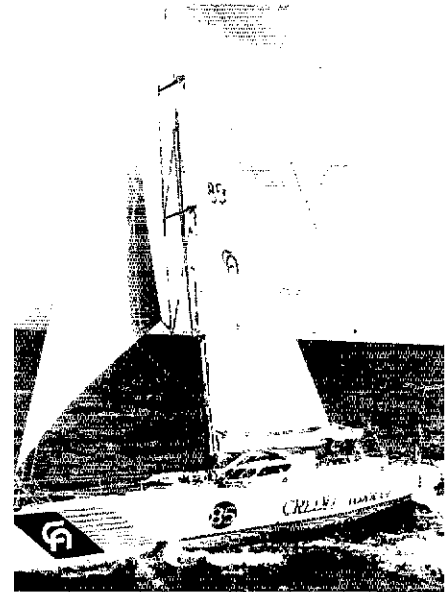
an around-the-world sailboat race from August 1986 through May 1987. The BOC (British Oxygen Corporation) Challenge was a 27,000-mile, single-handed boat race on Class I and Class II boats. Class I boats average about 60 feet in length, and Class II boats average from 40 to 50 feet in length. Twenty-five entries representing 10 countries left from Newport, Rhode Island on August 30, 1986. Six of the skippers were radio amateurs.

Communications plans, made in advance, called to use maritime marine band radio and Amateur Radio. The BOC Challenge headquarters asked KIWEW, club radio station at the Raytheon Submarine Signal Division, in Portsmouth, Rhode Island, to be the official Amateur Radio station. Working hours and propagation did not allow KIWEW to operate the entire race, but hams from all over the world were able to participate and report to race headquarters.

Out of the 25 boats that sailed the first leg to Cape Town, South Africa, six dropped out. One of the boats hit a submerged object and sunk. Radio amateurs in Florida monitored the distress call and alerted the US Coast Guard who in turn sent a team to rescue the skipper.

Amateur Radio was also instrumental in another emergency during the fourth and final leg of the race. Sailing between Rio de Janeiro and Newport, Pentti Salmi, the skipper aboard *Colt by Rettig*, cut his thumb while working in the bilge, and his hand became infected. Through the Amateur Radio network and radio relay by fellow competitors, Dr Chuck Ashworth, W1BIS, of Providence, learned of the symptoms and declared a medical emergency. Dr. Ashworth received daily updates through Bertie Reed, KAI0UH, aboard *Stabilio Boss*, and when it was apparent that the infection was spreading, W1BIS obtained the manifest from all the boats in the race and translated them into English. The antibiotic that Salmi needed was found aboard the French boat, *Let Go*. Skipper Jean Luc Van Heede immediately changed course and rendezvoused with Salmi in the open ocean and passed him the antibiotic. Ten days later, Salmi reported having almost full use of his arm again.

The final six days of the race in early May 1987 were tense. The first seven boats were within 100 miles of each other, and there was a constant battle for first place. Several schools up and down the East Coast of the US kept in touch with the action by monitoring Amateur Radio. Sixteen boats completed the race, and *Credit*



Credit Agricole III, skippered by Philippe Jeantot, was declared the winner in the 1986-87 BOC Challenge boat race. Over 30 radio amateurs provided communications assistance for the participants along the route. (photo courtesy of N1DWS)

Agricole III, skippered by Philippe Jeantot, was the overall winner with the shortest elapsed time of 134 days, 5 hours, 23 minutes and 56 seconds.—*Richard Worsfold, N1DWS*

YOUR CONDUCTOR'S CABOOSE

Thank you for your comments on the certification procedures for the Public Service Honor Roll (PSHR) (see July 1987 *QST*, page 74). The Public Service staff is accepting written notification from individual operators and ARRL Section Leaders that the candidate in question has achieved the required number of points for PSHR for 12 consecutive months or 12 months out of an 18-month period. HQ will then be able to verify these qualifications and send the PSHR certificate to the candidate.

Field Organization Reports July 1987

Region Net

1RN	29	74	2.55	210	71.0	77.4
2RN	28	95	3.39	259	94.3	61.3
3RN	18	10	0.55	096	57.4	64.5
4RN						67.7
8RN						74.1
ECN						83.8
TCC						
TCC Eastern	60	102				

Cycle Four

Area Nets						
EAN	31	1161	37.45	1.103	94.4	
CAN	31	984	31.74	1.156	100.0	
PAN	28	825	29.46	.942	87.1	

Region Nets

1RN	45	167	3.71	.318	65.5	100.0
2RN	62	197	3.17	.298	96.5	100.0
3RN	62	439	7.08	.280	100.0	90.3
4RN	62	509	8.21	.510	84.8	100.0
RN5	62	490	7.90	.730	100.0	88.7
RN6	62	356	5.74	.559	81.8	88.7
RN7	61	245	4.02	.331	83.0	93.5
8RN	62	333	5.37	.390	92.7	100.0
9RN	62	495	7.98	.499	89.4	100.0
TEN	62	178	3.18	.424	63.0	90.3
ECN	59	307	5.23	.345	89.8	83.8
TWN	31	128	4.13	.116	100.0	87.1
ARN						
TCC						
TCC Eastern	106	1188				
TCC Central	72	914				
TCC Pacific	102	736				

ARRL Section Emergency Coordinator Reports

Twenty nine SEC reports were received, denoting a total ARES membership of 16,957. Sections reporting were: BC, CO, KS, IA, ID, LA, MDC, ME, MI, MN, MO, NF, NE, NJ, OH, OR, PAC, SD, SDG, SFL, STX, SV, VT, VA, WA, WMA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic	
Cycle Two					
TCC Eastern	83	70.00	465	970	
TCC Central	72	77.40	247	632	
TCC Pacific	94	75.81	342	583	
Summary	249	74.40	1054	2185	
Cycle Three					
TCC Eastern	60	96.77	51	102	
Cycle Four					
TCC Eastern	106	85.48	604	1188	
TCC Central	72	71.28	396	914	
TCC Pacific	102	82.25	—	736	
Summary	382	79.67	1000	2838	

* PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, ENY, EPA, GA, IA, IN, IL, KS, MDC, ME, MI, MN, MO, MS, NC, NH, NF, NJ, NT, OH, ONT, OR, ORG, SB, SC, SD, SDG, SFL, SJV, STX, SV, TN, UT, VA, VT, WA, WIN, WMA, WNY, WTX, WV.

83	VE4AJE	W6RNL	WA8DHB
KJ4VT	KQ3T	N2GPA	VE7ANG
WA9VLC	WZ5N	KF8J	61
WB8SYA	KA1EXJ	67	N2DXP
N8IBS	74	KA4GUS	VE3GSQ
82	KJ3E	AA4AT	K14BR
KC3Y	VE3GT	KM5L	N2DXP
N7BGW	KB4BZA	KB2BKE	KA6BCB
KA8RNY	K4IWW	N8EFB	WA4MNR
K9ZBM	NN2H	KD8KU	K2YAI
81	N8HRW	66	60
WA0TFC	73	N3EFW	KA1HPO/T
W5VMP	VE3WV	VE3CYR	KA1LMR
80	72	WB6QBZ	WB0UD
KA0SBY	WA4LTO	KD0YL	WA0HTN
79	WB0WJN	WA1TBY	W09DZU
N2XJ	VE4RO	NYBJ	K2TWZ
WB5YDD	N0DZA	KA2ZYX	KAZNZT
NJ5S	71	W4HCN	W2FR
N2XJ	N0B9N	KB4JPN	W08RHU
WG5S	KA7EEZ	N2ABA/T	K8ND
WB7WOW	WB6BZQ	65	56
VE7EJU	N2CER	KA5UYV/T	N2ETO/T
VE7EJW	KA5QYV	WA3YLO	54
78	KI4YV	N4PL	KA1NOI/T
AC5Z	AE1T	K0PCK	50
W6INH	70	W4T3C	KA9CTW/T
K3JL	N3AZW	K4JST	48
WD4KBW	VE4IX	W7LNE	46
K4JVK	WB9PFZ	64	47
K9J	KA2INE	WB4TZR	N4MM/M/T
KA4TLC	WB2QMP	A100	47
77	WA4RNP	N2HIF	WA8DYS/T
WB5EPA	KF4FG	N4OZB	45
WA4RUE	N8AEH	K2MT	N6FWG/T
KA4TWI	69	KA8WNO	43
W0DQGU	W5KLV	N8FWA	43
KD9NH	W0FRG	KA8TNT	N0HMR/T
N8FXH	N0HWD	63	
AJ5F	W0UCE	KA4FZI	
76	WA6WJZ	WA3UNX	
N0CLS	WA6OCA	WD8KBW	
ND2S	N2EVGT	62	
75	W1RWG	KB4LB	
WA4JL	N8GPU	VE3POJ	
WD4ALY	68	WB1H8B	
NT0B	WA3UZI	KP4DJ	

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 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSRR certificate from HQ.

193	110	101	92
KA8CPS	W1PEX	K2VX	K6UYK
167	W2QNL	W3FA	N1EED
KA0EPY	109	K0GP	WA2FJJ
155	WB1HHH	WA8ZUD	WA2ERT
KA8TK	AA4MP	K2VX	91
144	KT1Q	K28Q	W0OYH
W7VSE	108	AA4JV	N6MCI
139	NQ2H	N7BHL	KA0ARP
WB5J	NC9T	K8TVG	90
132	K85ADE	100	W5CTZ
N4GHI	KD7ME	W9CBE	KA1GWE
N2EIA	KE0NI	99	K2ZVI
129	WD5GKH	107	W4PIM
VE3ORN	K9CNP	WD5YUK	89
N9BZZ	WB2ZJF	NE2W	W2RRX
128	W9JUJ	98	KC4VK
WX4H	N3EMD	KA2MYJ	VE3DPO
KA9RH	NK1Q	WB4ZTR	W2RRX
K5MXQ	WA4JDH	K4NLK	NO8A
122	WA2OOW	VE7BNI	87
WA4QXT	106	WA1JVJ	87
2FN	WA4PFK	97	AA4HT
3RN	AG0G	WA4RLV	WA4EIC
4RN	KN1K	NW7K	K8SI
RN5	K8UQY	WD8QXT	W9DM
RN6	118	96	N8FOO
RN7	KA3DLY	WA8VND	86
RN8	W9YCV	K4MTX	N3EFG
ECN	104	W4CKS	N7APC
TEN	7E4LB	WB8KWC	W9FZW
TWN	WA1FCD	95	K80Z
TCC	AA4TE	85	
TCC Eastern	115	N1CPX	
TCC Central	KA9FFO	W7GHT	
TCC Pacific	KW1U	N7GGJ	
2RN	K2YQK	W7LBK	
3RN	114	W8FPA	
4RN	N9BDL	84	
RN5	112	W3YVQ	
RN6	W9EHS	N4EXQ	
RN7	111	N8DPF	
RN8	KA2F	AA4ZV	
ECN	KA7AID	WB4WI	
TEN	KA2UBD	WB1CBP	

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	715	883	1276	82	2936
N8BQP	30	1135	45	767	1967
WB9PY	0	896	78	619	1583
W3VR	320	261	278	73	936
WA4JDH	1	418	440	6	865
WFSO	0	414	349	20	783
W1PEX	0	149	543	26	718
W7VSE	75	251	352	33	711
KT1Q	27	325	327	8	687
N4GHI	65	272	270	26	633
WB0WJN	232	67	300	3	602
N3DPP	80	227	266	5	598
W9JUJ	0	292	285	1	578
WX4H	0	298	248	12	558
N3AZW	—	—	—	—	553
WA1FCD	3	251	288	3	545
N8DPF	197	51	233	39	520
WB5J	37	179	250	52	518
KA8CPS	15	205	159	134	513

BPL for 100 or more originations plus deliveries:

WA8EYQ	176
KJ4JE	144
K1TQY	129
KA0EPY	108

Independent Nets

Net Name	Sess	T/c	Check-ins
Central Gulf Coast Hurricane Net	31	101	3329
Clearing House Net	31	400	432
Early Bird Net	31	775	281
Empire Slow Speed Net	31	52	291
Golden Bear Amateur Radio Net	31	35	1513
Hit and Bounce Net	31	203	509
IMRA	27	916	1592
Mission Trail Net	31	87	966
New England Novice Net	25	15	64
NYSPEN	31	53	454
Southwest Traffic Net	31	184	1424
West Coast Slow Speed Net	31	93	527
20 Meter ISSBN	27	625	346
75 Meter ISSBN	31	168	1133
7290 Traffic Net	51	464	2568

54th ARRL November Sweepstakes Announcement

The rules for this year's contest are similar to last year's. Note the addition of the "Q" class. This class is for single operators running QRP (5 watts or less output). Also note that the new "Q" category is eligible for awards.

Don't forget to work Novices and Technicians on 10-meter SSB as well as on CW. They've been very active with their new privileges. Significant Novice efforts will be recognized with certificates.

Be sure you log the complete exchange for each QSO and enter UTC times. Also, make sure you remove all duplicate contacts from your log.

Official log sheets, summary sheets and dupe sheets are available from ARRL HQ. Send an SASE with one unit of First Class postage (US) for each five sheets requested. You'll need one summary sheet and one dupe sheet for each mode. Log sheets hold 100 QSOs each, so order accordingly. Order your official entry forms now; they not only make it easier on the log-checkers, but also help make sure you submit all of the required information.

Logs must be postmarked by December 23, 1987. You should send them via First Class mail to ensure timely delivery. Entries not postmarked by the deadline will be classified as checklogs; no exceptions. If you want to make sure your entry has arrived safely, include a self-addressed, stamped postcard. We'll return it to you when we get the log.

Club officers: Remember to send us a membership roster by December 23, 1987 as detailed in the club competition rules. (January QST). CU in SS!

Rules

1) **Object:** For stations in the United States and Canada (including territories and possessions) to exchange QSO information, as detailed in Rule 4, with as many other US and Canadian stations as possible on 160 through 10 meters, excluding 30, 17 and 12 meters.

2) Contest Period

(A) **CW**—First full weekend in November.

(B) **Phone**—Third full weekend in November.

(C) **Time**—Begins 2100 UTC Saturday and ends 0300 UTC Monday. Operate no more than 24 of the 30 hours. Off periods may not be less than 30 minutes in length. Times off and on must be clearly noted in your log, and listening time counts as operating time.

3) Categories

(A) **Single operator.** One person performs all transmitting, receiving, spotting and logging functions.

(B) **Multioperator, single transmitter only.** Those obtaining any form of assistance such as relief operators, loggers or use of spotting nets.

(C) **QRP, single operator.** QRP is defined as 5 watts output or less.

4) **Exchange:** A consecutive serial number,

ARRL Sweepstakes

CALL USED: NJ1Q ARRL SECTION: CT

SENT: NJ1Q CW PHONE

RECEIVED

BAND	DATE	TIME ON/OFF	TIME	NR	NR	FREQ	STATION WORKED	CK	SECTION	POINTS
7	8 AM	2318	351	187	A		W3LYL	58	SST	2
		19	352	185	A		W3LYL	57	SST	
		20	353	70	A		K2TV	37	QRP	
		21	354	334	A		K2TV	38	QRP	
		22	355	17	A		N1OR	56	CT	
		22	356	129	A		W1LVT	46	QRP	
		23	357	97	A		W3QWOS	75	SST	71
		29	358	474	A		W3QWOS	77	LAX	DUPE
		30	359	101	A		W3QWOS	79	SST	
		31	360	54	A		K2JMS	33	CT	
		32	361	261	A		W3ZRC	64	SST	
		33	362	483	A		K2JMS	34	SST	
		34	363	138	A		W3LYL	56	SST	

Do not write above this line.

ARRL November Sweepstakes

CALL USED: NJ1Q CW PHONE ARRL SECTION (P ROST): CT

NOTE: Separate logs must be submitted, with separate summaries, for each mode.

SCORING: 1934 QSO points x 73 sections = 141,182 claimed score

Count 2 points per complete QSO. [Cross out sections worked on the list below.]

<u>141,182</u> Claimed Score	<u>967</u> QSOs	<u>73</u> Sections	<u>100</u> Power Output	<u>22</u> Hrs. of Oper.
------------------------------	-----------------	--------------------	-------------------------	-------------------------

Single Operator Station (operator's call if different from call used).

Multioperator Station (show calls of ALL operators, loggers)

Club participation? Yes
If yes, print the name of your ARRL Affiliated Club: MURPHY MARAUDERS

Equipment Description:
Rig: T5930S
Antenna: 80-40 Dipoles, TH6DXX

I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee.

Date: 12/10/87 Signature: Joseph P. Garcia Call: NJ1Q

Note your soapbox and other comments. Enclose your photos, as well as your SS logs and check sheets, and mail promptly to: ARRL Contests, 225 Main Street, Newington, Connecticut 06111.

MULTIPLIER CHECK-OFF LIST

1	2	3	4	5	6	7	8	9	0	VE
<input checked="" type="checkbox"/> CT	<input checked="" type="checkbox"/> ENT	<input checked="" type="checkbox"/> DE	<input checked="" type="checkbox"/> AK	<input checked="" type="checkbox"/> AR	<input checked="" type="checkbox"/> EB	<input checked="" type="checkbox"/> AZ	<input checked="" type="checkbox"/> MT	<input checked="" type="checkbox"/> NY	<input checked="" type="checkbox"/> MD	<input checked="" type="checkbox"/> MAR
<input checked="" type="checkbox"/> MA	<input checked="" type="checkbox"/> NH	<input checked="" type="checkbox"/> SPA	<input checked="" type="checkbox"/> VA	<input checked="" type="checkbox"/> LA	<input checked="" type="checkbox"/> LAX	<input checked="" type="checkbox"/> ID	<input checked="" type="checkbox"/> OH	<input checked="" type="checkbox"/> IN	<input checked="" type="checkbox"/> IA	<input checked="" type="checkbox"/> WY
<input checked="" type="checkbox"/> ME	<input checked="" type="checkbox"/> NH	<input checked="" type="checkbox"/> MDG	<input checked="" type="checkbox"/> VT	<input checked="" type="checkbox"/> MO	<input checked="" type="checkbox"/> OKG	<input checked="" type="checkbox"/> MT	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> AR	<input checked="" type="checkbox"/> OK	<input checked="" type="checkbox"/> OK
<input checked="" type="checkbox"/> RI	<input checked="" type="checkbox"/> NJ	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> DE	<input checked="" type="checkbox"/> NM	<input checked="" type="checkbox"/> UT	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> MN	<input checked="" type="checkbox"/> MB	<input checked="" type="checkbox"/> MB
<input checked="" type="checkbox"/> WI	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> NPE	<input checked="" type="checkbox"/> NEH	<input checked="" type="checkbox"/> SEP	<input checked="" type="checkbox"/> AR	<input checked="" type="checkbox"/> AR	<input checked="" type="checkbox"/> SK	<input checked="" type="checkbox"/> SK	<input checked="" type="checkbox"/> SK
<input checked="" type="checkbox"/> WI	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> LAK	<input checked="" type="checkbox"/> SMT	<input checked="" type="checkbox"/> AK	<input checked="" type="checkbox"/> AK	<input checked="" type="checkbox"/> ME	<input checked="" type="checkbox"/> AK	<input checked="" type="checkbox"/> AK
<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> SFT	<input checked="" type="checkbox"/> SFT	<input checked="" type="checkbox"/> SP	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> ND	<input checked="" type="checkbox"/> ND	<input checked="" type="checkbox"/> ND
<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY
<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WVA	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY	<input checked="" type="checkbox"/> WY

Print or type: NAME: Joe Garcia CALL: NJ1Q
ADDRESS: 59 HOLL STREET
MANCHESTER, CT 06040

1. Check log for duplicate QSOs.
2. Copy ALL QSO info carefully. A penalty is assessed for incorrectly copied QSO info.
3. Observe mailing deadlines.
4. Duplicate check sheet must accompany all entries of 200 or more QSOs.

MCS-87A (2/87)
Printed in U.S.A.

Contest Period

	Starts	Ends
CW	Saturday, Nov 7 2100 UTC	Monday, Nov 9 0300 UTC
Phone	Saturday, Nov 21 2100 UTC	Monday, Nov 23 0300 UTC

precedence ("A" if you run 150-W output or less, "B" if more than 150 W, or "Q" if 5-W output or less), your call sign, check (last two digits of the year you were first licensed) and your ARRL Section. For example, NJ1Q answers WIAW's call by sending WIAW NR178 A NJ1Q 79 CT for QSO number 178, less than 150 W, first licensed in 1979 and Connecticut Section.

5) Scoring

(A) **QSO points.** Count two points for each complete two-way QSO. No cross-mode contacts. Work each station only *once*, regardless of the frequency band.

(B) **Multiplier.** Each ARRL Section (listed on page 8 of this issue) plus VE8/VY1—maximum of 75. KP4, KV4/KP2 and KG4 stations are in the West Indies Section, while KH6 and other US possessions in the Pacific count as the Pacific Section.

Please note that the new West Texas Section is in effect for this contest and counts as a multiplier.

(C) **Final score.** Multiply QSO points (two per QSO) by the number of ARRL sections (plus VE8/VY1).

6) Miscellaneous

(A) A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned by FCC/DOC).

(B) One operator may not use more than

Explanation of Exchange

	Number	Precedence	Call	Check	Section
Exchanges	Consecutive serial number	Power output more than 150-W PEP	Send your station call	Last two digits of year first licensed	Your ARRL Section
Sample	NR178	A	NJ1Q	79	CT

Suggested Frequencies

CW	Novice CW	Phone	Novice Phone
1800-1810		1855-1865	
3530-3600	3710-3730	3850-3950	
7030-7080	7110-7130	7200-7250	
14,030-14,060		14,250-14,300	
21,050-21,080	21,110-21,130	21,300-21,400	
28,050-28,080	28,110-28,130	28,550-28,650	28,350-28,400

one call sign from any given location during the contest period.

(C) The use of two or more transmitters simultaneously is not allowed.

(D) 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:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL HQ for an SASE. Official forms are recommended. Any entry claiming more than 200 QSOs must submit duplicate-checking sheets (check sheets). Incomplete or late entries will be classified as checklogs. Logs must include dates, QSO times, exchange, sent/received, band and mode.

Postmark your entry within 30 days after the phone portion of the contest (December 23, 1987).

8) **Club Competition:** ARRL-affiliated clubs for club gavels and awards in the local, medium and unlimited categories as described in January *QST*.

9) **Awards:** Certificates to the top single operator CW and phone scores in "A," "B" and "Q" categories in each ARRL Section, and the top multiplier entry in each ARRL Division.

10) Condition of Entry

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications. See January *QST*

Canadian NewsFronts

(continued from page 62)

February meeting in Ottawa, and DOC agreed that if CRRL would supply a list of frequencies to avoid, they would distribute that list to their regional and district offices to serve as a guide when making frequency assignments. All DOC offices now have that list which asks for Canada-wide protection for frequencies used for weak-signal and satellite work, and regional protection for established ATV operations and FM repeaters.

□ Outgoing QSL Bureau Manager Don Welling, VE1WF, reports that CRRL members are making good use of the bureau's free service. In 1986, the CRRL Outgoing QSL Bureau forwarded 69,338 cards to some 200 QSL bureaus around the world. In the first six months of 1987, 54,585 cards were forwarded, pointing to a record year.

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	Jun 1987, p 51	Major ARRL Operating Events and Conventions—1987	Jan 1987, p 57
ARRL International EME Competition	Sep 1987, p 85	Novice Enhancement Report and Order	Apr 1987, p 64
Club Contest Rules	Jan 1987, p 81	Packet-Radio Frequency Recommendations	Sep 1987, p 54
Constitution Bicentennial Information	Sep 1987, p 14	QSL Bureaus Incoming	Jun 1987, p 54
DX Contest Awards Program	Feb 1987, p 82	Outgoing	Sep 1987, p 63
Element 2 Question Pool, New and Revised Questions, Answers	Apr 1987, p 23	Reciprocal-Operating Agreements	Jul 1987, p 51
Frequency/Mode Allocations	Apr 1987, p 70	Tech and General Written Exams	Apr 1987, p 29
Golden Jubilee of DXCC Award	Sep 1986, p 60	Third-Party-Traffic Agreements	Jul 1987, p 51
Hamfest Calendar Rules	Sep 1986, p 84	1987 Can-Am Contest Rules	Aug 1987, p 77
Landline BBS	This issue, p 56	220-MHz Band NPRM	Apr 1987, p 16
License-Renewal Information	Apr 1987, p 70		

Results, 1987 ARRL International DX Contest

C'mon sunspots!

By Billy Lunt, KR1R
Contest Manager, ARRL HQ

and Mark Burke, KA1MIS
Assistant Contest Manager, ARRL

This year's ARRL International DX Contest shows that participation is again on the increase. Go sunspots! From looking over the contest results from the last sunspot cycle until the present, it is clear that the amount of participation is in direct proportion with the number of sunspots. HQ received a total of 2782 logs this year, marking an increase of 391 logs over last year and an increase of 435 over 1985. Although conditions were not ideal for the 1987 Contest, we received both good and bad reports. The worst complaint was probably a high level of noise on the bands along with the lack of band openings. On the other hand, KB1XD boasts of great conditions on 40 meters and KW6Q says that he doubled his score from his last year's effort. A comparison look at all the scores shows that there was a slight increase over last year's scores.

W/VE contesters, phone and CW alike, enjoyed working new countries for multipliers while increasing their country totals for the popular Golden Jubilee DXCC Award being offered this year. This undoubtedly was a factor in some of the large scores of DX entries. Whatever the factor, multiplier hunting is not only fun but imperative for a win, along with high QSO totals. Twenty meters again this year supplied the most multipliers and QSOs. Ten and fifteen both showed slight increases as the sunspot numbers went up. Also, the low bands increased on the ability to supply multipliers.

W/VE Highlights

This year's W/VE single-op CW plaque was a battle of the Northeast with the entire top ten scores over 1.2 million and seven out of the ten from "1-land." Bob, KQ2M, guest oping at KM1H's NH station, won the CW plaque with a comfortable 28k edge over second place winner Stu, KC1F also from NH. Tom, K1K1, from CT, earned a respectable third place win with 1.6 million points.

Although the scores were a bit lower on phone, the fight for the plaque was just as fierce. Veteran John, K1AR, took the plaque by beating out the field of five Northeast single op stations occupying the top phone spots. Second place CW winner Stu, KC1F, was also the runner up on phone with 1.49 megs just ahead of Jeff, K1ZM with 1.46 megs.

The low power class (150 W or less) was won again this year by Gus, VO1MP, on CW bettering his last year's score by 26k. Second place honors go to NØDH and third to W2TZ. Fred, W2TZ, not only accomplished 3rd on CW, but managed to move up the ladder

from 4th place last year to capture the first place phone spot this year. Second place phone goes to K8NZ and third to N5AW.

The top QRP winners are unchanged for 1987 with NN4Q on CW and K3WS on phone. W8VSK moved up a notch from 3rd in '86 to 2nd place QRP CW this year. KD6PY claimed the runner-up QRP phone spot for 1987.

The single-band activity was plentiful

during both CW and phone weekends. In the CW battle, K1ZM took first place on 160-meters with 16k. W1FV reclaims the 80-meter crown again this year with 150k points. K4XS made a good showing to win the 40-meter spot with 194k. K1RM was the 20-meter winner with 336k. W5VX was tops on 15 scoring 17k and K9LZ/5 was the 10-meter plaque winner with 3k. During the phone weekend, K5UR edged out WB9HAD

Affiliated Club Program

Unlimited Category	Score	Entries	CW Winner	Phone Winner
Yankee Clipper Contest Club	42,740,277	76	KM1H(KQ2M)	K1AR
Frankford Radio Club	40,844,525	85	N2LT	KT3M
Northern California DX Club	7,890,282	58	K8DR	WZ6Z
Southern California DX Club	7,826,064	66	W6AE	KM6B
Medium Category				
Potomac Valley Radio Club	13,612,836	42	KC8C/3	KE9A
Mad River Radio Club	9,366,051	21	K3LR	K8AZ
North Texas Contest Club	6,331,089	19	N5RZ	N5JB
Dixie DXers	5,016,132	20	W4XG	NQ4I
Eastern Iowa DX Assn	4,009,791	46	W0WP	KF0H
Murphy's Marauders	3,838,596	17	K1ZZ	K1WA
Kansas City DX Club	3,208,671	15	W0JLC	N7DF
Grand Mesa Contesters	3,104,517	11	W0KEA	K0UK
Western Washington DX Club	2,266,491	29	NN7L	NN7L
Southeastern DX Club	917,751	16	WN4KKN	W4DXI
South Jersey Radio Assn	444,984	15	W2PAU	W2PAU
Local Category				
Overlook Mountain ARC	4,176,459	9	K2UR	KY2J
Texas DX Society	3,768,846	8	N5IVF	N5JJ
Central Virginia Contest Club	3,352,011	8	N4HB	NK4J
Hoosier Contest Club	2,374,017	4	W9RE	W9RE
Carolina DX Assn	1,607,679	8	N4IR	N4ZC
Boiled Owls of New York	1,395,327	6	K2LE/1	W2GGE
Northern Alabama DX Club	1,202,175	8	KR4F	WZ4F
Long Island Contest Club	1,181,760	5	KD3RD	KD2TT
Willamette Valley DX Club	1,014,018	9	KA7FEF	K5MM/7
Northern California Contest Club	738,480	7	WE6G	K16CG
Dauberville DX Assn	665,352	9	K3ZLK	KQ3V
Rochester (NY) DX Assn	661,974	3	W2TZ	W2TZ
Central Arizona DX Assn	596,805	9	WA7KJK	KC7V
Rubber Circle Contest Club	581,460	3	K7LXC	K7GEX
Colorado Contest Conspiracy	462,648	4	K0ZY	W0OSK
Mississippi Valley DX/Contest Club	461,352	6	AK0M	W0HBH
San Diego DX Club	456,336	9	N6ND	N6AW
Western New York DX Assn	423,951	5	W2FXA	WB2ABD
Delta DX Assn	355,674	7	NT5G	WB5SSD
Southern California Contest Club	353,925	6	NE6I	NE6I
Northern New Mexico ARC	317,460	3	N5EPA	N5EPA
Long Island DX Assn	315,192	10	K2YGM	K1EF1
Ohio Valley Area	312,429	5	W8RSW	W8RSW
Alamo DX Amigos	272,988	7	K5DB	K5DB
Columbus ARA	266,346	5	K9ALP	W8NPF
Fox River Radio League	252,597	5	K2OWE	K2OWE
Southern Florida DX Assn	246,231	3	W4OQ	K8JNP
Albany ARA	241,743	3	N2AIF	N2AIF
Four Lakes ARC	209,091	3	N9BUS	N9BUS
River City Contesters	204,768	3	KV6H	KV6H
Redwood Empire DX Assn	171,186	5	K6ZUR	N6OJ
Steel City ARA	138,862	3	---	N3DHC
Northern Ohio DX Assn	125,457	3	N8BC	N8BC
Greater Milwaukee DX Assn	118,287	3	N9AW	N4TZ
Eastern Michigan ARC	109,086	7	AC8W	N8CQA
Society of Midwest Contesters	88,857	8	W8REC	AG9E
Central California DX Club	67,560	3	W6BYH	W6BYH
Penn Wireless Assn	53,850	3	---	K3TX
Utica ARC	44,139	4	---	KE7KF
Rappahaunock Valley Radio Club	35,868	4	KA4RLJ	KA4RLJ
DX Assn of Connecticut	25,470	5	AB1U	AB1U
Great South Bay ARC	2,907	3	---	N2GYN

Top Ten—W/VE Phone

Call	Score	160	80	40	20	15	10
K1AR	1,584,375	40/32	100/57	102/56	1264/117	99/51	20/12
KC1F	1,492,542	32/27	92/48	62/41	1459/110	96/44	17/13
K1ZM	1,462,860	47/36	176/66	96/51	1119/111	102/43	18/8
KT9M	1,301,724	38/32	117/58	123/54	1025/104	91/47	24/11
W3BGN	1,235,874	36/28	102/58	96/43	1071/109	77/43	24/12
W9RE	1,227,963	34/22	96/51	117/51	989/107	122/49	39/13
KM6B	1,111,560	21/17	78/42	548/38	403/71	482/52	38/16
N2LT	1,070,118	26/22	84/46	92/47	1044/106	75/35	20/10
N2IC/D	993,510	21/12	68/36	175/36	542/92	468/48	56/35
K8UJ	908,988	13/11	47/29	402/32	354/69	587/54	33/16

Top Ten—W/VE CW

Call	Score	160	80	40	20	15	10
KM1H (KQ2M, op)	1,763,715	73/41	365/62	323/67	1087/90	52/35	15/12
KC1F	1,735,344	51/37	301/64	410/69	1006/67	69/41	17/14
K1K1	1,628,928	32/24	246/60	476/79	955/83	62/41	21/16
K1T0	1,462,272	38/28	269/58	362/62	1195/79	33/22	8/7
N2LT	1,453,140	25/21	156/53	448/68	1048/64	60/37	18/13
K1AR	1,399,398	27/24	242/58	447/75	847/66	57/36	11/7
AA1K	1,352,295	53/34	378/58	314/56	882/74	60/33	14/10
K1BW	1,312,038	45/30	337/58	298/61	899/79	45/29	14/10
W3BGN	1,309,608	45/34	236/58	365/52	994/73	44/32	9/9
K1CC	1,296,822	47/28	274/53	314/63	995/77	45/31	7/5

Top Ten—DX Phone

Call	Score	160	80	40	20	15	10
V31CV	7,844,760	407/55	1367/57	1106/57	2464/58	2251/57	329/46
HR6A (WB5VZL, op)	6,697,920	328/52	947/56	1045/56	2183/57	2021/56	453/43
8P6B	5,996,823	172/41	915/55	747/55	2252/58	2203/57	352/35
ZF2JR	5,807,826	404/54	889/57	894/58	2090/58	1640/56	389/24
6Y5V (A16V, op)	5,446,647	383/53	1272/53	508/53	2352/58	1570/55	154/19
XE2KJ (AA5B, op)	3,451,476	87/31	878/54	680/54	2416/55	762/41	11/3
4M4A	3,131,208	117/37	457/47	474/50	1498/56	918/56	304/34
CE3BFZ	2,720,340	0/0	216/46	224/48	954/55	1379/57	797/48
WR6R/KH6	2,398,320	45/20	604/56	383/40	1429/58	1134/54	119/12
EA9IE	2,029,302	86/34	520/45	207/44	1507/55	727/44	0/0

Top Ten—DX CW

Call	Score	160	80	40	20	15	10
P48GD (W2GD, op)	4,808,259	309/51	673/54	1116/57	961/57	1478/57	456/45
NP4A (NP4Z, op)	4,585,602	268/52	489/55	1163/57	1166/58	1257/56	303/51
PJ9J	3,678,819	290/49	404/51	739/54	865/57	1211/55	434/45
4M4A (K3UOC, op)	3,039,858	132/43	389/48	706/53	1317/57	955/55	107/25
XE2KJ (AA5B, op)	2,471,382	85/36	397/51	802/53	1027/55	868/54	14/9
EABRGT (OH2BH, op)	2,224,218	79/33	449/49	606/48	1497/57	551/45	1/1
K5KG/LU	2,062,341	1/1	80/28	302/51	809/56	1029/56	608/51
XE2GBD (N6EK, op)	1,333,116	80/27	278/44	564/51	572/53	442/47	13/6
OK1ALW	1,134,420	69/25	257/41	634/47	1058/57	26/15	0/0
N4RP/C6A	1,105,188	99/31	279/46	350/52	466/55	363/49	4/3

by 2k to win the 160-meter plaque. W5WU won the 80-meter plaque by scoring 29k. W6AQ (WA6OTU, op) was tops on 40 meters with 70k. On 20 meters, it was VO1SA with 643k. Fifteen-meter winner was West Coaster K6SVL. Ten-meter champ was KE5FI with 22k.

The multioperator class showed close competition again this year. In the multi-single class, K3KG and crew edged out KIYR by only 33k for the CW plaque. K3TUP with 1.7 megs won the phone plaque, beating 2nd place N3RS by 341k. The state of Texas boasts of both multi two-transmitter class winners for 1987. NR5M in STX took the CW plaque beating N3RG by 24k. K5RX in NTX with 2.8 megs won the phone plaque by beating K2TR with 1.9 megs. In the multi-unlimited class W3LPL and crew, last year's winner, won the CW crown easily again this year scoring 3.4 million points to outdistance runner up W3GM, who scored 1.8 million points. Last year's multi-two winner, K4XS and crew, tried multi-multi phone in '87 to the tune of 2.6 million points and won the plaque, beating the second place team,

NR5M, with 2.4 megs.

DX Highlights

The DX battles proved to be fierce again in '87 with only a few points separating the winners. P48GD (W2GD, op), with 4.8 million points, managed to edge out NP4A (NP4Z, op) with 4.5 megs to win the single op CW plaque. The phone plaque was a bit of a runaway with V31CV winning by 1.2 megs over second-place HR6A (WB5VZL, op).

The DX multiop crews had their work cut out for them with tough fights in all classes. In the multi-single class, the CW plaque winner was ZF2KE with 4.5 million points, edging out second place winner K5NA/KP2 with 4 megs. The phone plaque was won by NP4CC with 6.8 million points, beating runner-up PJ9J with 6.6 million. The CW multi-two plaque was won easily by XE2FU scoring 5 million points to beat second place winner GB4DX with 1 million. The multi-two phone plaque winner, K2SS/VP2V, scored 8.9 million points to outdistance the runner-up, JA1YWX, with 703k. The multi-multi

Top W/VE Single-Band Scores—Phone

160	20	15	10
K5UR	14,310	VO1SA	643,560
WB9HAD	12,126	K1RU	515,040
WA4SVO	8,910	AK1A	453,675
VE1BNN	6,216	W7WA	451,572
AB1A	5,883	N7TT	309,060
W0ZV	4,896	K4XS	226,368
W2FCR	3,840	W3YY	223,344
KF4HK	3,744	W4XJ	223,200
N8ATR	3,600	N7DF	158,013
K3UA	3,240	W8TWA	142,140
80			
W5WU	29,736	K6SVL	154,566
KW8N	17,820	K6VI	73,788
K59K	14,841	KE7C	62,436
KN5S	10,332	K3RV	59,427
N3AHF	10,209	K3KG	57,324
K3ND	6,930	WBSUDX	42,582
K7UR	4,836	K1RM	39,321
N9BUS	4,680	WA2QNW	31,785
KC8PQ	2,997	W5SO	31,455
K1HKI	2,808	K0ZX	26,905
40			
W6AQ (WA6OTU, op)	70,875	KE5FI	22,680
K45W	40,863	N4EJW	
K4RIG	31,980	(N4EJV, op)	12,288
K0DD	29,646	WA7KLK	6,006
K5KT/6	29,298	K9LA/5	3,192
K8XR	27,360	KD1U	1,764
K2DM	24,024	K1UO	1,260
W9CH	17,442	W3PWO	1,044
K8PO	13,662	WA6TKT	495
K1IK	12,420	KE2N	462
		KN8D	180

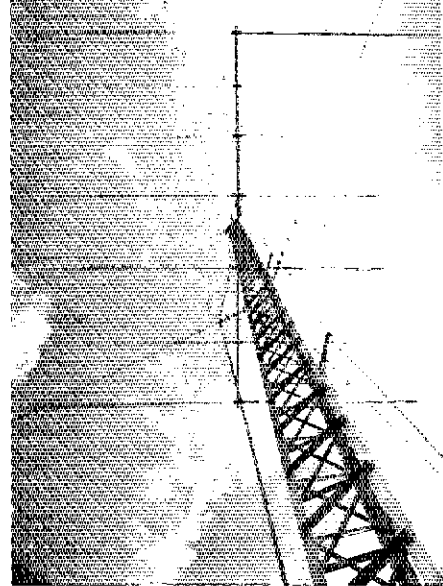
Top W/VE Single-Band Scores—CW

160	20	15	10
K1ZM	16,560	K1RM	336,900
K4TEA	8,760	K1RU	289,170
W1NG	6,156	K0RF	240,219
N4IN	4,608	K2SS	204,750
N4SU	4,500	W8LLD	191,241
K1IK	3,444	K9QVB	173,376
W0ZV	2,925	KJ9D	162,810
K3UA	2,652	W5FO	151,164
KJ9I	1,680	W0YK	139,300
VE3INQ	1,596	N6GG	126,488
		NG2X	112,690
80			
W1FV	150,696	W5VX	78,192
N4ZC	112,860	K1ZX	65,700
KC1Q	89,043	N6ND	43,746
KD2RD	69,540	N4VZ	43,680
K2SX	15,867	WB4TDH	42,411
WB2ABD	10,944	W5AC	
W4VQ	10,323	(WQ5C, op)	26,928
W0UO	9,660	WBSUDX	17,670
W6BIP	9,207	W8BAUB	15,141
KV8Q	8,505	KE7C	12,519
		N4TG	9,576
40			
K4XS	194,400		
WN4KKN	180,810		
W7EJ	170,718	K9LA/5	3,060
W0UA	137,592	WB7FDQ	2,520
KU2C	123,516	W5VLX	2,160
N2DT	102,837	KD1U	1,782
NE6I	95,178	W8JBM	
K2KIR	90,820	(K1W8N, op)	1,488
K5RR		N4JF	1,350
(WDSK, op)	48,675	WBAS/6	594
K4FU	43,281	K4RDU	462
		KE2N	210
		W4DRK	189

CW plaque winner was KH6XX (4.2m) and second place winner was 4N2E (1.5m). The multi-multi phone plaque fight was a bit closer. VP9AD (6.4m) squeezed out KH6XX (6.0m) for top honors.

Affiliated Club Competition

This year four clubs made it to the Unlimited Category. The Yankee Clipper Contest Club got it together and scored 42 million points to beat rival Frankford Radio Club by 2 million points for the gavel. The Potomac Valley Radio Club returns for another year as Medium Club Category winners with a combined score of 13 million



An interesting view of the tribander that Mike, K3UOC at 4M4A, used on both modes.

points to outdistance runner-up Mad River Radio Club by 4 million points. The Local Category was the closest race with the top four within 1.8 megs of each other. Last year's champs, The Overlook Mountain ARC, scored 4.1 million points to reclaim the gavel by edging out The Texas DX Society by only 400k.

There are a few changes in the Club Competition rules for next year. So, make sure you and your club check the rules for 1988 before making plans for Club Competition after Jan 1, 1988. Also, make sure your club sends in a list of eligible members to compete in the contest for your club and your ARRL Club Affiliation is up to date. See everyone again in 1988!

SOAPBOX

W/VE Phone

Thanks again for a fun weekend. CU next year (A13E). Wild, wild weekend on 10-meter phone! Biggest thrill was a band opening! (K1UO). Conditions not so hot—no propagation into Far East, Pacific and most of Russia (W1VY). Seventy-five-meter QRP is a lot of fun (AA2U). A 75-degree day outside in early March and no propagation inside the shack—what a bummer! (WA2QNW). Who scheduled this thing while it was 75 degrees outside in March in New Jersey? (N4BNC). After a great amount of years, I got back into DXing. Enjoyed the contest in spite of low number of hours active (W9LSD). I thought conditions were poor for the CW weekend, but these were the worst ever! (W3VT). Tower and beam blew down in a wind-storm during the night. I ended up putting up a multi-band doublet with high SWR and then the amplifier went out—a very sad weekend (W4YN). I did not even hear any Europe (W4AY). Happiness is... with all the whole US and Canada calling, being answered by TR8SA on the very first call (W4RKV). Had a lot of fun and I look forward to next year with better antennas and more power (WA5VAL). Worst general conditions I have ever seen for a contest; however BY1 on 75 meters made up for the lack of activity (WM5K). Just think of the fun we are going to have when the sunspots return! (KASPVB). I would like to thank all the DX stations who had the patience to listen for my 5-watt signal (W15W). Thanks for a good time! (W5KA). Thanks for a nice contest. I enjoyed it (W7FP). Noisy the first night, quiet the second. I worked all the DX I heard except P29PR (K7IDX). Too bad the band foiled Sunday—Lots of fun Saturday! (KE7C). The one that really threw me was LU2DVI/"Hotel." I didn't know if it was a phonetic "H" or if he was operating from a hotel! (N8BC). A very good contest. The DX stations

Top W/VE Multioperator Scores—Phone

Single Transmitter

Call	Score	160	80	40	20	15	10
K3TUP	1,742,004	36/28	110/56	119/51	1467/126	75/45	19/12
N3RS	1,399,380	30/28	120/63	128/57	945/108	135/61	47/15
K1CC	1,215,396	39/31	81/52	82/49	1059/106	98/49	19/7
WB2ULI	1,109,469	18/16	122/64	54/36	1174/105	67/33	4/3
N0XA	1,067,346	38/29	105/51	119/45	691/96	173/56	56/24

Two Transmitter

K5RX	2,811,240	57/39	159/64	302/69	927/116	744/86	91/37
K2TR	1,967,868	62/42	129/63	163/57	1378/113	152/52	34/15
N3RG	1,817,244	45/35	184/71	135/56	1145/108	154/63	53/22
AA1K	1,297,812	46/32	159/62	88/48	917/103	121/55	38/16
K9MWM	1,193,508	35/23	64/35	274/40	504/91	623/49	42/20

Unlimited

KX4S	2,647,296	56/39	153/67	274/77	1565/125	200/59	56/16
NR5M	2,427,696	36/25	125/57	379/65	921/110	601/75	137/36
W3LPL	2,297,061	69/41	312/77	183/58	1142/104	252/71	73/26
K5NA	1,590,177	51/35	94/53	86/44	1558/111	75/33	9/7
W3GM	1,571,328	41/34	107/56	140/57	1023/108	161/64	64/22

Top W/VE Multioperator Scores—CW

Single Transmitter

Call	Score	160	80	40	20	15	10
K3KG	1,464,300	41/33	165/53	343/64	884/81	172/53	22/16
K1YR	1,431,102	34/25	364/53	413/63	857/85	57/38	160/10
N3AD	1,283,130	33/24	204/59	466/64	867/83	36/27	8/6
K8AZ	1,144,746	26/20	210/58	310/61	843/77	55/31	18/14
KY1H	1,129,464	31/25	275/53	255/62	910/76	34/30	3/3

Two Transmitter

NR5M	2,598,114	25/20	173/55	722/79	1192/94	348/76	43/22
N3RG	2,574,000	54/34	527/65	680/79	1207/90	112/54	20/8
N3RS	2,535,456	48/34	429/70	617/80	1155/96	126/58	26/14
K2TR	2,191,140	87/41	290/58	527/76	1209/93	86/47	21/14
KS8S	1,715,112	42/31	299/73	321/73	897/90	81/52	13/9

Unlimited

W3LPL	3,418,959	86/40	597/74	887/86	1237/98	160/60	40/21
W3GM	1,870,914	54/37	374/64	469/69	895/88	96/51	25/17
K3OO	1,459,785	41/33	413/70	242/71	728/76	95/57	16/10

Top DX Multioperator Scores—Phone

Single Transmitter

Call	Score	160	80	40	20	15	10
NP4CC	6,863,148	359/53	866/57	1190/57	2538/58	2284/56	119/30
P1J9	6,675,840	342/49	1180/57	786/56	1882/58	2100/56	664/44
VP2MU	6,421,869	154/35	1345/57	1019/57	1973/58	2749/55	167/27
FJ0B	4,893,660	N/A	N/A	N/A	N/A	N/A	N/A
XE2EBE	4,045,734	406/51	914/55	481/53	1963/55	1013/53	74/11

Two Transmitter

K2SS/VP2V	8,912,835	371/49	1601/57	1923/58	2603/58	3318/56	255/17
JA1YWX	705,760	0/0	167/16	262/29	967/57	486/23	0/0
JA7YFB	611,433	0/0	172/19	294/30	818/56	373/18	0/0
JA7YAA	423,576	0/0	174/19	234/17	700/54	224/16	0/0
JG1ZKO	218,139	0/0	27/8	117/15	461/50	152/16	0/0

Unlimited

VP9AD	6,483,720	445/47	1636/56	1013/56	3583/58	936/53	17/14
KH6XJ	6,062,463	289/50	763/55	1761/58	1952/57	1695/53	438/20
I3MAU	889,371	22/15	320/39	93/23	1794/56	0/0	0/0
JA2YKA	809,580	0/0	170/22	251/26	1034/58	805/25	0/0
JA9YBA	471,096	0/0	89/16	207/22	948/55	210/15	0/0

Top DX Multioperator Scores—CW

Single Transmitter

Call	Score	160	80	40	20	15	10
ZF2KE	4,509,960	341/52	805/54	1138/56	1417/58	1286/57	110/18
K5NA/KP2	4,065,984	251/48	697/54	1076/55	903/56	1143/55	274/44
6JCO	3,520,803	155/38	522/52	1136/55	830/53	1334/55	17/30
XE2EBE	1,882,518	83/38	446/48	595/53	956/56	506/43	7/4
AH6AZ	1,062,465	1/1	106/33	261/46	714/54	709/51	44/8

Two Transmitter

XE2FU	5,546,205	416/34	878/55	1536/57	1853/58	1007/58	179/33
GB4DX	1,193,808	23/15	521/42	398/40	1265/58	54/21	0/0
JA7YAA	870,599	0/0	186/35	424/40	619/53	234/25	0/0
JA7YFB	585,888	0/0	123/19	432/36	649/52	232/29	0/0
OH1AF	165,048	1/1	37/14	89/23	464/50	7/4	0/0

Unlimited

KH6XX	4,275,177	207/45	547/49	1264/56	1384/58	1376/55	154/26
4N2E	1,544,400	83/28	430/44	704/49	1278/56	79/23	0/0
LZ1KWF	296,571	0/0	120/24	151/29	522/53	27/15	0/0

showed us US boys how good their operating skills are (K10F). Ten meters was completely dead (W0ACT). Next year I hope the contest doesn't coincide with the first warm sunny weekend of spring! (VE3GRA). Very tough to run SSB without an amplifier. Lots of action, however, and I was able to hunt and peck for 41 countries (VE3NBE). Fourteen MHz was the band (VE4RP). Only a handful of EU on 15. Can't wait for flux levels of 100 and up (K3TUP). A few Europeans on 15 or 40 would have put us over 1 million. I also climbed the 20-meter tower in freezing rain to repair a 160-meter dipole (WK6V).

W/VE CW

Gathering countries to fill out Golden Jubilee Award. Much fun (W2KTF). CATV and a bored 9-year-old son didn't make this an easy contest (K2SX). I would have spent more time on the air,

Special Plaques

Single Operator	Winner	Donor
W/VE Operator Combined Score	KC1F	National Contest Journal
W/VE Low Power, Combined Score	W2TZ	Rochester DX Assn
Africa, Combined Score	9Q5NW	N4NW, AL7EL and KC4NC
Atlantic Division (CW)	AA1K	K2NY Memorial—Salt City DX Assn
Fifth Call Area (CW)	N5RZ	Red Stick DX Assn
Great Lakes Division (Phone)	K8AZ	Livonia Amateur Radio Club
Great Lakes Division (CW)	W8UA	Livonia Amateur Radio Club
Japan (Phone)	JH7WKQ	Western Washington DX Club
Southeastern Division (Phone)	WZ4F	Robert Gartough, KB4UW Memorial
USSR All-Band (Phone)	UW0MF	A46BB, K1K1, KA6V, NE8Q, W2MIG, W3XU
USSR All-Band (CW)	RB5WA	AA6BB, K1K1, KB1FK, KA6V, NE8Q, SV0AA, W1FJ, W3XU, W5BOS, WB4TDH
Multioperator		
Caribbean Multi-Single (Phone)	NP4CC	W5MYA
Caribbean Multi-Single (CW)	ZF2KE	The YASME Foundation
Multi-Multi Combined World	KH6XX	W2PV Memorial—Schenectady ARA

DX Plaque Winners—Phone

Single Operator	Winner	Donor
World	V31CV	North Jersey DX Assn
Africa	EA9IE	Kenwood Employees Amateur Radio Club, WD6DJY
Asia	UW0MF	Acadiana DX Assn
Europe	OK1RI	Gerald Griffin, MD, W8MEP/6
North America	V31CV	Chod Harris, VP2ML
Oceania	WR6R/KH6	Oregon Chordal Corps with Doc Sayre, N7AVK
South America	4M4A	Kenwood Employees Amateur Radio Club, WD6DJY
1.8 MHz	GT1AOZ	Fred Race W8FR in Memory of DL1FF, A 160 Pioneer
3.5 MHz	CU2AK	Kenwood Employees Amateur Radio Club, WD6DJY
7 MHz	9Y4AA	Central Arizona DX Assn
14 MHz	KK9A/VP2V	Don Wallace W6AM Memorial, Central CA DX Club
21 MHz	PY5JW	Ray Molony W2NCL Memorial, Long Island DX Assn
28 MHz	LU1E (LU3AJW)	William Fulcher, N4WF, and Middle TN DX ARC
QRP	YX3A	Gerald Griffin, MD, W8MEP/6

Multioperator, Single Transmitter

World	NP4CC	Gloucester County ARC
Asia	JE2YRD	Kenwood Employees Amateur Radio Club, WD6DJY
Europe	I5NPH	Metro DX Club
North America	NP4CC	Nick G. Lash, K9KLR
Oceania	N1EE/KH6	Society of Midwest Contesters
South America	PJ9J	Kenwood Employees Amateur Radio Club, WD6DJY

Multioperator, Two Transmitter

World	K2SS/VP2V	Kenwood Employees Amateur Radio Club, WD6DJY
Asia	JA1YWX	Kenwood Employees Amateur Radio Club, WD6DJY
Europe	FF6LCJ	Tom Middleton, WB4CKY and Joyce Middleton, KB4OMW
North America	K2SS/VP2V	John Brosnahan, W0UN

Multioperator, Unlimited

World	VP9AD	H. J. "Hoppy" Hopkins, W4SHJ Memorial—Phil Sager, WB4FDT
Asia	JA2YKA	Kenwood Employees Amateur Radio Club, WD6DJY
Europe	I3MAU	ARRL
North America	VP9AD	Willamette Valley DX Club
Oceania	KH6XX	ARRL

W/VE Plaque Winners—Phone

Single Operator	Winner	Donor
All Band	K1AR	Frankford Radio Club
1.8 MHz	KSUR	Butch Greve, W9EWC, Memorial
3.5 MHz	W5WUMU	Lance Johnson Engineering, K0CS
7 MHz	W6AQ (WA6OTU)	David L. Thompson, K4JRB
14 MHz	VO1SA	Dayton Amateur Radio Assn
21 MHz	K6SVL	Kenwood Employees Amateur Radio Club, WD6DJY
28 MHz	KE5FI	Windsor Amateur Radio Club
QRP	K3WS	Woodbridge Wireless Club—N4MZJ and KZ2E

Multioperator

Single Transmitter	K3TUP	Kenwood Employees Amateur Radio Club, WD6DJY
Two Transmitter	K5RX	Kenwood Employees Amateur Radio Club, WD6DJY
Unlimited	KX4S	Western New York DX Assn—W2RR

DX Plaque Winners—CW

Single Operator	Winner	Donor
World	P40GD (W2GD)	North Jersey DX Assn
Africa	EABRCT (OH2BH)	ARRL
Asia	JE2YRD	Alamo DX Amigos
Europe	OK1ALW	Clarke V. Greene, K1JX
North America	NP4A (NP4Z)	W4KFC Memorial—PVRG
Oceania	VK9LT	Robert J. Halprin, K1XA
South America	P40GD (W2GD)	Herbert Hoover W6ZH Memorial
1.8 MHz	K8WW/VP9	Jim Dionne, K1MEM and Bill Poellnitz, K1MM
3.5 MHz	EA8RL	Mad River Radio Club
7 MHz	KP4FI	Dr. William R. Staples, W4SME
14 MHz	LU8DQ	Bencher, Inc.
21 MHz	HK1KYR	Southern New England DX Assn
28 MHz	HK3MAE	Douglas J. Woolley, N4PW
QRP	YX3A	Woodbridge Wireless Club—KZ2E and N4MZJ

Multioperator, Single Transmitter

World	ZF2KE	George Schultz, W0UA and John Brosnahan, W0UN
Africa	ZS1CT	ARRL
Asia	JA1YWX	Kenwood Employees Amateur Radio Club, WD6DJY
Europe	IK2DVG	ARRL
North America	ZF2KE	Kenwood Employees Amateur Radio Club, WD6DJY
Oceania	AH6AZ	ARRL

Multioperator, Two Transmitter

World	XE2FU	Tom Frenaye, K1K1
Asia	JA7YAA	Kenwood Employees Amateur Radio Club, WD6DJY
Europe	GB4DX	Kenwood Employees Amateur Radio Club, WD6DJY
North America	XE2FU	John C. Kanode, N4MM

Multioperator, Unlimited

World	KH6XX	H. Stephen Miller, N0SM
Asia	JA9YBA	Kenwood Employees Amateur Radio Club, WD6DJY
Europe	4N4E	Texas DX Society
Oceania	KH6XX	ARRL

W/VE Plaque Winners—CW

Single Operator	Winner	Donor
All Band	KM1H (KQ2M)	Frankford Radio Club
1.8 MHz	K1ZM	Billy Lunt, KR1R and Mike Kaczynski, W1OD
3.5 MHz	W1FV	Dayton Amateur Radio Assn
7 MHz	K4XS	Northern Arizona DX Assn
14 MHz	K1RM	Fox Cities ARC, W9ZL, Appleton, WI
21 MHz	W5FX	Carl Luetzelschwab, K9LA
28 MHz	K9LA/5	W5MYA
QRP	NN4Q	David Newkirk, AK7M
Multioperator		
Single Transmitter	K3KG	W9BW Memorial—Northern Illinois DX Assn
Two Transmitter	NR5M	Kenwood Employees Amateur Radio Club, WD6DJY
Unlimited	W3LPL	Colorado Contest Conspiracy

but four 12-week-old puppies take precedence! (KT2D). Eighty-meter QRP—a lot of fun (AA2U). Supporting the League and entering this contest are two things I take great pleasure in—regardless of sunspots! (NG2X). First contest from east of the Mississippi. Didn't even notice how bad 15 was because the low bands were like nothing I've ever heard! (KR0Y). Great contest, but no time for it (W3HDDH). In my 40 years of postwar DX contesting, I can't remember conditions as poor as they were (W3VT). Conditions very noisy

Top DX Single-Band Scores—Phone

160		20	
CT1AOZ	19,722	KK9A/VP2V	614,916
YU2TW	8,148	HC1HC	434,652
IV3PRK	2,820	AL7CQ	334,428
		I4JMY	325,728
		CT1BOP	276,210
80		K6GSS/KH6	265,050
CU2AK	121,176	YU3EO	255,954
EA7EL	71,070	I1ZEU	227,976
YV3BKC	66,096	IQ1EEW	
ZL2AFY	39,456	(I1EEW, op)	209,670
ZL1AAS	37,008	I0JBL	204,003
YU2CCY	26,826		
JM1BPP	16,686	15	
F6BDN	9,570	PY5IW	509,544
RO4OA	2,652	HC1OT	485,469
RB5DX	2,256	LU2E	
		(LU8DFM, op)	386,568
40		K5KGLU	378,252
9Y4AA	364,008	HK3MAE	313,785
I0WDX	95,739	NP4TB	258,876
LU4D	62,646	CX2AAL	239,064
JA2BAY	44,415	HK3JUH	224,694
4N4L		K2KTT/PJ7	219,102
(YU4OO, op)	34,524	CE4FXV	202,725
CT3DL	17,340		
JH1AEP	14,280	10	
JA0UMV	8,316	LU1E	
I4EWH	7,644	(LU3AJW, op)	231,348
VK2EKY	5,394	T12CCC	146,935
		LU5UL	94,374
		LU7UAI	16,533

Top DX Single-Band Scores—CW

160		20	
K8WW/VP9	87,363	LU8DQ	293,538
YV1OB	61,884	YU3EO	215,412
FG/W2KN	10,098	I3JSS	205,296
CT1AOZ	7,020	I1XPQ	201,096
G3XWZ/A	6,930	AL7CQ	169,974
YU2TW	6,408	YT3T	
JF1NZW	192	(YU3BQ, op)	157,410
RA3DX	168	4N2V	156,492
UO2GFB	75	YU1DX	139,878
JE1SPY	42	UA1ZO	131,040
		LUSUL	127,512
80		15	
EA8RL	106,950	HK1KYR	175,770
CU2AK	95,550	YV5IWT	141,426
OK3YX	56,244	9J2EZ	67,584
4N1W		KH6WT	28,167
(YU1SV, op)	44,088	VK4XA	28,044
HA3MY	43,440	JA9RPU	19,350
SP2JKC/3	29,484	WD5BJT/KP4	8,100
EA3AQS	28,728	YC3HCM	4,416
OK2BFN	21,522	J13GAB/3	4,140
FF6LCT		JA6YCU	
(F8HLC, op)	16,832	(JE6UWK, op)	3,836
HO4OA	14,790		
40		10	
KP4FI	353,115	HK3MAE	2,052
I0JX	203,115	JE1SLP	6
CX8BBH	141,426		
4N4L			
(YU4OO, op)	119,217		
YW7A			
(YV7QP, op)	105,924		
F6ARC	89,535		
JA7HMZ	83,202		
JA9NFO	82,767		
HA9RE	67,536		
XE2AHQ	66,621		

DX Continental Winners—Phone

Single Operator	Africa	Asia	Europe	North America	Oceania	South America
All Band	EA9IE	UW0MF	OK1RI	V31CV	WR6R/KH6	4M4A
160	—	—	CT1AOZ	—	—	—
80	—	JM1BPP	CU2AK	—	ZL2AFY	YV3BKC
40	CT3DL	JA2BAY	I0WDX	—	VK2EKY	9Y4AA
20	TR8SA	JH7LRS	I4JMY	KK9A/VP2V	K6GSS/KH6	HC1HC
15	—	JR7QKR	CU2CE	NP4TB	VK9NT/2	PY5IW
10	—	—	—	T12CCC	—	LU1E (LU3AJW)
QRP	—	JA2JSF	FD1BEG	—	VK4UR	YX3A
Multioperator						
Single TX	—	JE2YRD	I5NPH	NP4CC	N1EE/KH6	PJ9J
Two TX	—	JA1YWY	FF6LCT	K2SS/VP2V	—	—
Unlimited	—	JA2YKA	I3MAU	VP9AD	KH6XX	—

DX Continental Winners—CW

Single Operator	Africa	Asia	Europe	North America	Oceania	South America
All Band	EA8RCT	JE2YRD	OK1ALW	NP4A (NP4Z)	VK9LT	P40GD (W2GD)
160	—	JF1NZW	CT1AOZ	K8WW/VP9	—	YV1OB
80	EA8RL	UA0ZCQ	CU2AK	—	—	—
40	—	JA7HMZ	I0JX	KP4FI	AH6EK	CX8BBH
20	EA8BCJ	JA3YCK (JH4RHF)	YU3EO	AL7CQ	FO5JP	LU8DQ
15	9J2EZ	JA9RPU	EA7AZA	WD5BJT/KP4	KH6WT	HK1KYR
10	—	JE1SLP	—	—	—	HK3MAE
QRP	EA8BIE	4X8IF	PA0ADT	—	VK5AGX	YX3A
Multioperator						
Single TX	ZS1CT	JA1YWY	DF0RK	ZF2KE	AH6AZ	—
Two TX	—	JA7YAA	GB4DX	XE2FU	—	—
Unlimited	—	JA9YBA	4N2E	—	—	KH6XX

W/VE Low Power Top Ten (< 150 W)

Phone	CW	Score
W2TZ	VO1MP	618,000
K8NZ	N0DH	435,969
NSAW	W2TZ	371,742
WB3FYL	N5AW	315,468
KA2AJT	W6JTI	225,924
KQ9L	VE1DH	178,416
W0GOR	KR8Y	163,170
W7YAO	WA1FCN	161,640
KB3YJ	K9UIY	157,950
WD8EKO	K9ALP	151,200

W/VE QRP Top Ten

Phone	CW	Score
K3WS	NN4Q	112,791
KD6PY	W8VSK	81,753
N8OJ	K1CGJ	72,765
KB7VD	KD6PY	58,032
WA8AGH	KW6O	54,900
AD7U	N1AFC	52,437
W6YVK	K4JM	51,273
N8CQA	W8IQ	42,612
KH6CP/1	WB2ENW	41,850
WA7TUX	AC8W	36,738

Top DX QRP Scores—Phone

Call	Score	Call	Score
YX3A	86,142	FD1BEG	4,896
YV2NY	70,560	JH7XGN	2,520
VK4UR	52,182	EA6SK	1,332
JA2JSF	27,219	PA3DWA	540
4X6IF	5,382	JR8UKI	306

Top DX QRP Scores—CW

Call	Score	Call	Score
YX3A	561,120	OK1DZD	11,136
EA8BIE	72,891	YU1LM	10,170
4X6IF	26,085	JA6GCE	8,640
PA0ADT	13,176	IS0LYN	7,533
SP5CJQ	11,877	G3XWZ/A	6,930

one (W0KEA). I never thought I would enjoy contesting. Twenty meters was blood and guts, scratch and claw...but I loved it! (KD0EE). Contest provides a nice edge toward the DXCC Golden Jubilee Award—86 countries by the end of the contest! (VE3NBE).

DX CW

I enjoyed the contest, the first one made with this temporary call in the Ivory Coast (TU4CG). Dead



Takeo, JR1GSE, was there in the JA pileups on phone.



Carl, 6Y5V's operator, AI6V, finished third in the phone contest.

Overall Division Leaders

Phone	Division	CW
VO1SA	Canada	VO1MP
K73M	Atlantic	AA1K
W9RE	Central	W9RE
KC0CU	Dakota	K0SR
W4XJ	Delta	W4XJ
K8AZ	Great Lakes	W8UA
K12M	Hudson	N2LT
K4VX/0 (KM9P)	Midwest	W0WP
K1AR	New England	KM1H (KQ2M)
NN7L	Northwestern	NN7L
K16CG	Pacific	W6JTI
KE9A	Roanoke	W3VT
N2IC/0	Rocky Mountain	K0RF
W24F	Southeastern	WX4G
KM6B	Southwestern	K6NA
N5JB	West Gulf	N5RZ

Low-Power Division Leaders (<150 W)

Phone	Division	CW
VO2WL (VO2AM)	Canada	VO1MP
W2TZ	Atlantic	W2TZ
KQ9L	Central	K9UIY
AC0W	Dakota	KA0MX
K4JHT	Delta	K4OAO
K8NZ	Great Lakes	KRBY
K3FNW	Hudson	W2HLI
WB0YJT	Midwest	AK0M
W1KRS	New England	WA1FCN
W7YAO	Northwestern	W7YAO
WD8EKO	Pacific	W6JTI
W8WVM	Roanoke	WA4WKY
W0GOR	Rocky Mountain	NC5O
N4JF	Southeastern	N0DH
W6CN	Southwestern	NG7S
N5AW	West Gulf	N5AW

QRP Division Leaders

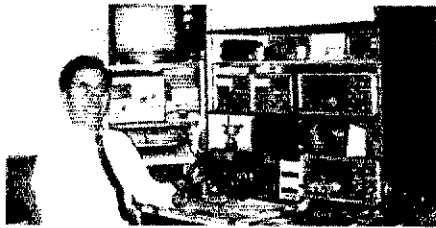
Phone	Division	CW
—	Canada	VE1NH
K3WS	Atlantic	WB2YOF
AD7U	Central	K9EIJ
—	Dakota	—
—	Delta	NU4B
WA8AGH	Great Lakes	WBVSK
AA2U	Hudson	WB2ENW
WA0LHK	Midwest	K0GT
KH6CP/1	New England	K1CGJ
KB7VD	Northwestern	K7SS
KD6PY	Pacific	KD6PY
—	Roanoke	NN4Q
WA7TUX	Rocky Mountain	K7JP
KB4GID	Southeastern	KB4GID
—	Southwestern	KW6O
W15W	West Gulf	WA9FWO

band conditions from 0600 to 1300 daily greatly reduced the score (Q95NW). Conditions were poor (HZ1HZ). I enjoyed this contest very much! I will enjoy every year as long as possible (JA2UOT). I had a very good time during the contest, I'd like to participate in the contest and work more stations next year (JH4UYB). Took part from JD1 last year, but this year from Japan. Better conditions from JA on 21 MHz than last year! (JM1LRQ). First time I tried my new indoor antenna on 20 meters. Was very surprised how it worked. A very enjoyable contest. See you in the next! (DL1MAY). Nice contest. I hope to work it again in 1988 (EA7AAW). Great Fun! (FD1JTL). Conditions can only get better next time (OH7RS). Thanks for a nice contest (OH6CD). I enjoyed the contest very much (ON6LO). Nice to work so many Ws, especially at 3.5 MHz (PA3BNT). Thanks for a very nice contest (PA3ACC). Not so much time to enjoy the whole contest, but still worth to join it for a few (PA3DUA). Good sportsmanship, gentleman-like, and a friendly contest! (PA0GG). Aurora spoiled the conditions and only those with BIG antennas

heard me (SM1CNS). In the first night propagation was not good. Why so few stations from W5 and W0 lands? (SP2JKC/3).

DX Phone

TVI in my neighbor's VCR did not let me work all



JA1ASO at the operating position of his neat shack.

the time I planned to (ED4DPK). No propagation in 21 and 28 MHz (EA6SK). Very pleased to be back in the contest after a 10-year break! Hope to be better next year, with a complete antenna! (F6BDN). It was a great experience and I learned a lot (G4ZXC). Calling CQ and calling CQ contest for hours and just got two short openings! (Iv3PRK). Thanks for the contest. The conditions were strange. I heard almost every station 59, but they couldn't hear me! (OH3GD). Nice contest. Hope to see you next year (PA3EOB). Good contest (PA3DWA). Thanks for a nice contest, but the aurora disturbed the working (SM3COL). Not so funny. Too much QRM/QRN, but will enjoy the test again next year (SM7TV).

Feedback

Please note the following correction to 1986 October QST results:

On CW, KJ3L was listed as an all-band entry; he should have been single-band 40.

Scores

The scores are listed by mode—phone and CW. For both WVE and DX scores, single operators are listed first, followed by multioperator single-transmitter, multioperator two-transmitter, then multioperator unlimited. WVE single transmitter scores are broken down by call area and ARRL Section. WVE multi-single scores are broken down by call area only. All WVE multiop two-transmitter and unlimited scores are grouped together in descending order by score. DX single-op and multiop scores are broken down by continent and country. Under each ARRL Section (and country for DX), single-op scores are listed in descending order by category. All-band scores are listed first, followed by 160, 80, 40, 20, 15, and 10-meter single-band scores. Each line score lists the following information: call, score, QSOs, multipliers, power output used (A = 5 W or less; B = 6-150 W; C = more than 150 W). The first station in each category (other than all-band) has a designator following the power indicator. Single-band entries are indicated by 160, 80, 40, 20, 15 and 10. For example, in Connecticut, the top all-band phone scorer is ND1X. The top low-power (150 W or less) entrant is KB1WR. KB1H has the top 40-meter single-band score, K1RU has the top 20-meter single-band score, and K1RM has the top 15-meter single-band score. KH6CP/1 has the top QRP score.

WVE Phone

1

Connecticut

ND1X	488,585	801-195-C
W1QK	350,780	790-148-C
K1WA	259,290	430-201-C
K1IN	121,125	323-125-C
W1LWV	71,640	199-120-C
K1EM	42,240	160-88-C
K1BV	38,960	222-80-C
W1DD	30,000	100-100-C
KH6CP/1	6,505	63-45-A
N1CC	6,496	58-48-C
KB1WR	6,384	56-38-B
K1RX	3,024	42-24-C
W1BWS	2,175	29-25-C
AA2Z	1,920	32-20-C
KB1H	8,547	77-37-C-40
K1RU	615,040	1480-175-C-20
K1EF	53,760	256-70-C-20
K1YXG	43,880	215-68-C-20
AB1U	4,116	49-28-C-20
K1BN0	2,232	31-24-C-20
KB1XD	864	18-16-B-20
K1RM	39,321	257-51-C-15

Eastern Massachusetts

K5ZD/1	824,460	1057-260-C
K1VR	707,400	1048-225-C
N1AU	292,624	554-152-C
A13E	123,540	290-142-C

W1FQ	112,548	332-113-C
K1CLN	98,553	247-133-C
W1GIH	93,918	302-103-C
NB1B	84,233	189-117-C
K1HBM	47,700	159-100-C
KA1DWX	40,545	158-85-C
WB1GEX	17,180	110-62-B
KA1MI	7,830	58-45-B
W1FV	7,011	67-41-C
KC1BC	4,992	52-32-B
W1PLJ	3,741	43-29-B
K1T10	2,520	30-28-B
AB1A	5,883	53-37-C-160
K8PO	13,662	98-48-C-40
W1KRS	42,900	220-85-B-20

Maine

W1MGP	4,880	40-39-B
K1U0	1,260	30-14-C-10

New Hampshire

K1AR	1,584,375	1625-325-C
K1DG	720,114	934-257-C
W210L	33,654	142-79-B
KA1LMR	18,648	84-74-B
AK1A	453,675	1315-115-C-20
W1VY	24,426	118-69-C-20
KE1E	12,084	109-38-B-20
W2UP	11,466	91-42-B-20

Rhode Island

K1VSIJ	239,598	458-174-C
K1U	97,983	227-143-C

W1RFD	3,999	43-31-B
N1EIA	36	4-3-B

Vermont

KD2EN/1	69,185	265-87-C
W1KQ	37,587	187-67-C
W3SDX	25,530	115-74-B
K1HK1	2,808	36-26-C-40
K1JK	12,420	90-45-C-80

Western Massachusetts

KC1F	1,492,542	1758-283-C
K21M	1,350	30-15-B

2

Eastern New York		
K1ZM	1,482,860	1548-315-C
KY2J	492,228	726-226-C
N2AIF	86,394	238-121-C
W2GHQ	37,884	164-77-B
WA3AFS	26,964	107-84-C
K2IBW	124,425	525-79-C-20
KC2QF	6,930	70-33-C-15

NYC-Long Island

WA2LQ	172,326	373-154-C
KD2ZT	134,820	321-140-C
NS2W	12,045	73-55-B
N2KA	11,076	71-52-C
W2GGE	6,588	61-36-C
K2RY1	4,284	51-28-B
W2GKZ	2,790	35-26-C

N2GYN	2,640	40-22-B
KA2RF1	36	4-3-B-80
K2MFY	47,186	228-69-B-20
WA2OVG	5,260	50-35-C-20
AC2P	2,520	35-24-C-20
WB2AMU	1,767	31-19-B-15
N2GXY	231	11-7-B-15
KE2N	462	22-7-C-10

Northern New Jersey

N2LT	1,070,118	1341-266-C
W1GD	208,190	385-174-C
K3FNV	62,370	198-105-B
W2PHW	45,108	178-84-C
WB2HJW	32,190	145-74-C
W9NTU	18,500	100-55-B
WA2UDT	12,012	81-44-B
KD2RC	11,592	84-46-B
KT2D	11,520	80-46-B
AA2U	5,406	53-34-A
WA2ASO	4,998	49-34-B
W2FCR	3,840	40-32-C-160
N3AHF	10,209	83-41-C-30
K2DM	24,024	143-56-C-40
KA2YCV	3,375	45-26-B-20
KY2P	108	9-4-B-20
WA2QNW	31,785	163-65-C-15
K4BNC	7,227	73-33-C-15
K2PF	3,243	47-23-C-15

Southern New Jersey

N2MM	766,422	1026-249-C
N2RM	232,965	501-155-C

K2FL	183,762	360-166-C
N2VW	112,518	266-141-C
K2OWE	106,272	288-123-C
W2PAU	89,310	229-130-C
W2FGY	51,360	214-80-C
K2OSV	35,520	149-80-C
K2L00	9,360	65-48-B
W2FA	2,664	37-24-B
KA2KFO	960	20-16-B
K8XR	27,980	160-57-C-40
WA2VYA	27	3-3-B-40
K2PS	17,700	118-60-B-20
W2GTN	900	20-15-B-15

Western New York

W2TZ	259,182	462-107-B
WB2ABD	190,836	331-152-C
KA2AJT	150,837	367-137-B
W2FXA	139,898	318-137-C
W2FUI	31,416	154-68-C
KB2SE	31,050	138-75-C
KK2B	16,380	91-60-B
W2FR	8,336	48-44-C
W2OMV	1,173	23-17-B
WB2TKD	8,550	75-38-B-20

3

Delaware	
W3XU	618,975- 817-225-C
W3NX	148,349- 303-161-C

Eastern Pennsylvania

Table listing Pennsylvania counties and their corresponding numbers, including KT3M, W3BGN, VB3GAC, etc.

Southern Florida

Table listing Florida counties and their corresponding numbers, including KRUNP, WK4F, KA4UBC, etc.

Tennessee

Table listing Tennessee counties and their corresponding numbers, including KC3Z, K4JHT, W4ZVZ, etc.

Maryland-DC

Table listing Maryland and DC counties and their corresponding numbers, including K3ZJ, W3UJ, K3WS, etc.

Western Pennsylvania

Table listing Pennsylvania counties and their corresponding numbers, including WB3KOE, N3DHC, K3UA, etc.

Alabama

Table listing Alabama counties and their corresponding numbers, including W24F, N4JF, KE4BM, etc.

Georgia

Table listing Georgia counties and their corresponding numbers, including NQ4I, N4VZ, W4DXI, etc.

North Carolina

Table listing North Carolina counties and their corresponding numbers, including NQ4I, N4VZ, W4DXI, etc.

Kentucky

Table listing Kentucky counties and their corresponding numbers, including WBAFOT, N4QGW, etc.

South Carolina

Table listing South Carolina counties and their corresponding numbers, including W3WV, W4FCJ, etc.

Northern Florida

Table listing Florida counties and their corresponding numbers, including W4WIKO, K4HRL, etc.

Oklahoma

Table listing Oklahoma counties and their corresponding numbers, including K5GL, W1SW, etc.

South Texas

Table listing Texas counties and their corresponding numbers, including WQ5Y, K5DB, etc.

Table listing Texas counties and their corresponding numbers, including NSJ, W5RJA, W5KCR, etc.

West Texas

Table listing Texas counties and their corresponding numbers, including W5E, W5SUDX, etc.

East Bay

Table listing Texas counties and their corresponding numbers, including K6SJK, W1EGG, etc.

Los Angeles

Table listing California counties and their corresponding numbers, including K6M5E, K6EID, etc.

Utah

Table listing Utah counties and their corresponding numbers, including W7HS, KE7KF, etc.

Washington

Table listing Washington counties and their corresponding numbers, including N7NL, N7N7, etc.

Orange

Table listing California counties and their corresponding numbers, including W6TMD, W1BC, etc.

Santa Clara Valley

Table listing California counties and their corresponding numbers, including N6ADI, K6BJ, etc.

San Diego

Table listing California counties and their corresponding numbers, including K6BGG, K6BIT, etc.

San Joaquin Valley

Table listing California counties and their corresponding numbers, including W6MKB, K6NA, etc.

San Francisco

Table listing California counties and their corresponding numbers, including N6QJ, W6W8D, etc.

San Joaquin Valley

Table listing California counties and their corresponding numbers, including W6GPF, K6BIM, etc.

Sacramento Valley

Table listing California counties and their corresponding numbers, including W6REC, etc.

Table listing California counties and their corresponding numbers, including K6V8, K6DR, N6JM, etc.

Arizona

Table listing Arizona counties and their corresponding numbers, including K6CV, K6C7CE, etc.

Idaho

Table listing Idaho counties and their corresponding numbers, including K4YT, K6RN, etc.

Montana

Table listing Montana counties and their corresponding numbers, including K7LTV, K6ST, etc.

Nevada

Table listing Nevada counties and their corresponding numbers, including W6UTM, W7UJ, etc.

Oregon

Table listing Oregon counties and their corresponding numbers, including K5MM7, N5TP, etc.

Wisconsin

Table listing Wisconsin counties and their corresponding numbers, including K6CAN, W6QOP, etc.

Colorado

Table listing Colorado counties and their corresponding numbers, including N2ICB, K6UK, etc.

Iowa

Table listing Iowa counties and their corresponding numbers, including K6FH, W6EJ, etc.

Michigan

Table listing Michigan counties and their corresponding numbers, including N6CXX, K6CV, etc.

Ohio

Table listing Ohio counties and their corresponding numbers, including K6AZ, K6N2, etc.

Kansas

Table listing Kansas counties and their corresponding numbers, including W6BYJ, K6BG, etc.

Minnesota

Table listing Minnesota counties and their corresponding numbers, including AC6W, W6LP, etc.

Table listing Minnesota counties and their corresponding numbers, including W6CQG, W6BE, K6MR, etc.

West Virginia

Table listing West Virginia counties and their corresponding numbers, including W6WVM, W6VEN, etc.

Illinois

Table listing Illinois counties and their corresponding numbers, including K6BOL, K6CUM, etc.

Indiana

Table listing Indiana counties and their corresponding numbers, including W6RE, W6SHAD, etc.

Wisconsin

Table listing Wisconsin counties and their corresponding numbers, including K6CAN, W6QOP, etc.

Colorado

Table listing Colorado counties and their corresponding numbers, including N2ICB, K6UK, etc.

Iowa

Table listing Iowa counties and their corresponding numbers, including K6FH, W6EJ, etc.

Michigan

Table listing Michigan counties and their corresponding numbers, including N6CXX, K6CV, etc.

Ohio

Table listing Ohio counties and their corresponding numbers, including K6AZ, K6N2, etc.

Kansas

Table listing Kansas counties and their corresponding numbers, including W6BYJ, K6BG, etc.

Minnesota

Table listing Minnesota counties and their corresponding numbers, including AC6W, W6LP, etc.

Wisconsin

Table listing Wisconsin counties and their corresponding numbers, including K6CAN, W6QOP, etc.

Colorado

Table listing Colorado counties and their corresponding numbers, including N2ICB, K6UK, etc.

Iowa

Table listing Iowa counties and their corresponding numbers, including K6FH, W6EJ, etc.

Michigan

Table listing Michigan counties and their corresponding numbers, including N6CXX, K6CV, etc.

Ohio

Table listing Ohio counties and their corresponding numbers, including K6AZ, K6N2, etc.

Kansas

Table listing Kansas counties and their corresponding numbers, including W6BYJ, K6BG, etc.

Minnesota

Table listing Minnesota counties and their corresponding numbers, including AC6W, W6LP, etc.

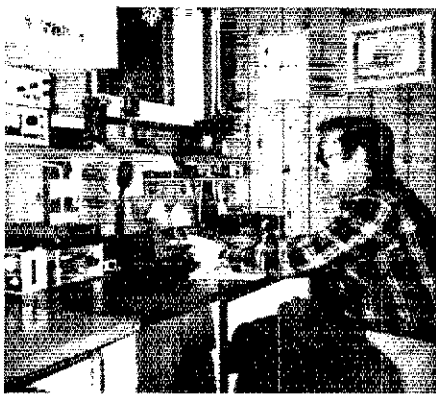
Table of radio call letters and frequencies for various states and territories, including Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Table of radio call letters and frequencies for various states and territories, including Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Table of radio call letters and frequencies for various states and territories, including Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Table of radio call letters and frequencies for various states and territories, including Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Table of radio call letters and frequencies for various states and territories, including Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.



Ron, SMØBTS, looking for multipliers in the contest.



George, K5KG in LU land, won seventh place on CW.



Paco, EA7XC, takes a break from his CW operation to pose for a photo.

K3ZLK	4,608	48	32-B	South Carolina	N4QS	137,160	381-120-B	KD6PY	58,032	248	78-A	W7YF	17,523	177	33-B					
K3ND	4,563	39	39-C	W3VT	907,776	1182-256-C	NG6N	54,288	232	78-C	K7LXC	16,104	122	44-C	K7LXC	16,104	122	44-C		
K3CQ	4,320	48	30-C	W6OKO/4	84,966	238-119-C	NS6V	47,817	253	63-C	W7KT	13,932	129	36-C	W7KT	13,932	129	36-C		
K3VD	2,736	36	24-A	W2FCC	7,866	69	38-C	W6STKT	30,192	136	74-C	W7QGN	13,320	120	37-C	W7QGN	13,320	120	37-C	
W1BET	2,415	35	23-C	Southern Florida	W5AW	68,236	211	82-C	K7SS	10,890	121	30-B	K7SS	9,435	85	37-A	K7SS	9,435	85	37-A
W3ANNA	3,354	43	26-B	NØDH	435,969	723-201-B	W5AFWO	13,617	89	51-A	KA7PDM	4,794	94	17-B	KA7PDM	4,794	94	17-B		
N3C2B	3,888	54	24-B	WD4AHZ	148,742	354-141-B	K5KJ	9,720	81	40-B	K7JUR	3,843	81	21-C	K7JUR	3,843	81	21-C		
Maryland-DC				W4YX	74,250	225-110-C	NG5A	1,584	24	22-B	W7DRA	5,616	78	24-C	W7DRA	5,616	78	24-C		
KC8G/3	1,053,360	1520	231-C	WD4JNS	44,589	167	89-B	K5MZQ	48,675	295	55-C	KD6XY	1,033	19	19-B	NTTT	82,008	408	67-C	
K3ZZ	552,872	908	203-C	K5JTI/4	26,487	109	81-C	W5FO	14,490	115	42-B	KG6AM	270	10	9-C	W7VIH	12,519	107	5-B	
W3USS (W9LT/4, op)	548,046	918	199-C	KBUNP	19,006	99	64-B	W5BO	9,450	90	35-C	W6ATO	9,396	108	29-C	W7LVI	8,673	79	29-C	
W3UJ	505,472	688	148-C	W5DB/4	7,920	55	48-C	N15M	151,164	663	76-C	San Diego	661,365	1035	213-C					
W3AZ	240,624	557	144-C	N4IN	2,448	34	24-C	N5LA	69,810	358	65-C	K6NA	54,900	244	75-A					
K3AV	87,009	299	97-C	W4OO	4,608	48	32-C	K9LA/5	31,266	193	64-B	K6WB	28,764	141	68-C					
K23B	66,435	215	103-C	K4JRF	16,236	132	41-C	N5M	3,060	51	20-C	A6EE	20,475	105	65-C					
W3GN	66,000	200	110-C	K1ZX	4,452	53	28-C	K1ZX	65,700	300	73-C	K6MC	252	14	6-B					
K3SA	42,240	176	80-B	WB4TDH	65,700	300	73-C	K1ZX	42,411	211	67-C	N6ADK	19,257	131	49-C					
K3NS	26,680	128	70-B	Tennessee				N5OK	44,388	137	108-C	N6DZ	43,746	317	46-C	Wyoming				
W3TFA	9,792	68	48-B					South Texas				N6ND				NS7Z	2,379	61	13-C	
W3APL	714	17	14-C	W4XJ	691,020	1047-220-C	K5DB	92,391	299	103-C					8					
N4RR	106,398	514	69-C	W4YX	247,080	710-116-C	NSJJ	67,404	274	82-C	San Francisco				Michigan					
W3HW	49,950	370	45-C	K4OAQ	103,887	291-118-C	N5HB	34,410	155	74-B	W6JTI	225,924	562	134-B	W8JIA	775,341	1181	217-C		
W5TLX	2,544	53	16-B	K2ZZ	30,375	135	75-B	W5KCR	34,056	172	66-C	W6WV	102,660	295	116-C	K8CC	546,840	840	217-C	
W4JEE	1,462	26	19-C	W5RUH	7,686	61	42-C	N5DEE	22,725	101	75-C	K6ZUR	64,206	261	82-C	W8XQ	81,753	229	119-B	
Western Pennsylvania				U4UB	6,840	60	38-A	W5HIF	18,315	111	55-B	K6ANP	42,660	158	90-C	W8TJQ	40,482	173	78-B	
K3TUP (K6WY, op)	1,258,814	1427	294-C	NA4TG	9,576	84	38-C	NS4VF	81,180	492	55-C	N6OJ	26,082	167	92-C	AC5W	36,738	157	78-A	
K3LR	1,057,468	1313	271-C	Virginia				W5VX	78,192	362	72-C	W6WJ	1,584	37	14-C	K8CV	26,130	130	67-C	
W3HDR	20,904	104	67-C	N4HB	155,828	398	131-C	W5AC (WQSC, op)	26,928	187	48-C	W6BIP	93,207	393	33-C	N6CQA	25,047	121	69-C	
W3FGS	3,654	42	29-B	W4YE	146,688	382	128-C	West Texas				W6D	1,854	37	14-C	W8JRK	22,275	135	69-B	
K3HGR	398	12	11-B	N4RA	71,688	232	103-C	KD5IA	18,837	161	39-C	W6JAC	132,135	383	115-C	K8DQ	18,480	110	56-A	
K3JJA	2,652	34	26-C	K4OD	65,751	217	101-C	W5FE	68,075	427	75-C	K6GJM	40,194	154	67-C	W8FEM	11,322	74	51-B	
AD8J/3	65,340	396	55-C	W4AWKY	82,115	205	101-B	W5UDX	17,670	155	38-C	W6BYH	25,344	128	66-C	W8QBG	8,742	62	47-B	
4				NO05	60,066	213	94-C	W5VLX	2,160	40	18-C	Sacramento Valley				W8TWA	70,494	379	62-C	
Alabama				W4XD	58,856	184	103-C					K8CWG	3,630	68	22-B	W8CUP	3,630	68	22-B	
KR4F	221,517	453	163-C	K4JM	51,273	211	81-A	6				W8CUP				Ohio				
WB4AKE	54,435	181	95-C	K4BAM	48,936	193	84-C	East Bay				W8RWS	340,261	673	119-C	W8RWS	340,261	673	119-C	
W24FE	29,116	132	71-C	K4RFF	45,264	184	82-B	K6ATV	87,000	290	100-B	K8RY	163,170	370	147-B	K8RY	163,170	370	147-B	
K4MG	27,675	123	75-C	N4MM	38,220	140	91-C	W6EG	30,846	194	53-C	K9ALP	151,200	360	140-B	K9ALP	151,200	360	140-B	
K5RY	741	19	13-B	N3JT	27,186	187	46-C	K6CSL	13,530	110	41-C	KJ2T	141,174	241	138-C	KJ2T	141,174	241	138-C	
N4JF	1,350	25	18-B	KA7RLV	22,326	122	61-B	W6BFDQ	11,169	73	51-C	N8DB	118,287	337	117-C	N8DB	118,287	337	117-C	
Georgia				W6TFM/4	17,700	100	59-C	W6BSY	24,804	156	53-C	K8MNG	47,385	195	81-C	K8MNG	47,385	195	81-C	
WV4G	1,164,282	1459	266-C	W4UG	8,040	67	40-B	Los Angeles				W8IQ	42,612	212	67-C	W8IQ	42,612	212	67-C	
K4BAI	413,055	685	201-C	W4KMS	4,200	50	28-C	W8AE	231,255	571	135-C	NS7S	52,398	261	82-B	NS7S	52,398	261	82-B	
KX4R	163,620	404	135-C	N4ZH	2,622	38	23-C	N6IC	203,190	521	130-C	W7YU	42,042	154	91-C	W7YU	42,042	154	91-C	
W1UA	79,875	213	125-C	KJ4TK	900	20	15-B	N6DKP	140,238	371	128-C	W8JUC	2,400	40	20-C	W8JUC	2,400	40	20-C	
W4DXI	70,596	212	111-C	NA4D	7,242	71	34-C	K6EID	113,904	339	112-C	W7LWU	243	9	9-B	W7LWU	243	9	9-B	
N8LM	65,552	223	99-C	N4MO	107,334	534	67-C	N6DG	90,072	278	108-C	W7NWL	45	5	3-A	W7NWL	45	5	3-A	
W8ZFL	62,988	181	116-C	K4RDU	462	14	11-C	W6EVI	85,554	291	98-C	K7SP	231	11	7-C	K7SP	231	11	7-C	
W8CNL	19,261	93	69-B	5				N6EY	70,218	249	94-C	W7AYY	8,112	104	26-C	W7AYY	8,112	104	26-C	
KB4GID	17,751	97	61-A	Arkansas				A1EZ	49,200	205	80-C	W7FKL	2,760	46	20-C	W7FKL	2,760	46	20-C	
K4PVM	2,918	36	27-B	K5FUV	7,548	68	37-C	W8ABW	46,842	211	74-C	W8FDDQ	2,520	40	21-C	W8FDDQ	2,520	40	21-C	
K4TEA	8,760	73	40-C	W5EJY	7,128	66	36-C	N6AA	32,438	158	68-C	Idaho				N7HJM	107,520	320	112-B	
WU4E	6,264	58	36-B	Louisiana				N6AW	30,303	258	38-C	K8RN	57,240	212	90-C	K8RN	57,240	212	90-C	
WN4KKN	180,810	735	82-C	NT5G	98,952	266	124-B	N6BEP	22,770	138	55-B	KA7T	6,780	113	20-C	KA7T	6,780	113	20-C	
W4JFL	15,990	130	41-B	W5OB	61,779	208	99-C	W6ES	17,588	122	48-C	Montana				K8ST	99,782	336	99-C	
N4NX	13,158	102	43-C	W5CP	61,200	200	102-B	W6MFC	17,010	126	45-C	W7KZK	41,118	178	77-B	W7KZK	41,118	178	77-B	
W9KTB/4	2,091	41	17-B	NS0PP	9,256	64	43-B	K6EV	12,938	77	56-C	K7ABV	2,508	44	19-C	K7ABV	2,508	44	19-C	
N4VZ	43,680	208	70-C	N0SW	1,020	20	17-A	K6GO	10,836	84	43-C	W6ALQ	2,820	47	20-C	W6ALQ	2,820	47	20-C	
Kentucky				Mississippi				N6K5A	8,991	111	27-B	Nevada								
N4XM	256,788	479	178-C	K5MKG	198,768	404	164-C	N6KA	8,874	87	34-C	W7UTM	91,800	340	90-C	W7UTM	91,800	340	90-C	
N1WRI/4	48,024	184	87-B	K5SVR	93,225	275	113-C	K6BSAS/6	4,620	70	22-B	K5MM7/6	430,443	849	168-C	K5MM7/6	430,443	849	168-C	
WB4FOT	33,058	129	53-C	W5LJO	54,708	188	97-B	K1EQA	864	24	12-A	W7YAQ	144,585	405	118-B	W7YAQ	144,585	405	118-B	
K4FU	43,281	228	63-C	New Mexico				K6ICS	540	15	12-B	W7HGX	58,065	245	79-B	W7HGX	58,065	245	79-B	
North Carolina				K1SL	202,134	571	118-C	K6DDO	1,260	28	15-C	KA7FEF	13,566	119	38-B	KA7FEF	13,566	119	38-B	
K4PB	147,396	346	142-C	N5EPA	64,428	236	91-C	NE6I	95,178	547	58-C	W7GUR	7,821	79	33-C	W7GUR	7,821	79	33-C	
NN4Q	112,791	287	131-A	NC5D	61,758	219	82-C	K5KT/6	3,105	45	23-C	W7EJ	170,718	789	74-C	W7EJ	170,718	789	74-C	
K4JO	60,584	208	98-C	W5UR	39,408	148	82-C	W6AKS/6	594	18	11-C	W7ZN	2,160	30	24-C	W7ZN	2,160	30	24-C	
KA3PDG	21,840	130	56-C	W7LHO																

AD7U	4,725	45-35-A
K19D	162,810	670-81-C-20
K8VQK	4,116	49-25-C-20
K8V	7,884	73-36-C-15

Wisconsin

278,108	632-173-C	
W9OP	140,844	388-121-C
W9NA	35,916	164-73-C
N9C	15,834	91-58-B
W9GL	10,962	97-42-B
N9EZ	3,244	34-22-B
K9J	1,880	28-20-C-160
N4TZ	35,880	184-65-C-40
N9AW	75,636	382-66-C-20
W9GL	62,409	283-71-C-20
W9WAO	34,965	185-63-C-20
N9BS	2,610	30-29-U-20
W9YCV	714	17-14-B-20

Colorado

K4XU	213,969	443-161-C
W0KCA	201,117	427-157-C
K0ZX	179,065	577-115-C
K0UK	186,649	583-101-C
K10G	124,416	384-108-C
W0G0R	44,793	109-79-C
K10J	30,744	163-56-C
N0FFZ	6,822	81-34-C
N0CNV	7,582	76-34-C
K0CXY	5,544	56-33-C
NNOM	1,386	33-14-B
N0QL	162	9-6-B
N0HRJ	18	3-2-B
W0ZV	2,925	39-25-C-160
W0UO	9,690	92-35-C-80
W0UA	137,582	637-72-C-40
K9AY	21,872	186-43-C-40
K0RYF	4,032	48-28-C-40
K0RF	240,219	861-93-C-20
W0YK	139,308	811-76-C-20

Iowa

W0WVP	448,184	774-193-C
K0FH	373,704	677-184-C
K0JH	267,838	588-149-C
N0SM	253,590	539-194-C
W0IZ	135,792	388-123-C
W0EJ	100,344	286-113-C
K0CQ	81,096	248-109-C
W0SR	75,320	240-106-C
W0VX	55,692	204-91-C
K0Y9	63,064	201-86-C
K0TR	44,499	163-91-C
A0BM	38,106	174-73-C
N0UP	19,494	114-57-C
N0C0	18,000	100-80-B
W0FO	11,934	78-51-C
W0BYZ	11,220	85-44-B
K0JH	10,626	40-77-B
K0R8	9,218	64-48-B
W4NIM	6,771	61-37-C
N0BH	6,324	62-34-B
K0F0Z	4,350	50-29-B
K0ZC	2,175	29-25-C
K0GT	429	13-11-A

Kansas

W0ACFZ	27,105	139-65-C
W0WPL	15,312	88-58-B
N0WF	14,888	96-51-C
K0BG	38,795	212-61-C-40

Minnesota

W0LP	16,929	99-57-C
K0B0MX	7,434	59-42-B
W0RDL	3,354	43-26-C-80
K0SR	107,775	479-75-C-20

Missouri

W0ULC	826,560	984-280-C
A0KM	88,040	239-120-B
N0IG	52,128	181-96-B
N0SB	51,207	169-101-C
5A0P	5,202	51-34-B
K00X	4,386	43-34-B
W0PKO	2,394	42-19-C
NV0U	1,638	26-21-B

North Dakota

K0QK	36,105	145-83-C
K0C8U	1,890	35-18-C-40

Nebraska

K0SCM	25,808	148-57-C
W0AT	1,824	32-19-C-20

South Dakota

K0DEE	28,566	138-89-C
K5LZT	150	10-5-B

VE

K0AZ	1+K8NZ,K08M,N0AA,W08SK,W8K1C	1,144,746-1462-261-C
------	------------------------------	----------------------

Maritime-Newfoundland

V01MP	618,000	1000-206-B
VE1DH	178,416	422-126-B
V01QST (V01AW, op)		
VE1NH	17,328	75-76-B
	4,500	60-25-A

Quebec

VE2AYU	316,872	652-162-C
VE2FE	3,000	50-20-C-80

Ontario

VE3KP	266,742	606-146-C
VE3ST	92,412	302-102-B

VE3NBE	64,728	232-93-B
VE3XN	22,563	109-69-C
VE3TE	1,835	34-18-B
VE3INQ	1,598	28-19-B-180
VE3CUI	4,820	55-26-C-80
VE3NKO	23,532	148-53-B-20
VE3AEJ/3	324	12-5-C-120

British Columbia

VE7WO	149,583	419-119-C
VE7BS	684	19-12-C-160

Multioperator Single Transmitter

1		
K1YR (+K1KX)		
	1,431,102-1741-274-C	
KYH (+AK4L,NJ2L,N2XK)		
	1,129,464-1512-249-C	
KM1C (+KB1T,KM1P,W1PH,W08BTH)		
	1,067,154-1406-253-C	
W1PH (+KM1P)		
	351,936-624-188-C	
W1RR (+NET)		
	328,420-740-182-C	
W1AW (A42W,N1CX,NG1J,W4CM5,WB1FTH,ops)		
	226,580-580-128-C	
W1OP (+K41KWE,N1AKO,WA1JH,ops)		
	101,788-482-73-C	
K1GW (+K1KA)100.602		
NC1B (+K41KP)		
	85,800-286-100-C	
NC1M (+K1FFX)79.650		
K41KPH (+NC1B)		
	43,085-145-99-C	

2

KY2J (+NA2N)	728,448-1084-224-C
K2CMF (+KA2UJH)	
	279,936-648-144-C
K2TD (+NET)	197,478-414-159-C
W2UI (+N3KR)	197,448-433-152-C

3

N3AD (+NET)1,283,130-1614-266-C	
W3GG (+K3RT)	
	1,105,425-1445-255-C
K3PA (+K3s OX,YL)	
	578,068-868-217-C
N3LR (+K3RW,N3NA)	
	568,704-1032-174-C
W3MA (+K3SD)	
	413,424-783-176-C
K3UEJ (+NET)404,550-725-186-C	
K63MM (+N3ARK,WB3L7)	
	346,878-703-184-C
K3JF (+NE3F)311,634-597-174-C	
N3BNA (+N3J,N3D)	
	283,065-565-167-C
W3HW (+N3EBF)	
	186,675-475-131-C
AA3B (+K43BER)	
	130,320-362-120-C
AA3B (+K43BER)	
	130,320-362-120-C
NA3K (+NET)	89,887-243-123-C

4

K3KG (+K4FJ,W4NL)	
	1,464,300-1624-300-C
K0HLB (+W0MHS)	
	425,484-892-159-C

5

W0ASP (+K5s MA,TU,WA,N5s BA,EA,W0ASP,W0ASVE)	
	784,446-1157-226-C

6

AG6D (+N1EE,W6s NWS,TMA,W08I,W7KA)	
	324,480-876-160-C
W70N (+W0UQF)	
	148,623-463-107-B
W6KV (+K5KT,N6CS,W08OPQ)	
	124,743-395-105-C
W6RWO (+KD7E,W6WZ)	
	61,692-398-53-C
K6LNR (+NET)56,176-232-53-C	
W6K6E (+NET)43,440-181-80-C	
N28N (+NET)30,843-149-69-C	
W6KR (+NET)17,856-124-48-B	
W6GC (+NET)11,931-97-41-B	
W6EL (+NET)4,356-44-33-B	
W6XG (+NET)2,829-41-23-C	

7

N7NG (+W6AJE)	
	343,185-685-167-C
W47E (+N07M)	
	272,828-659-138-C
W47NN (+W6OAT)	
	193,440-413-155-C

8

K0AZ (+K8NZ,K08M,N0AA,W08SK,W8K1C)	
	1,144,746-1462-261-C

9

W9NNE (+ops)258,408-582-148-C	
N99C (+N9EJL,N9JM,N9FS)	
	201,801-491-137-C
NE9U (+KA9LQ)	
	35,904-176-68-B

0

NEA (+A0Bs W,X,K0s RWL,UA,VBU,XXU,W0AT,KJ,789,888-1088-242-C	
W0NA (K0BU,W0s AR,CY,YR,ops)	
	346-129-C
A00P (+W0B0HC)	
	94-233-311-101-C

N0CKO (+KH6JTW)	
	35,298-159-74-B

VE

VE3IY (+VE3EDG)	
	326,340-588-185-C
VE8RCS (+VE3PFC)	
	3,960-60-22-C

Two Transmitter

N8SM (+K2TNO,NTSD,K5GN,KN5H,NM5M,W6SN,W6AGH)	
	2,598,114-2503-346-C
N8RG (+N2AA,W42HGM,NF2L,N2ME,K2TW,K2JL)	
	2,574,000-2600-330-C
N8RS (+K03F,K2JG,K2TM,N3RD)	
	2,535,456-2401-352-C
K2TR (+K2s RO,XA,W42SPL,W2KMY)	
	2,191,140-2320-329-C
K5SS (+N24K,KU8E,K08NS,AD8P,K48PLH,KN8S)	
	1,715,112-1743-328-C
K4VX0 (+A0HJ,N4CC,K9s BGL,FU,LJ,KM9P,W08IN,K4BY8S)	
	1,667,340-1770-314-C
N6RO (K3EST,N6BT,K6T6M,W46VF,W6SZN,ops)	
	825,188-1876-271-C
K1RQ (+K03E,K5,W,NB1Y,NJ1F,WA1ZM)	
	879,878-1384-236-C
N04I (+W4R)912,978-1149-261-C	
WB4DX (+N6DJ,WBS CZN,JGU,W48s BFN,R0CN)	
	717,030-1285-186-C
K0Z0 (+K2B)683,290-1040-219-C	
K1XM (+K2JF)513,216-793-216-C	
K6ZM (+CE3AQ,K4LVT,K4GEZ,N68L,AK4T,WZ2)	
	382-182-743-158-C
W3KWH (K4Ss KSD,PJS,N60EF,K3S1,KT3L,ops)	
	94,530-274-115-C

Unlimited

W3LPL (+K1DQV,KA1GD,WB3JRU,K3s KU,RA,TM,KMST,K7JY,KT4W,NW5E,W5AXX,N81J,418,958-3007-378-C	
W5XGM (+K3s GM,FJKND,N3ATQ,W3s FV,GM,GU,W43JZ)	
	1,870,914-1913-326-C
K3OO (+K3s NZ,ZUF)	
	1,469,785-1535-317-C
K4JPD (+W4HOV,W04KI,K4VCO)	
	7,353-57-43-C

DX CW

Single Operator

Africa	754 632-1338-188-B
E88RCT (OH2B), op	
	2,224,118-3182-233-C
E88IE	72,891-287-31-A
E88R	48,687-231-59-C
E88BL	106,950-713-30-80
E88BCJ	720-20-12-C-20
H21HZ	185,367-637-97-C
TU4CG	307,197-957-107-B
JG1FVZS/N0	257,788-682-126-C
5T5CJ	949,560-1840-193-C
9J2EZ	67,584-512-44-C-15
9L1SL (KD3F), op	
	218,064-616-118-B

Asia

HL1LW	4,968	92-18-B-20
JE2YRD	625,933	1181-151-C
JH7WIK	481,152	1259-129-C
J47RHJ	452,738	1152-131-C
J47FWR	338,708	889-129-C
JH7VJK	289,926	819-116-C
J4EJL	212,544	696-108-C
J4EJL	159,243	377-53-B
J41JUY	47,720	270-50-B
J49CWJ	47,081	249-53-C
J42UOT	31,185	189-63-C
J47LHT	26,182	184-51-B
J47IAER	24,381	189-43-B
JH6TDY	19,800	150-44-B
J41DFQ	17,589	143-41-B
J4RGCE	8,640	96-30-A
J4ATV	7,227	73-33-C
J42SD	6,375	85-25-A
J47ASD	5,700	76-25-B
J4SARM	5,214	79-22-C
J41VZM	5,103	81-21-B
JH7AJD/1	4,500	60-25-B
J48SW	4,386	98-17-C
J47JVP	3,980	66-20-B
J4SAJE	3,540	59-20-B
J510SP	3,249	57-19-B
J48W	2,806	52-18-B
J41JGP	2,520	58-15-B
JF1JAX	2,520	60-14-B
JP1TRJ	2,475	55-15-B
J48JHJ	1,677	43-13-B
JG3EHD	1,549	43-12-B
J48BWH	1,044	59-12-B
J41AUF	726	23-11-A
J41AAE	390	13-10-B
J4SUWB	84	7-4-B
JF1NZW	192	16-4-C-160
JF1SPY	42	7-2-C-160
J41YBK (JH0LFE), op		
	9,000-120-25-C-80	
J48DNV	3,762	66-19-C-80
JH4LYB	1,452	44-11-C-80
J41KFX	1,368	38-12-B-80
JR0X0J	1,254	38-11-B-80

J42FJP	1,055	32-11-C-80
J47HMHZ	83,202	566-48-B-80
J48NFO	82,767	567-47-C-40
J48JUMV	46,082	334-49

OCTOBER

3-4

California QSO Party, Sep *QST*, p 86.

International DX-HC Middle of the World Contest, Sep *QST*, p 86.

VK/ZL/Oceania DX Contest, phone, Sep *QST*, p 87.

Columbus Contest, Sep *QST*, p 87.

OMISS QSO Party, sponsored by the OM International Sideband Soc, 0000Z Oct 3 until 2400Z Oct 4. SSB, single-op only. Contact each station once per band, 160-10 meters. Exchange OMISS number, state/province/country, name, call, RS, indicate if Novice. Count 2 points for member QSOs, 2 points per Novice QSO and 1 point all other QSOs. Multiply total QSO points by the number of states/provinces/countries worked. Add 500 bonus points for each 100 OMISS members worked. Submit separate logs for each band worked. Awards. Mail by Nov 16 to Ricky Martin, KA4TLC, Rte 1-Box 199J, Hope Mills, NC 28348.

6

West Coast Qualifying Run, 10-35 WPM, at 0400Z Oct 7 (9 PM PDT Oct 6). W6WGP prime, W6ZRJ alternate. Frequency is approximately 3590 kHz. Underline one minute of the highest speed you copied, certify 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/endorsement.

8

WIAW Qualifying Run, 10-40 WPM at 0200Z Oct 9 (10 PM Oct 8, EDT). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. Underline one minute of the highest speed you copied, certify 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/endorsement.

10-11

Radiosporting Championship Contest, Sep *QST*, p 87.

Pennsylvania QSO Party, Sep *QST*, p 87.

GARTG-SSTV Contest, part 2, Sep *QST*, p 87.

Concurso Ibero-Americano Contest, sponsored by the Seccion Territorial de URE del Valles Oriental and CQ Radio Amateur de Boixareu Editores from 2000Z Oct 10 until 2000Z Oct 11. Phone only. Classes: single operator Latin American; single operator non-Latin American; multioperator single transmitter Latin American; multioperator single transmitter non-Latin American; single operator EC (EA Novice); QRP, single operator, all band; SWL. Bands: 1.8, 3.5, 7, 14, 21, 28 MHz. Work stations once per band. Exchange signal report and serial number starting with 001. Count 3 points per Latin American QSO and 1 point per non-Latin American QSO (Latin American stations count 1 point per QSO). Multipliers are Latin American DXCC countries (CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, HT, KP4, LU, OA, PY, TG, TI, XE, YS, YV, ZP, 3C and DXCC dependencies). [This is the way the official rules read, but several of the prefixes listed are non-Latin American countries.—Ed.] Final score equals total QSO points times total multipliers. Awards. Send logs before Nov 30 to IX Concurso Ibero-Americano, Gran Via de les Cortes Catalanes, 594, 08007 Barcelona, Spain.

11

RSGB 21/28 MHz SSB Contest, sponsored by the Radio Society of Great Britain, from 0700Z-1900Z Oct 11. Phone only. Single operator and multioperator. Exchange signal report and serial number starting with 001. 21 MHz and 28 MHz only. Avoid

21.400-21.450, 28.000-28.500, 29.100-29.700. Non-European stations count 3 points per QSO with G, GD, GI, GJ, GM, GU, GW stations (not GB). Multiply by number of G prefixes worked. Log must be received before Dec 7, 1987. Mail entries to RSGB Contests Committee, PO Box 73, Lichfield, Staffs WS13 6UJ, England.

11-12

Illinois QSO Party, Sep *QST*, p 87.

17-18

ARRL International EME Competition, part 1, Sep *QST*, p 87.

ARCI QRP Fall CW Contest, sponsored by QRP ARC International, from 1200Z Oct 17 until 2400Z Oct 18. Operate max 24 hours. CW only. Work stations once per band. Exchange signal report, state/province/country and QRP number if member. Nonmembers send power output. Suggested frequencies: 1.810 3.710 3.560 7.110 7.040 14.060 21.110 21.060 28.110 28.060 50.060. No 12- or 30-meter QSOs. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (4-5 W output $\times 2$; 3-4 W output $\times 4$; 2-3 W output $\times 6$; 1-2 W output $\times 8$; 0-1 W output $\times 10$). More than 5 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Bonus points: add 200 pts for each band a home-brew TX is used on; add 300 pts for each band a home-brew RX is used on; add 500 pts for each band a home-brew TCVR is used on (max 500 bonus pts per band). Awards. Mail entry to be received by Nov 19 to QRP ARCI Contest Chairman, Eugene Smith, KA5NLY, PO Box 55010, Little Rock, AR 72225-0010.

Rhode Island QSO Party, sponsored by the East Bay Amateur Wireless Assn, from 1700Z Oct 17 until 0500Z Oct 18 and 1300Z Oct 18 until 0100Z Oct 19. Work RI stations (RI stations work all). Exchange RST and state/province/country (city or town for RI stations). Score 2 pts per phone QSO, 3 pts per CW QSO. Multipliers are RI cities and towns (39 max). Multipliers for RI stations are RI cities and towns, states, provinces and countries. Multiply total QSO points by multipliers for final score. Certificates. Send logs (SASE for results) by Nov 30 to East Bay AWA, PO Box 392, Warren, RI 02885.

VK/ZL/Oceania DX Contest, CW, Sep *QST*, p 87.

Simulated Emergency Test, Sep *QST*, p 75.

Jamboree on the Air (JOTA), sponsored by the World Scout Bureau, will be 0000 local, Oct 17 until 2400 local, Oct 18, although some activity will flop over from Fri to Mon. Scouts usually exchange their name, QTH, Scout rank and other hobbies, often becoming pen pals with their new found radio friends. Look for K2BSA, the BSA HQ station in Dallas, Texas, and HB9S, the World Scout HQ in Switzerland. Suggested frequencies: CW—3.590 7.030 14.070 21.140 28.190; phone—3.940 7.290 14.290 21.360 28.990; packet, RTTY, SSTV, ATV on normal frequencies; check Novice bands. No logs are necessary, but activity reports including Scout unit number, number of participants and interesting incidents are appreciated. Interesting photographs with captions are especially needed. Send reports to ARRL HQ, Club Services Dept, 225 Main St, Newington, CT 06111.

18

RSGB 21 MHz CW Contest, sponsored by the Radio Society of Great Britain, from 0700Z-1900Z Oct 18. CW only. Single operator and QRP single operator (less than 10-W input). Exchange signal report and serial number starting with 001. 21 MHz only. Avoid 21.075-21.125. Non-European stations count 3 points per QSO with G, GD, GI, GJ, GM, GU, GW stations (not GB). Multiply by number of G prefixes worked. Log must be received before

Dec 14, 1987. Mail entries to RSGB Contests Committee, PO Box 73, Lichfield, Staffs WS13 6UJ, England.

24-25

CQ World-Wide DX Contest, phone, sponsored by CQ, from 0000Z Oct 24 until 2400Z Oct 25 (CW contest 0000Z Nov 28 until 2400Z Nov 29). 1.8 through 28 MHz. Entry classes: single op, all bands; single op, single band; single op, QRP; multiop, single transmitter; multiop, multi transmitter. QRP is defined as 5-W output or less. Multi-single: Only one transmitter and one band permitted during a 10-minute period. Exception: one—and only one—other band may be used during the same 10-minute period if—and only if—the station worked is a new multiplier. Stations found in violation of the 10-minute rule will be reclassified as multi-multi. Multi-multi stations are allowed one signal per band maximum. All transmitters must be located within a 500-meter-diameter circle, or within the limits of the licensee's address property, whichever is greater. All antennas must be physically connected to the transmitters by wires. Exchange signal report and CQ zone number. A station in a different zone or country than indicated by its call sign must sign portable. QSOs between stations on different continents count 3 points. QSOs between stations on the same continent but in different countries count 1 point. Exception: QSOs between North America stations in different countries count 2 points. QSOs with your own country count for multiplier credit, but not for QSO points. Multipliers: Count one multiplier for each different CQ zone worked per band (max 40 per band). Count one multiplier for each different country worked per band (DXCC and WAE lists). Multiply QSO points from all bands operated by multipliers (zones plus countries) from all bands operated for final score. Single-band logs eligible for single-band awards only. Single ops must operate at least 12 hours (multiops, 24 hours) to be eligible for awards. Dupe sheets required for any band with more than 200 QSOs. Entry forms are available from the sponsor for an SASE, and all entrants are encouraged to send for a set. Each dupe removed by the CQ Contest Committee also carries a 3-QSO penalty. Phone logs must be post-marked by Dec 1, 1987, and CW logs must be post-marked by Jan 15, 1988. Mail logs to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

25

WIAW Qualifying Run, 10-35 WPM, at 2400Z (7 PM EST) Oct 25. See Oct 8 listing for more details.

31-Nov 1

Maryland-DC QSO Party, sponsored by the Columbia ARA, from 2200Z Oct 30 until 2200Z Nov 1. Single operator only. Work stations once per band and mode. 80-10 meters. Suggested frequencies: CW—60 kHz up from bottom (Novice—10 kHz up from bottom); phone—3.950 7.250 14.290 21.390 28.490. Exchange serial number, ARRL section, MD Co or Country. Note that Baltimore City and Baltimore County are separate multipliers. Work MD stations (MD stations work all for multipliers but only non MD stations for QSO points). Multipliers are MD counties, Baltimore City and Washington DC. Score 1 point per phone QSO and 2 points per CW QSO. QSO points times multipliers for final score. Novices and Techs are encouraged to participate. Certificates. Send entries (SASE for results) by Nov 30 to NB3P, 8454 Church Ln, Ellicott City, MD 21043.

GARTG-RTTY Contest, part 4, Sep *QST*, p 87.

NOVEMBER

4

West Coast Qualifying Run, 10-35 WPM, at 0500Z Nov 5 (9 PM PST Nov 4). W6WGP prime, W6ZRJ alternate. Frequency is approximately 3590 kHz. See Oct 6 listing for more detail.

ARRL November Sweepstakes, CW, this issue, page 72.

International Police Association Contest, sponsored by the IPARC German Section, from 0600Z to 1000Z and 1400Z to 1800Z each day, Nov 7-8. CW Nov 7 and phone Nov 8. Non-IPA stations work IPA members only. Exchange signal report and serial number. US stations also send state. IPA members send IPA with exchange. Phone and CW contests are separate. Work stations once per band on each mode. Count 1 point per QSO with non-IPA members and 5 points per QSO with IPA members. Multiply by sum of IPA countries/states worked per band. Suggested frequencies: phone—3.650 3.775 7.075 14.295 21.295 28.575 MHz; CW—3.575 7.025 14.075 21.075 28.075 MHz. Mail entries by Dec 31 to Anton Kohten, DK5JA, PO Box 40 01 63, D-4152 Kempen 1, Fed Rep of Germany. For more information, contact WA8VDC, 4828 Elm, Newport, MI 48166.

13

WIAW Qualifying Run, 10-35 WPM, at 0300Z Nov 14 (10 PM EST, Nov 13). See Oct 8 listing for more details.

14-15

European DX Contest, RTTY, sponsored by the Deutscher ARC, from 1200Z Nov 14 until 2400Z Nov 15. Work stations once per band, 3.5, 7, 14, 21 and 28 MHz only. Entry classes: single op, all band; single op, high band (14, 21, 28 MHz); multiop, single transmitter; SWL. Single ops may operate a maximum of 30 hours. The 6 hours of off-time may be taken in one to three periods and must be noted in the log. Non-European stations work European stations only (Europeans may work Europeans). Exchange signal report and serial number. Count one point per QSO and one point per QTC (explained later). QSO as well as QTC-traffic with one's own country is not allowed. Multiply by number of "countries" worked per band (DXCC list, plus GM-Shetland, IT, UN1 and

4U1VIC). 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 to a station. A QTC contains the time, call sign and QSO number of the station being reported (eg, 1300/DJ1QQ/134). A QSO may be reported once, and not back to the originating station. A maximum of 10 QTCs to the same station are 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 QTCs are reported. W/K stations may exchange QTCs with European stations only. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Mail before deadline, Dec 15 to WAEDC Committee, PO Box 1328, D-895 Kaufbeuren, Fed Rep of Germany.

ARRL International EME Competition, part 2, Sep QST, p 85.

15

SOWP High Speed Certificate Test, sponsored by the Society of Wireless Pioneers, starting 0130Z Nov 16 on 3.523 3.525 7.023 7.025 MHz. Speeds will be 40, 45, 50, 55 and 60 WPM in that order. Important instructions start at 0130Z 40 WPM; 0150Z 45 WPM; 0200Z 50 WPM; 0210Z 55 WPM; 0220Z 60 WPM. Copy one minute consecutively solid at any of the five speeds. For certificate send your copy to George Hart, W1NJM, 66 Highland St, Newington, CT 06111.

21-23

ARRL November Sweepstakes, phone, this issue, page 72.

AOEC 160-Meter DX Contest, sponsored by the Osterreichischer Versuchssenderverband from 1800Z Nov 21 until 0700Z Nov 22. CW only.

Suggested frequencies: 1.810-1.950. Work Austrian stations. Exchange RST and serial number (OE stations send RST and Austrian district locator). Count 1 point per QSO. Multipliers: each OE call area (max 9)—2 multiplier points; each Austrian district locators (ADL)—1 multiplier point; each different prefix—1 multiplier point. Total score equals the total QSO points times the total number of multiplier points. Awards. Send logs before Dec 31 to OVSV-AOEC 160 M, Theresiengasse 11, A-1180 Vienna, Austria.

MARAC Maritime Activity Contest, sponsored by the Radio Amateur Club of the Royal Netherlands Navy, from 1300Z-1600Z Nov 21 (145.000-146.000 all modes, no repeaters), 0900Z-1200Z Nov 22 (3.520-3.570 MHz CW only) and 1300Z-1600Z Nov 22 (3.600-3.700 MHz SSB only). Classes: HF CW only; HF SSB only; VHF only; SWL. Exchange RST and serial number (MARAC number if member). Work stations once per class. Separate logs per class. Count 2 points per non-MARAC member QSO, 5 points per MARAC member QSO and 10 points per P14MRC QSO. Multiply total QSO points times number of worked MARAC members for final score. Send entries by Dec 15 to E. van der Velde, PA2REH, Queridolaan 21, 2343 KH Oegstgeest, The Netherlands.

23

WIAW Qualifying Run

28-29

CQ World Wide DX Contest, CW, see Oct 24-25 listing for more details.

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 Nov 1 to make the **January issue**. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted by Mark R. Burke, KA1MIS
Contest Assistant ARRL

Marfa Texas: The Big Bend ARC will operate K5FD, Oct 2-4, 1500-0000Z each day, from the Marfa Lights Festival. Suggested frequencies: phone—3.920 7.250 14.250 28.400. For certificate, send QSL and SASE to Stewart Billingsley, N5HXZ, PO Box 1458, Marfa, TX 79843.

Clovis, California: The Fresno ARC will operate W6TO from 1500Z Oct 3 until 0100Z Oct 4. Suggested frequencies: lower portions of the General 80, 40, 20 and 15-meter bands; Novice phone—28.450; CW—7.130; 2-meter repeater—146.22/82 or 146.34/94. For certificate, send QSL and 9- x 12-in SASE to FARC, W6TO, PO Box 783, Fresno, CA 93712-0783.

Manteca, California: The Manteca ARC will operate K6SWT from 2000Z Oct 3 until 0200Z Oct 4, from the Manteca Pumpkin Festival. Suggested frequencies: phone—40, 20, and 10 meters; CW—40 and 20 meters. For QSL, send QSL and SASE to Ron Watkins, KA6ILO, 963 Alpine Ave, Manteca, CA 95336.

Lafayette, Indiana: The Tippecanoe ARA Inc will operate a special event station from 1200Z Oct 3 until 0200Z Oct 4, in celebration of The Feast of the Hunters Moon. Suggested frequencies: 3.870 14.235 21.375 28.400. For certificate, send QSL and large SASE to W9REG, 111 S Seventh St, Lafayette, IN 47901.

Topeka, Kansas: The Kaw Valley ARC will operate W0CET Oct 3-4, 1500Z-2300Z each day, in celebration of John Amis' call sign, 9CET. Suggested frequencies: 7.275 14.275 28.400. For certificate, send QSL and SASE to Terry Hoss, KA0BHO, 2931 Tutbury Tn Rd, Topeka, KS 66614.

Dearborn, Michigan: The Ford ARL and the Tin Lizzie club will operate K8UTT and member

stations Oct 3-4, 1200Z-2200Z each day, to commemorate the first Model-T Ford, built on Oct 1, 1908. Operation will be in the General portions of the 80, 40 and 20-meter bands. For certificate, send QSL and 9- x 12-in SASE to Ford ARL, K8UTT, Box 2112, Dearborn, MI 48123-2112.

Alexandria, Virginia: The Mount Vernon ARC will operate K4US Oct 3-4, starting at 1500Z each day, to commemorate the Constitution of the US. Suggested frequencies: 25 kHz up from the bottom of the General portion of 80 SSB, 40 CW, 20 SSB; 10-meter Novice SSB; HF packet on all bands. Send QSL and SASE to Steve Schneider, WB4EEA, 8602 Cushman Pl, Alexandria, VA 22303.

Canon City, Colorado: The Royal Gorge ARC will operate KD0MY Oct 4, 1500Z-2200Z, to commemorate Colorado Days. Suggested frequencies: phone—7.235 14.235 21.360; CW—7.110 14.110. For QSL, send QSL to KD0MY, 3049 Ute, Canon City, CO 81212.

Boardman, Ohio: The Mahoning Valley ARA will operate W8QLY Oct 4, 1200Z-2100Z, to celebrate the Rotary Octoberfest. Suggested frequencies: 40-meter phone. For QSL certificate, send standard-size SASE to MVARA Special Event Station, PO Box 2950, Youngstown, OH 44511.

Fullerton, California: The Rehab Radio program at St Jude Hospital will operate WD6BPT Oct 4, 2000Z-2400Z, with an open house from 2100Z-2400Z. In addition, look for periodic operation Oct 5-9, 1500Z-0030Z, to mark its 10th anniversary. Suggested frequencies: 14.200-14.300 21.300-21.400 28.300-28.600. For QSL, send QSL to St Jude Hospital, c/o WD6BPT, PO Box 4138, Fullerton, CA 92635.

Helena, Arkansas: The West Helena ARC will

operate member stations Oct 10, 1400Z-2100Z, in conjunction with the annual King Biscuit Blues Festival. Suggested frequencies: lower portions of the General 80, 40, 20 and 15-meter bands; Novice phone—28.400. For certificate, send large SASE to Phillip St Columbia, N5IPU, City Hall, Cherry St, Helena, AR 72342.

Hodgenville, Kentucky: The Kentucky ARS will operate WE4K Oct 10, 1500Z-2000Z, honoring the heritage of the 16th president of the United States, Abraham Lincoln. Suggested frequencies: lower 25 kHz of the General phone bands of 40 and 20 meters; 28.325. For certificate, send a business-size SASE to WE4K, 128 Meadow Ln, Bardstown, KY 40004 or *Callbook* address.

Hot Springs, Arkansas: The Hot Springs ARC will operate WA5BRF from 0001Z Oct 10 until 2400Z Oct 11, in recognition of the opening of its radio station at the Mid-America Museum. Suggested frequencies: 10 kHz up from the bottom of the General portion of the phone bands; 10-meter Novice band. For special QSL, send QSL and SASE to WA5BRF, 117 Camellia Dr, Hot Springs, AR 71901.

Dalton, Georgia: The Dalton ARC will operate K14IG Oct 10-11, 1400Z-2000Z each day, at the Prater's Mill Country Fair activities. Suggested frequencies: 7.250 14.250 28.400. For special QSL, send QSL and SASE to Dalton ARC, PO Box 143, Dalton, GA 30722-0143.

Treasure Island, New Jersey: The Garden State ARA will operate W2GSA from 1600Z Oct 10 until 1600Z Oct 11, to commemorate the day that Robert Louis Stevenson stayed on Treasure Island. Suggested frequencies: 3.910 7.235 14.235. For certificate, send QSL to Harry Polhemus, KN2B, 18 Gardners Ln, Manasquan, NJ 08736.

Harlingen, Texas: The South Texas RS will operate NSCAF Oct 10-11, 1400Z-2300Z each day, to commemorate the annual Confederate Air Force Airshow. Suggested frequencies: 7.250 14.250 21.325 28.400. For special QSL, send QSL and SASE to Dr David Woolweaver, K5RAV, 2210 S 77 Sunshine Strip, Harlingen, TX 78550.

Carthage, Missouri: The Carthage ARC will operate W0LF Oct 12-16, 2100Z-0200Z each day, and Oct 17, 1300Z-2000Z, in conjunction with The Carthage Annual Fall Maple Leaf Festival. Suggested frequencies: phone—3.860 7.230 14.260 21.375 28.350; CW—3.600 7.050 14.050 21.050. For special QSL and certificate, send QSL and 9- x 12-in SASE (39 cents) to CARs, W0LF, c/o Civil Defense, 407 S Garrison St, Carthage, MO 64836.

St Paul, Minnesota: The St Paul RC, together with the Science Museum of Minnesota, will operate K0AGF from 1600Z Oct 15 until 0300Z Oct 16, and Oct 17-18, 1600Z-2300Z each day. Suggested frequencies: 25 kHz up from the lower end of the General-class CW and phone bands on 80 through 10 meters. For certificate, send #10 SASE to St Paul RC, Box 9375, North St Paul, MN 55109.

Marshall, Missouri: The Indian Foothills ARC will operate WB0WMM Oct 17-18, 1400Z-1900Z each day, from the National Cornhusking Championships. Suggested frequencies: phone—7.235 14.235; CW—7.110 21.110. For certificate, send QSL and a large SASE to WB0WMM, 125 Lakeview, Marshall, MO 65340 or *Callbook* address.

Edmond, Oklahoma: The Edmond ARS will operate W5ERY from 1700Z Oct 17 until 1700Z Oct 18, in celebration of the Edmond ARS's 30th anniversary. Suggested frequencies: 3.870 7.270 14.270; CW—14.100; FM—147.735/135. For unfolded certificate, send a 9- x 12-in SASE (39 cents) to Edith Vaughn, KA5YPX, 1020 Juno Cir, Edmond, OK 73034.

Poteau, Oklahoma: The Fort Smith Area ARC will operate W5ANR from 1500Z Oct 17 until 0300Z Oct 18, and 1500Z-2300Z Oct 18, in conjunction with the 1st Annual Green Country Sorghum Festival. Suggested frequencies: lower 30 kHz of the General phone bands; Novice phone—28.435; packet—145.010. For certificate, send QSL and SASE to F5AARC, W5ANR, Box 32, Ft Smith, AR 72902-0032.

El Cajon, California: The El Cajon ARC will operate WA6BGS Oct 17, 18, 24 and 25, from 1400Z-0100Z each day, during their "All States Picnic." Suggested frequencies: phone, CW, RTTY and packet on the 40, 20, 15 and 10-meter bands. For a QSL, send QSL and SASE to QSL Request, City of El Cajon, 200 E Main St, El Cajon, CA 92020.

Circleville, Ohio: The Teays ARC will operate WB8PPH Oct 21-24, 1900Z-2400Z each day, to commemorate the Circleville Pumpkin Show. Suggested frequencies: 40-through 10-meter phone. For certificate, send QSL and SASE to Len Campbell, WB8PPH, 8951 SR 188, Circleville, OH 43103.

Ocala, Florida: The Silver Springs RC of Ocala Inc will operate K4GSO Oct 24, 1100Z-2200Z, for their 40th Anniversary QSO Party. Suggested frequencies: 40, 20 and 15-meter phone. For unfolded certificate, send QSL and large SASE by Oct 30 to SSRK Inc, PO Box 3944, Ocala, FL 32678-3944.

Lexington, North Carolina: The Healing Springs Mountain VHF Society will operate K4HOG Oct 24, 1300Z-2100Z, for the 4th Annual Lexington Barbecue Festival. Suggested frequencies: 7.250 14.250 21.325 28.325; Novice frequencies; local 2-meter repeaters. For special Bar-h-QSL, send SASE to Healing Springs Mountain VHF Society, Inc, PO Box 41, Lexington, NC 27293-0041.

Grand Cayman, Cayman Islands: The Cayman ARS will operate ZF10PW Oct 24-31 for the Cayman Islands Pirates Week. Operation will be on all bands and all modes. For special QSL, send QSL to Cayman ARS, PO Box 1029, Grand Cayman, BWI.

Carnegie, Pennsylvania: The Steel City ARC will operate W3KWH Oct 31-Nov 1, 1900Z-2400Z each day, to commemorate the 200th anniversary of Allegheny County, Pennsylvania. Suggested frequencies: 20 kHz up from the bottom of the General phone and CW portions on 40 and 20 meters; 28.120 28.320. For certificate, send a large SASE to Steel City ARC via *Callbook* address.

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 Nov 1 to make the Jan 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-Event 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 unfolded 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 during your 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.

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is given to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in *Italics* for each band listing. Initial qualifiers are shown first, followed by those with endorsements, for June 14, 1987 through August 13, 1987. An SASE will bring you the rules and application forms.

6m (50 MHz)				23 cm (1296 MHz)	
	<i>100</i>	AA4FL 150	WB8ART 200		
218 AF0T		NA4I 150	WABNPX 125	41 K00GT	
219 NSJHV		K4RWS 250	KD8SI 275	42 W4GJO	
220 KB0HH		KS4S 175	KA9LDS 175	43 NSWS	
221 W7KYT		NS5DB 300	WB9MSV 200	44 KC0QR	
222 KB9QC		W5FF 375	WB9QJR 150	45 K0RZ	
223 KM0A		W5OZI 200	KF0M 200	46 W5SAGT	
224 WBRT		KD5RO 125	W0VD 150	47 N0EKT	
225 N0FFO		WASS 125			
226 WA6BYA		WA6BYA 325	1.25 M (220 MHz)		
227 N0FHO		K6JEO 150	<i>50</i>		
228 WA5DJJ		WB7OHF 300	20 K0TLM	KD5RO 50	
229 WB3LJK		K8TGC 275	WB8BK 80	WAS7KU 30	
230 K5HYE		WB8TGY 125		WB8BK 55	
231 N2CG		K8WKZ 400		N8DJB 30	
232 WB5MTU		WB8YFE 200	70 cm (432 MHz)	2.3 GHz	
233 WB8PAT		NC9F 175	<i>50</i>	<i>5</i>	
234 N0CMW		KA0JGH 275	93 KD5RO	18 WB8BK	
235 W7LQV		W0VD 125	94 W6HJN	19 WB8TGY/8	
236 W0FY			95 W6HAD	20 K0RZ	
237 WB5RUS		2m (144 MHz)	96 KA9SPD	21 WA5TKJ	
238 N2GBY		<i>100</i>	97 N8BJN		
239 WA2HYC		179 NE4C	98 DF8ZW		
240 N1ABY		180 K01FL	99 N0LL	KD5RO 15	
241 VE3EUV		181 KB0HH	100 WA5TKU	W8YIO 20	
242 KB4OLM		182 DL8AAV	101 KI4C		
243 VE3LNX		183 W0RTZ	102 W3WFM	5.7 GHz	
244 WB4AYE/6		184 NSWS		<i>5</i>	
245 N9KS		185 K4RWP		10 K0RZ	
246 W7NKT		186 KB4CRT			
		187 KSIS			
245 W7IDZ		188 AA2Z	W4GJO 130		
246 WA6UZR		189 W3WFM	WB5AFY 150		
		190 YU3OV	KSYY 120		
K1GPI 200			WB8ART 100		
W1JR 250			WB8BK 120		
WA1OUB 375			N8DJB 70		
K1RSA 150		W3CAG 150	KD8SI 80		
WA1FRE 150		K4CAW 180	W8YIO 80		
K2DNR 150		KB4CSE 150	WA9JFM 90		
KA2GOJ 175		K4JQU 125	KF0M 70		
W2HRW 200		W4ATWX 125	W0RAP 170		
N3COG 250		WA4VCC 150			
WA3DMF 300		W4ZD 175			
AC3T 175		W5FYZ 150			
W3WFM 350		NSWS 150			
KB4CRT 275		KSYY 275			

NCJ NATIONAL CONTEST JOURNAL

The NCJ features articles by top contesters, letters, hints, statistics, scores and much more. Big gun or small, the NCJ provides you with a valuable source of information on the exciting world of competitive radio.

The September/October issue includes:

- The W9RE rotating side mount
- The N6TR Amateur Radio micro-computer system
- NCJ Profile featuring G3FXB
- CQ WW Phone US call area records
- Sweepstakes CW section records

Other features are columns on propagation, antennas, clubs and West Coast contesting.

National Contest Journal is edited by Randy Thompson, K5ZD, PO Box 11439, Pittsburgh, PA 15238, and is published by the ARRL. Subscription rate for 6 issues (one year) is \$10 first class mail, \$11 first class to Canada or Mexico and \$12 elsewhere by air mail. NCJ subscription orders and changes of address should be addressed to the ARRL and be marked NCJ Circulation. Letters, articles, club newsletters and other editorial material should be submitted directly to the Editor.

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, Bill Gillespie, VE6ABC—ASM: VE6AMM. SEC/TC: VE6AFO. OO: VE6TY. STM/DEC/SM: VE6ABG. The Alberta Radio Emergency Service Net is closed until the fall. Thanks Mike, VE6XD, for looking after the Sunday morning NCS. Ken, VE6AFO, reports the Calgary Amateurs assisted with communications for the Jasper-Banff Relay Race in June, and also reported that the Calgary Field Day group exceeded last year's score and were very pleased with their activities. Coming events are the Galcier/Waterlorn Hamfest in mid July and the Saskatchewan Hamfest and Symposium with CARR/CRR/DOC July 31 to Aug 2. Traffic: AFSN QNI 1055, QTC 10, Informal 34. ATN QNI 195, QTC 72. Personal totals: VE6GUS 32, VE6ABC 11, VE6AMM 7, VE6AKY 3, VE6CHV 2.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—British Columbia Emergency Net, 3650 at 0300 UTC. Net manager, Ferdi, VE7EJU, says it's his most active activities and the net is holding up well. With QNIs 784, QTC 324. Total minutes 572. British Columbia Public Service Net, 3729 kHz nightly at 0030 UTC. Jim VE7LBO reports the nets activity is doing well with a total Check-in of 4104-High 159 Low 99. Strange this almost compared to one year ago. We wish to say thanks to those unsung heroes—the NCSs of BCEN:7EJU, 7EJW, 7BNI, 7ANG, 7EGM, 7DJ, 7BCF, and for those that represent BCEN on RM-7: 7BNI, 7EJU, 7EJW, 7ANG, 7EGM, and 7SR. It sure is nice to have so many young ladies take these active parts in the nets. Many thanks to all the 73. Ernie's traffic: VE7BNI 330, VE7EJU 145, VE7ANG 134, VE7EJM 105, VE7EJA 51, VE7FME 46, VE7AB 43, VE7CQJ 17, VE7BZ1 14, VE7EGM 9.

MANITOBA: SM, Jack Adams, VE4AJE—Thanks to Keith, VE4BC, and other manitoba operators (whom I will not mention in fear of missing somebody) who manned VE4WSC (Winnipeg Seniors Club) station handling priority and welfare traffic after the disastrous tornadoes touched down over Edmonton, Alberta, July 31, causing many fatalities and completely bringing the Alberta telephone system to a jammed up mess. It is my understanding that between 450-500 messages were sent and received through VE4WSC. August report will recognize this traffic in the Public Service Honor Roll. Net reports: MEPN 31 sessions, 857 QNI, 19 QTC. MMWN 31 sessions, 595 QNI, 29 QTC. MTN 18 sessions, 99 QNI, 26 QTC. Individual traffic over 25—VE4LB 42, VE4AJE 26, VE4KE 26, VE4TE 25. Total 156.

MARITIME-NEWFOUNDLAND: SM, Leigh Hawkes, VE1GA—SEC: VE1JJ. BM: VE1BQO. My apology for having missed last month's report. Very little news and no field reports were received. Moncton ARC will be holding a Fleamarket in October. Check your local nets for details. Congrats Yarmouth ARC, recently celebrated its 40th anniversary. Newfoundland's ambassador to the mainland, Cyril, VE1RO has been recalled and now signs VO1PO. Congrats VE1SE, 50 years as an amateur. VO1BD recently visited VE7 land and now has new antenna system in operation. Regret to report following Silent Keys: VE1GL, VE1MQ, VE1JK, VO1EL, and Bob Eagles, ex VO1FS. Traffic for June: VE1BKM 51, VE1VX 17, VE1ALU 2, VE1BPM 2. July: VE1BKM 40, VE1VX 11, VE1BPM 5, VE1BT 4.

ONTARIO: SM, Larry Thivierge, VE3GT—ABM: VE3GT. SEC: VE3GV. STM: VE3CYR. TC: VE3GO. ATC: VE3ADC. DEC: VE3FOB, VE3JJA. By the time you read this, you have probably already had a QSO on the newly released, at long last, 12 and 17 meter bands. While DOC has no sub band plan, CRR/L suggests that you should use the IARU band plan which is as follows: 2.4-3.2 MHz 24-30 CW, 24-30 CW/RWITTY, 24.930 to 24.990 PHONE/CW, 18.068 to 18.100 CW, 18.100 to 18.110 CW/RWITTY, 18.110 to 18.168 PHONE/CW. The Prince Edward Radio Club, using the special call sign VF3RAA, held a radio demonstration in Picton where 50 messages were generated from the general public. This was a first for the Club who also sent a message to the Minister of Communications outlining their public service activities. And speaking of such events, it is always a good idea to inform the Section Traffic Manager what traffic plans you have in mind for your activity and, even more important, someone should be assigned to pick up the return traffic which usually flows few days after the event is over. VE3KAS is a new amateur in the Windsor area. VE3RJ had a great trip to the Boston area and Nova Scotia. The annual Simulated Emergency Test (SET) will take place on the weekend of the 17th and 18th of October. Check into your nets and see if you can help. Traffic: VE3GSO 367, VE3FAS 302, VE3ORN 145, VE3HGJ 127, VE3KJD 123, VE3CYR 117, VE3GT 113, VE3GNW 111, VE3DPO 86, VE3WV 84, VE3OCF 72, VE3BUD 69, VE3EAM 27, VE3POJ 26, VE3WV 26, VE3WV 25, VE3NVJ 22, VE3BAJ 20, VE3KAZ 14, VE3AJN 11, VE3MCO 10, VE3BDM 7. (Jun.) VE3OCF 135, VE3NVJ 10, VE3FGU 6.

QUEBEC: SM: Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. TC: VE2ED. OO: VE2DHN. As activities resume, ORS (Official Relay Station) appointments are open, please contact your STM or SM, September 19 and 26: 1987 CRR/L Can-Am Contest, see August QST for details. New Amateurs and members VE2SUN and VE25IR (XYL and OM). With regret I have to report VE2CZ Silent Key. Bill, ex VE2FX, was very active in the Montreal area before moving to VE3 land. Caux a qui le trafic interesse, on demande des ORS (Official Relay Station). Contacter votre STM ou SM. Traffic: VE2BP 51, VE2WH 32, VE2JN 23, VE2EC 21.

SASKATCHEWAN: SM, Gord Kosmenko, VE5GF—STM: VE5HG. NM: VE5EE. SEC: VE5VH, VE5AGM. VE5MML. VE5WM. TC: VE5XZ. OBS: VE5JA. I finally made it. My first report in Section News. Congratulations to the Saskatoon ARC for sponsoring the CARR/CRR/L National Symposium. In the next few months, I will be reviewing the Saskatoon section field appointees, your support would be greatly appreciated. And also plan to visit the local clubs this coming winter. Until next month 73.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WYI—SEC: KC3TI. DEC: KP3WF and N3FDL. ACC: KC3JM, KA3LKN, WA3PHH, WA3VDJ. STM: KA3GRQ. PIO: WB3DPJ. SGL: AF3R. PSR: K3JL. WA3EWK has resigned as EC in NCC and has been replaced by WA3TNP. Field Day has come and gone with the following results. DARC class 4A total 1996 points, winner trophy in multitransmitter class. FSARC 1A total 2588 winner trophy single transmitter class. SARA 1A total 2164 NARC 1A total 1352. Congrats to N3FIA on upgrade. FSARC is thinking of operating a special events station on Dec. 7 as is Kent ARC,

maybe they can be combined. D1N stations 295 traffic 51 in 22 sessions. DEPN stations 37 traffic 5 in 4 sessions. SEN stations 52 in 4 sessions. Traffic: WA3WYI 35, W3PQ 34, WB3DUJ QO, KA3GRQ 28, W3FEG 25, K3JL 19, W3PVO 11, KC3JM 7.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: WA3PZO. ACC: KC3QB. SGL: WA3JAD. STM: KB3UD. PIO: W3AMQ. TC: W3FAF. The top Section-wide news is the Pennsylvania QSO Party on Oct. 10-11. Please put your county on the air and help us bring the club trophy back to Eastern PA! We'd like the new small/medium club gavel, too, please. Also be sure to get some Novices on the air for the new plaque sponsored by your Section Manager. Concentration, endurance, and accuracy are just a few of the skills a good contest can transfer to emergency communications when the need arises. Simulated Emergency Test weekend is October 17-18, when you'll still be sharp from the QSO Party. We wish all clubs, nets, and ARES groups a successful exercise. ARES Districts 1 and 4 have National Disaster Exercise drills on the scheduled for September and October. Scranton-Pocono ARK newsletter editor WA3LWR was honored as Outstanding Disaster Volunteer of the Year by Scranton Chapter, American Red Cross. The hamfest session rolls on this month with Pack Rats on Oct. 11 and C-CARS on the 18th. The Rats' VHF conference convenes on Oct. 10. Let's welcome some new Field Organization appointees: Assistant TC NG3Z, OBS's K3FJU (of PARR) and KB3UD (for his PBBS vol), Official Observer KC3SM, and Official Emergency Station KC3TX. RF Hill ARC awarded their Jack Willard Memorial Scholarship to former Perkiomen Valley ARC prez KA3FX. WSFYK is scheduled to receive his 10 year membership plaque from Atlantic Division Director WA3BC. The DC-LEHIGH meeting, Congrats to Warrmister's 1987 officers KY3T, NJ3J, N3ESI, and KA3JE. Did you see the photo from Tamaqua Transmitting's hamfest on page 12 of August's QST? Harrisburg RAC offers Novice tests an hour before club meetings on an every-other-month schedule. License test information appears in each issue of EPA FEEDLINE, the quarterly Section newsletter sent to all Field Organization appointees and Affiliated Clubs. It's good to see that info reprinted in many club newsletters. There is still time to send in your club's 1987 Annual Report. ACC KC3QB has been in touch with non-reporting groups to offer help getting the forms in. We can't serve you by re-sending mail to unique addresses. Active Novices who are ARRL members may now hold many Field Organization appointments previously not open to them. Your help in spreading the word about these opportunities will benefit everyone. Batter late than never, ARL forty-six to OHS WA3DE on his 82nd last summer! Traffic (June): N3AZW 553, N3DRM 122, KD3AO 120, AA3B 101, N3OD 97, N3COY 67, W3JKX 66, KU3R 63, KA3DJ 60, W3AKA 62, W3JPF 46, K3WPI 45, KB3UD 42, WA3U 39, WA3CKA 34, W3DPP 25, W3TRV 24, WA3QAN 19, N3EFW 19, KO3M 19, W3CL 18, KA3RFQ 12, KY3M 10, WA3DE 7. Packet BBS: K3RL1 118, KB3UD 65, AG3F 36.

MARYLAND-DC: SM, John A. Barolet, KJ3E—ASM: N3EGF. SEC: K3NBU. STM: N3EGF. SGL: K3W3X. October, and the annual ARL GSC activity. SEC: K3NBU advises that the section-wide test this year will be weather-related. Hurricanes, tornadoes, floods, blizzards? I don't know, but be sure that normal communications will be unable to handle the problem and amateur radio "disaster" communications support will be required. Be ready! You don't know what to do? Contact K3GU or KJ3E now! About now the clubs should be coming alive again after the summer quiescent period; is your club affiliated? Ask Lee Hayford, Club Manager at ARRL HQ, or me, for a listing of the benefits of affiliation. They are many, and useful! There are forty plus Maryland-DC affiliated clubs at present. The section-level leadership position of Affiliated Clubs Coordinator (ACC) is vacant now. The ACC interfaces between ARRL HQ and all the Maryland-DC, providing them with a nearby source of ARL-related information. ACC should have, and use, good written and oral communication skills. Ask KJ3E for further information on appointment to this position. In the two years I have been the SM many clubs have regularly sent me their newsletter, something very much appreciated. But, the lead time for this column is two months and newsletters arrive here usually after the fact. So, it is seldom possible to use material from the newsletters in this column; however, the information contained is important to the SM in keeping him aware of section activities. Please continue sending them to me, and to my soon-to-be successor. Plan to participate in the Maryland QSO party, honchoed by NB3F. It will be from 2200Z October 30 until 2200Z November 1, 8C/10 meters (no WARC bands), single operator category only. A plaque will be awarded to the highest scoring Maryland club; a plaque will also be awarded to the highest scoring single operator scores. Appointments: KC3AG as OO, WITH THE NETS: Net/Mgr DND/TQC/NI: MSN/KC3Y 3/14/1/3/00, MFPN/N3EGF 3/03/6/95, WRPN/WB3BFK 20/12/1/39, MDCPON/W30Y1 5/13/47, BCN/N3EGF 4/1/21, MDDN/W3FA 6/2/19/490 (TOP BRASS KJ3E/80, W3FA/76, WA3YL/0/66, K3NNI/65, KC3Y/63, PSHR: W3FA 1/01, W3YVQ 93, N3EGF 86, KC3Y 82, KJ3E 74, WA3UJ 68, WA3YLO 65. Traffic: W3FA 124, KJ3E 98, N3EGF 95, W3LDD 84, W3YVQ 82, NC3Z 75, K3K3 74, WA3UJ 74, WA3YL 68, KC3Y 61, K3N3 59, W3DDJ 44, N3DE 42, W3QC 34, W3FZ 39, K3T3 22, NB3P 21, KC3U 16, WB3BFK 14, WB3LQ 13, K3OPR 11, K2EB 10, KC3J 4, KC3DW 2, WA1QA 2, WA3GYW 2, N3FO 2.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2QEP. SEC: KP2LI. STM: W2ZUVE. ACC: KJ2XE. TC: N2BOT. PIO: ACANT. SGL: KA2KKL. BM: W2EUV. OO: WA2HEB. ATC: KJ2F, KA2RJA and WB2MNF. Congratulations to Frank Camposano, N2BOT, of Lakehurst. Frank has become the section's new TC replacing KA2PRA who moved out of the section. Frank's address is: 164 Brandon Rd., Lakehurst 08733. The Jersey Shore ARS will be conducting VE tests on October 20, 7PM, at the Rivarwood Park Recreational Building, Whitesville Rd., in Toms River. For further information contact Bill Haldane, AC2F, 15 Cedar Crest Dr., Bayville 08721. Also, the Cape May County ARC will be giving tests on October 24, beginning at 10 AM sharp at the Library Building basement on Mechanic Street (just off of Route 9) in Cape May Court House. For info contact Mary Petruzzi, AE2Y, 16 Rose Lane, Villas 08251. The weekend of October 17-18 marks the annual Simulated Emergency Test (SET) exercise. I'm not sure what the SEC has planned for that weekend, but please listen to EASTLINK for the latest details.

Don't hesitate to set something up locally. Need some help? Contact your county SEC. If you don't know who your traffic EC is, please contact our SEC. Until next month, 73. Traffic: WB2JF 276, N2CER 70, K2SB 28.

WESTERN NEW YORK: SM, William W. Thompson, WB2JF—ACC: N2EJF. PIO: WA2PUJ. SEC: NN2HT. TC: K2QR. SGL: WB3CFE. STM: WA2PUJ. APPOINTMENT: (NM) N2EJA NYSM. Club Officers: GRAM WB2CZC, KA2HJ, WA2HED, WB2JOB; KLARA, KV2W, WA2VVK, N2GVJ, WA2JD5. THANKS to 81 operators who supported the 1987 Empire State Games at Syracuse—WA2PUJ, Public Service Honor Roll: N2ABA, N3DPF, N2EJA, N2EYV, WA2JFU, W2FR, NN2H, W2MTA, WB2CWO, ND2S, KA2UBD, NE2W, K2YAI, KA2ZNZ. July BPL: N3DPF.

NET NAME	FREQ	TIME	DAY	MGR	QNI-QSP-QND
NY RACES SSB	3993	0800	SUN	N2AGO	076-008-04
NYSR CW	3530	0930	SUN	W2MTA	011-002-04
NYSM CW	3677	1000	DY	N2EJA	323-204-31
WDNM FM	04/64	1100	DY	WB2QWO	303-113-31
NYPON SSB	3913	1700	DY	KA2UBD	475-211-31
EMPIRE SSB CW	3590	830	DY	W2PUL	221-052-31
LEWIS CO FM	0/15	1800	SUN	WA2OEP	047-004-04
NYSPTEN SSB	3925	1800	DY	WB2HKU	454-053-31
OCTENEF FM	34/94	1830	DY	WB2HLY	515-091-31
Q Net FM	31/91	1830	DY	N2AGK	374-000-31
STAR FM	13/73	1830	DY	NE3B	298-049-31
WDNE FM	57/17	1830	DY	WB2CWO	476-185-31
NYSIE CW	3677	1900	DY	KU2N	411-212-31
BRVS Net FM	6555	2000	DY	WB2OFU	305-002-31
Blue Line FM	93/33	2000	DY	WA2SEF	138-018-18
Mohawk CW	21150	2000	T	KA2QOC	008-010-08
Jefferson FM	10/70	2000	All	KA2QTS	369-021-29
WV TWIN FM	90/54	2000	Wed	WB2CWO	040-003-04
CNYTN FM	90/30	2115	DY	W2PUL	519-797-31
OCTENEL FM	28/88	2130	DY	WB2HLY	212-053-31
WDNL FM	04/64	2130	DY	WB2CWO	404-088-31
NYS/L CW	3677	2200	DY	KU2N	419-282-31

*NTS Nets. HAMFEST CALENDAR: Sorry for the gremlin problems last month for Trumansburg, HAM-O-RAMA and Elmira—remaining are Elmira Sept. 26th and Syracuse October 17th. Batavia Hamfest was the best ever. Thanks to all the GRAM efforts and the 1,000 plus attendees. GOLDEN AWARD goes to WA2PUJ for another successful Empire State Games. If you haven't been part of this in the past, you've missed lots of fun and excitement. Why not plan to help next Summer at Syracuse contact WA2PUJ the State Coordinator for Amateur Radio. Is your radio club affiliated with the League? Is your radio club considering application to become a Special Service Club? Affiliated Club Coordinator, N2EFH, can assist your club, drop him a line. Presently there are less than 200 appointees in Western New York... if you're interested in an appointment or want to know more, contact Section Manager, W2MTA. July Traffic: N3DDP 598, N2EJA 369, KA2UBD 357, WB2CWO 351, W2FR 250, WA2FJJ 235, NE2W 195, W2MTA 193, WB2QJU 128, N2ABA 122, ND2S 102, NN2H 99, KA2QO 92, KA2ZNZ 87, N2EYV 81, KA2BBD 52, WB2JHJ 52, K2YAI 55, AF2K 35, NE3B 34, N2FJK 30, W2B3J 23, KA2HJ 19, NS2X 19, K2OR 10, K2IUT 8, WA2OEP 8. (Jun.) K2VR Happy Halloween!

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—NET: KQC QTC SSSS KHZ T/D MAN WA2PACW 218 31 3895 7:00P/D WA3JUN WPAFTN 326 103 31 3983 6:00P/D WA3JUN KFN 119 49 23 3983 3:30P/M WA3HLN PPN 138 137 31 3958 5:00P/D KZ3THT NWPA2MTN 551 82 27 443/345.13 9:00P/D WPA2MTN 276 66 31 462/88 8:00P/D. NWPA2MTN Net man is KC3NY and the man for the WPA2MTN is KA3BGC. I would like to announce we have a new Public Info Officer. He is N3DOK and has been very active in our ARES and RACES EVENTS. He did the job of getting volunteers (95) for the PGH Marathon and did a fine job coordinating communications. He also has been able to get publicity in the local news. We have had three major events in Allegheny County and the assistant EC who did the work of setting up the operations did an excellent job. N2AEJ had the March of Dimes event using about 35 plus ops. WA3PJV had the responsibility for obtaining ops for the Vintage Grand Prix Races in the city. This event drew about 45,000 visitors during the two days. The P.A. announcer praised the amateurs quite often during the events, and I had him also mention the ARRL. I would like to hear from other counties and the events the other amateurs are providing communications for. If you know of any type of a public show or other event, find out who the people in charge are. Some may turn you down until you let them know what Amateur Radio can do. Also, all appointees are expected to report monthly to hold the appointment. Otherwise we don't know if you are still interested. July Traffic: K3ST 92, W30CA 61, K3EJL 51, N2AEJ 47, N3AES 10, WA3JUN 99, W2XO 86, N3CZV 71, KA3DEM 62, K3SMB 52, W3NGO 45, W3KUN 45, WA3DBW 42, KD3AG 39, W3RWL 27, WA3QNT 16, K3LTV 15, KA3EGE 12, W3AHH 8.

CENTRAL DIVISION

ILLINOIS:	SM, David E. Lattan, WD9EBQ—SEC: W3QBGH, STM: K3CNP, ACC: W9TT, BM: K3EUI, SGL: W9KPT, PIO: N3GEWA, OO: WB9SFT, TC: N9RF, AFM: A9LD.
ILLINOIS SECTION NETS:	
NET	FREQ TIME (LOCAL ILLINOIS)
ISN	3905 1800 DAILY
ITN	3830 1500 DAILY
ITN	3705 1800 DAILY
CTN	147/69/09 2100 DAILY
HLARE9	3905 1630 1ST + 3RD SUNDAYS
ILLINOIS INDEPENDENT NETS	
IEN	3940 0900 SUNDAYS
ILPN	3915 1630 M-F, 1430 SUNDAY
NCPN	3915 0700 MONDAY-SATURDAY
NCPN	7270 1215 MONDAY-SATURDAY

The following report received this month from WA7MAD is a good example of how one ham can have a positive impact on bringing Amateur Radio before the public. "Today was the day of my PACKET radio demonstration at the Evanston Art Festival on the lakefront. I picked a good day since it was HOT inland and very pleasant and breezy by the lake. I took 13 messages from the public and had a couple of people express interest in becoming hams. I passed out some material that I obtained from the ARRL. People were initially cautious, but (continued on page 94)

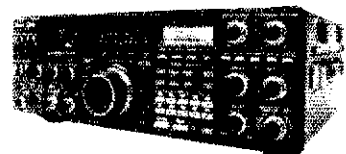
HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

**GUARANTEED
AT LOW OUTLET PRICES**

7 STORE BUYING POWER

KENWOOD TS-940S



TOP-OF-THE LINE
HF TRANSCEIVER
GREAT PRICE, CALL

KENWOOD TM-3530A

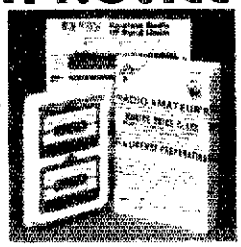


The First Comprehensive
220 MHz FM Transceiver.

**ARE YOU READY FOR
220 MHz OPERATION?**

Gordon West's 21 DAY NOVICE

\$19.95



- CODE TAPES • 112 PAGE BOOK • BANDS CHART
ALL FCC FORMS • SAMPLE TESTS • PLUS MORE!
- \$70 in equipment certificates from ICOM, KENWOOD, & YAESU.
 - Ham radio equipment "Wish Books".
 - ARRL membership forms.
 - Hotline for student questions.
 - Course completion certificate.

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

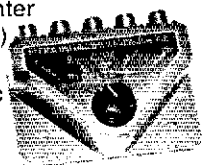
shown with optional
MARE rotor base

IN STOCK FOR QUICK DELIVERY
OTHER MODELS AT GREAT PRICES

Alpha Delta Model DELTA-4

Lightning Surge Protected
4-Position RF Coax Switch

- Exclusive center "off" (ground) position.
- Uses ceramic Arc-Plug® protector.
- Micro-strip circuitry—no wafer switch.



Model DELTA-4
(UHF Connectors) **\$69.95**

Model DELTA-4/N
(N-type Connectors) **\$89.95**

FREE SHIPMENT
MOST ITEMS UPS SURFACE

GEOCHRON GLOBAL TIME INDICATOR



- Detailed illuminated map shows time, time zone, sun position and day of the week at a glance for any place in the world.
 - Continuously moving - areas of day and night change as you watch.
 - Mounts easily on a wall. Size: 34 1/2" x 22 1/2".
- \$1295 DELIVERED IN U.S.**

YAESU FT-727R

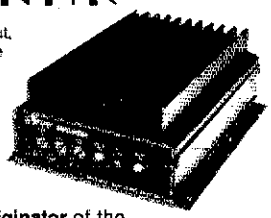
5w, Dual Band
2m/440 MHz

**Enhanced
Version**
GREAT PRICE!



INDUSTRIES INC. UNAR

30w in, 160w out,
with low-noise
preamp!
MODEL
2M30-160P
for 2 meters
SALE!
\$219.95



From the Originator of the
QUALITY VHF AMP/PREAMP COMBO!

2 METERS	220 MHZ	440 MHZ
2M2-100P	1.3M2-80P	70CM2-50PG
2M4-40P	1.3M4-30P	70CM10-100PG
2M10-80P	1.3M10-80P	70CM30-100PG
2M30-160P	1.3M30-140P	

Full Line Now Includes
UHF Models with
GaAs FET PREAMP!



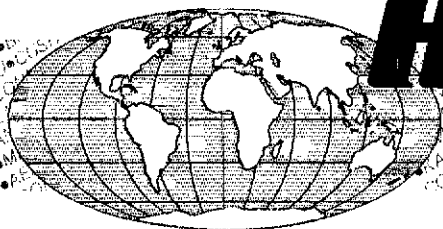
All Major Brands in Stock Now!

CALL TOLL FREE (800) 854-6046



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





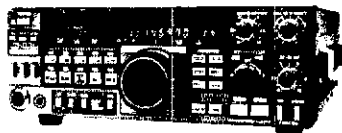
HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

**GUARANTEED
QUALITY
AT LOW OUTLET PRICES**

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
TH-21BT/31BT /41BT**
2MTR 220 MHz 440 MHz

MINI HAND-HELD

With dip switch
programmable
CTCSS encoder built-in.

FREE
ADDITIONAL
BATTERY
WITH
PURCHASE



**GREAT
PRICE!**

**KENWOOD
TS-440S**



HF TRANSCEIVER
• 160-m to 10-m Amateur Band
• 100-kHz to 30-MHz General
• Available with optional built-in Antenna Tuner.

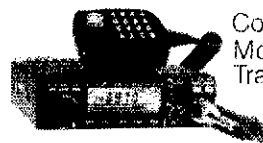
CALL FOR PRICE!

NOW! RAPID DELIVERIES



FROM STORE NEAREST YOU

**KENWOOD
TM-221A/421A**
2 MTR 70 cm



Compact FM
Mobile
Transceivers

**FREE SHIPMENT
MOST ITEMS UPS SURFACE
LOW PRICE!**

**KENWOOD
TM-2570/2550/2530**
70w 50w 30w



Compact FM Mobile Transceivers
LOW PRICE!

**KENWOOD
TM-3530A**



The First Comprehensive
220 MHz FM Transceiver.

**ARE YOU READY FOR
220 MHz OPERATION?**

**KENWOOD
TH-215A**

Full-featured
2m Hand-held
Transceiver
with 10 memories

**FREE SHIPMENT
MOST ITEMS UPS SURFACE
GREAT PRICE!**



All Major Brands in Stock Now!



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

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

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

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

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

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

SAN DIEGO, CA 92123
5375 Kearny Villa Rd
(619) 580-4900
Tom, Mgr. KM6K
Hwy. 163 & Claremont Mesa Blvd

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

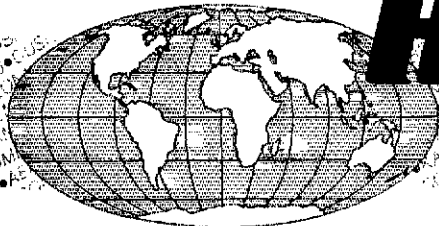
**STORE HOURS
10 AM-5:30 PM
CLOSED SUNDAYS**



CALL TOLL FREE (800) 854-6046

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





HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

FREE SHIPMENT
MOST ITEMS UPS SURFACE

7 STORE BUYING POWER

ICOM IC-761



HF SUPERIOR GRADE
TRANSCEIVER

SALE! CALL FOR PRICE

ICOM IC-275A/275H



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

GREAT PRICE!

ICOM IC-900 MULTI-BAND MOBILE



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

ICOM IC-28A/28H



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

LOW PRICE!

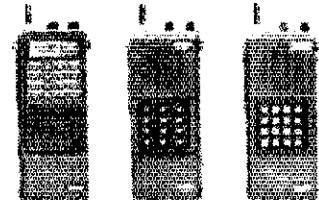
NOW!
IC-38A
220 MHz

NOW! RAPID DELIVERIES

COAST TO COAST

FROM STORE NEAREST YOU

ICOM HAND-HELD VHF/UHF



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

ICOM IC-735



The Latest in ICOM's Long
Line of HF Transceivers

CALL FOR LOW, LOW PRICE

ICOM IC-R7000



25 MHz-1300 MHz

IN STOCK FOR
IMMEDIATE DELIVERY

ICOM IC-U4AT/U2AT 440 MHz, 2 MTR

Mini
Hand-Held
AT Model
w/ TT Pad
GREAT
PRICE!



All Major Brands in Stock Now!



Bob Ferrero W6RJ
President

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

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

ATLANTA, GA 30340
8071 Buford Hwy.
(404) 263-0700
Neil Mgr. KC4MJ
Doraville 1 mi. north of I-285

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

OAKLAND, CA 94606
2710 Livingston St.
(415) 534-5757
Al Mgr. WA6SYK
17N-5th Ave. 17S-16th Ave

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
Hoh Mgr. K7RHH
East of Hwy. 17

SAN DIEGO, CA 92123
3375 Kearny Villa Rd.
(619) 560-4900
Tom Mgr. KM6K
Hwy. 163 & Claremont Mesa Blvd

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
Al Mgr. K6YHA
San Diego Fwy
at Victory Blvd.

STORE HOURS
10 AM-5:30 PM
CLOSED SUNDAYS



CALL TOLL FREE (800) 854-6046

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



HAM RADIO OUTLET

LARGEST HAM OUTLET IN THE WORLD

**FREE SHIPMENT
MOST ITEMS UPS SURFACE**

7 STORE BUYING POWER



**YAESU
HANDHELD**

FT-209RH
2M

FT-109RH
220 MHz

FT-709R
440 MHz

**FREE SHIPMENT
MOST ITEMS
UPS SURFACE**

GREAT PRICE!



**FREE SHIPMENT
MOST ITEMS UPS SURFACE**

**YAESU
FT-757GX**



Compact HF Mobile Transceiver

CALL FOR PRICE



**YAESU
MINI
HAND-HELD**

FT-23R
2 METER

FT-73R
440 MHz

**FREE SHIPMENT
MOST ITEMS
UPS SURFACE**

**CALL NOW
FOR
LOW PRICE**

NOW! RAPID DELIVERIES



FROM STORE NEAREST YOU



**FREE SHIPMENT
MOST ITEMS
UPS SURFACE**

**YAESU
FT-727R**

5w, Dual Band
2m/440 MHz

**Enhanced
Version**

CALL FOR PRICE



**YAESU
FT-211RH/FT-711RH**
45W/2MTR 35W/440 MHz



YOUR BEST BUY!

**WE SHIP DIRECT TO YOU
FROM ANY ONE OF OUR
NATIONWIDE OUTLETS.**



**YAESU
FL 7000**



HF AMPLIFIER

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 &
Knotts Berry Farm

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

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

OAKLAND, CA 94606
2210 Livingston St
(415) 534-5757
Al Mgr. WA6SYK
17N-5th Ave #12S-16th Ave

PHOENIX, AZ 85015
1702 W. Camelback Rd
(602) 242-3515
Bob Mgr. K7BDH
East of Hwy 17

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
Tom Mgr. KM6k
Hwy 163 & Claremont Mesa Blvd

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

STORE HOURS
10 AM-5:30 PM
CLOSED SUNDAYS



CALL TOLL FREE (800) 854-6046

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



UNADILLA REYCO/INLINE™

Amateur Antenna Baluns

For 20 years, preferred by Amateur, Commercial and Military Operators. First with built-in lightning arrester—minimizes TVI, maximizes power.



W2AU 1:1 & 4:1
\$17.95



W2DU-HF
\$19.95



W2DU-VHF
\$19.95

W2AU Broadband Ferrite Core Baluns

For medium power (1000 watts RF min.) and broadband operation 3-40 MHz.

W2DU Non-Ferrite Very High Power Baluns

W2DU-HF (High Power)

- * 1.8-30 MHz
- * 3000-9000 watts with 1:1 antenna SWR
- * 1500-5000 watts with 2:1 antenna SWR

W2DU-VHF (High Power and Extended Range)

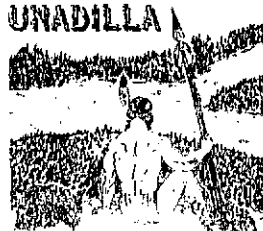
- * 30-300 MHz
- * 2000-4000 watts with 1:1 antenna SWR
- * 1200-2400 watts with 2:1 antenna SWR

W2AU 1:1

- * 50 to 50 or 75 to 75 ohms
- * For dipoles, V's, beams, quads

W2AU 4:1

- * 200 to 50 or 300 to 75 ohms
- * For high impedance antennas such as folded dipoles



Purchase from any of over
300 dealers nationwide
or order direct

To request informational brochure, call

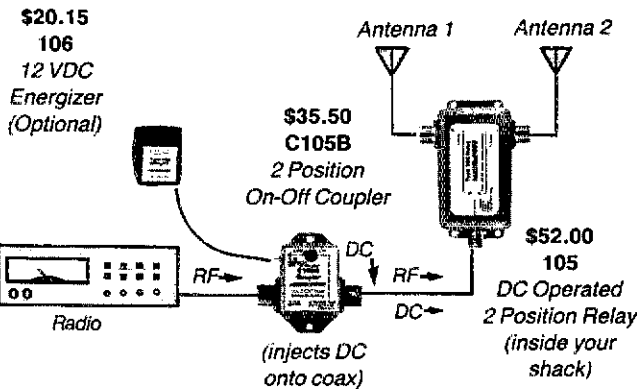
617-475-7831

write

ANTENNA'S ETC.

Ballardvale P.O. Box 215, Andover, MA 01810-0814

Switch All Your Antennas Over One Coaxial Feedline



This system operates from 1.5 to 180 MHz and handles 1250 RF watts.

Use our antenna switching kit and eliminate excess coax runs. With this kit and a single run of coax, you can switch between your antennas remotely. Use to add an antenna at modest cost, or change array direction.

Other types and combinations of relays are available. Please call or write us for more information, and save on your coax runs!

30 day MONEY BACK GUARANTEE on all products
Unadilla/Reyco/Inline is now a Division of ANTENNA'S ETC.

when they realized the TNS was a free public service they thought it was a pretty good deal. Unfortunately, I was unable to find a volunteer to help out so was there by myself. The officials were very cooperative and gave me a spot in the shade right by one of the main entrances. As I expected, the sight of the PACKET equipment aroused lots of curiosity and I had several enjoyable conversations. Hams should realize that this kind of thing can be fun to do. I thought it was a good way to spend a summer afternoon... and it sure beat mowing the lawn. I depended on and got great cooperation from Sy, KJ9L, whose BSC on 145.01 made the transmission of messages effortless. Slightly to the west, AAD reports that Kane Co. ARES and Kane Co. ESDA provided communications and traffic control for the American Cancer Society Biathlon which was held on July 11th in St. Charles. With the recent incentives of Novice Enhancement, now is a great time for club projects which maximize contact with the general public. Ham radio is a great thing! Let's be willing to share it with others who are interested. If we don't continue in the traditions of invitation, training and service that are so much a part of our past, we may not have a future worth worrying about. Traffic: KA9FEZ 259, NC9T 242, K9CNP 183, W9HLX 164, W9EHS 142, WA7MAD 105, WA9VLC 80, W9DPT 69, W9LWH 69, W9LXG 65, KA9WIN 50, W9DZL 40, NN9M 33, N7DOV 26, KD9K 23, W9KH 23, K9WMP 18, KA9CTW/T 18, W9TVD 15, W9HQW 11, K9EHP 10, KA9BBV 9, W9VEY/M 8, WA9RUM 5, KD9TK 4. Total: 1672.

INDIANA: SM, Ron Koczor, K9TUS—ASM; W9UMH, SEC; W9SZOE, STM; W9LJL, ACC; K9TUS, PIO; KA9LQM, TC; K9PS, SGL; WA9VOD, BM; KC9TA, OOC; KJ9G, SRC; N9WB, Net Managers; ITN KD9DU, QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC.

NET	FREQ	TIME	DAILY	UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2130/2300	2949	364	2009	88		
QIN	3656	1430/0000/0300	629	236	1696	93		
ICN	3705	2315	122	18	447	27		
IWN	3910	1310	1166	382	31			
IWN	VHF	Bloom/Kokomo	2142	377	62			

HOOSIER VHF NETS:
5169 262 4242 126
Silent Keys: K9LZQ, Logansport; KA9LS, Fort Wayne; BPL; W9JUL, Cig O. Reynolds, 292 sent; 285, Divd. 1. This year's SET is set for Oct 17/18. If your group is making plans, let the Section staff know what you're planning. Also, we'd like you to make a special effort this year to include as many local served agencies in your plans as possible. Groups like Red Cross, Salvation Army, etc., need to be involved in our training exercises. Our people need to learn how to support these agencies. ECs make sure that our SEC is informed of your plans. The importance of this training exercise cannot be overstated! If your group has set the dates for your 1988 hamfest or VEC test sessions, let me know. I'd like to include your info in the list I'm compiling. This info is distributed around the state. DXers take heart! The sunspots seem to be on the way up, just in time for new DX Expeditions to Bouvet, Marion Island and selected other goodies!... and just in time for this Fall's contest season. How is your Golden Jubilee DXCC coming? Hard to believe but almost 3000 have been applied for already! Some people already have over 200 countries worked in 1987 who needs spots? Come see me next month at the Fort Wayne Hamfest, one of Indiana's biggest and best! See you at the Bedford Hamfest on the 11th. My trips to the southern part of the state are fewer than I'd like, but that can't be helped right now. Public Service Honor Roll is an award within reach of anyone active in public service. Contact me for details. If you'd like to talk on the air, I am NCS for the Saturday 2300 session of ITN (in use) Station reports for July: W9JUL 578, K9J 174, KA9FO 110, K9AWA 103, NJ9S 89, K9TKE 88, W9PPFZ 70, N9BZZ 52, KD9ER 45, KA9RNY 38, W9BHR 34, KA9EV 27, W9UEM 27, KB9HH 23, K9ZBM 23, W9MDS 20, WD9HJ 18, WD9DWD 17, K9SBW 15, KA9QMI 15, W9BTZ 14, W9ZGC 14, WA9QCF 12, W9PMT 12, WA9YIF 11, KA9LQM 10.

WISCONSIN: SM, Richard R. Reagent, K9GDF—SEC; W9OAK, STM; K9UTQ, ACC; KA9FOZ, BM; W9JISW, OOC; NC9G, PIO; K9ZZ, SGL; AG9V, TC; K9GDF, Special congratulations to 18-year old Scott Young, N9FZS, of Colby for receiving the ARRL Hiram Percy Maxfli Award of \$1,000 cash plus travel and accommodation expenses to attend ARRL Convention to formally receive a plaque. Scott will use the cash toward tuition to study E.E. at M.S.O.E. Four Lakes ARC has qualified to renew their Special Service Club status; info on SSCs and ARRL Affiliated Club benefits is available from KA9FOZ. New officers of greater Milwaukee Association: Pres. KC9AW, Sec. Treas. N4TZ, GMDXA welcomes new members, try repeater on 224.08 MHz or Net 9 PM Mondays and Thursdays on 147.36 MHz. New officers W/K ARC of greater Milwaukee: Pres. WA9TZE, Sec./Treas. KA9TEP, Awards Manager KY9P at Ozaukee HC reports KA9SPD awarded VUCC on 432 MHz and WA9OKB 6-meter WAS. Badger Examiners exam October 17th, St. Nicholas Parish, 5353 North Green Bay Ave., Milwaukee, 1 PM, reservation with KB9G. Wisconsin Chapter 55 QCWA meeting is October 3rd with a lunch and auction at the Liberty Club in Kimberly, October 25th, Kettle Moraine Radio Amateur's Ham, Computer and Video Fest, Waukesha Exposition Center, Highways J and FT, 9AM. Thanks to communicators who worked hard under the direction of EC W9BMM to make the Milwaukee City of Festivals and Circus Parades successful. Sorry to report Silent Keys W9RYO of Beaver Dam, K9HJ of Milwaukee, and W9KJU of Lake Geneva. KB9YY is forming ARES group in Rock County, please let him know of any available volunteers.

NET	FREQ	TIME	MGR	QNI	QSI	SESS
BWN	3984	6AM	WD9ID			
BEN	3985	NOON	KA9RII	701	204	31
WSBN	3985	5:30PM	WB9ESM	701	164	30
WNN	3723	6PM	N9DGL	153	10	26
WSSN	3645	6:30PM	N9BDL	149	24	31
WIN-E	3682	7PM	WB9FH	137	133	31
WIN-C	3682	10PM	WB9CJ			
NW7N	3494	6:30PM	W9ZZM	432	41	31
WCW7N	3191	8:00PM	KD9TT			
WB9YYP	1583	WB9CV 271, KA9RII 245, K9GDF 190, W9CBE 153, W9DND 149, N9BDL 92, W9UCL 82, N9BCX 74, AG9G 71, W9BCH 59, KA9BHL 50, K9UTO 42, W9ODV 32, K9FHI 31, W9IEM 31, K9BED 24, W9DNDQ 20, KA9KLZ 12, W9JW 12, KA9MWT 10, W9PVD 4, N9BYS 3. (Jun.) WA9WYS 109, WB9ESM 56, N9B 25.				

DAKOTA DIVISION

MINNESOTA: SM, George Fredrickson, Jr., KC9T—SEC; KA9ARF, STM; KD9CI. Wow the summer months went by fast and winter is knocking at our back door. For some of you, those antenna projects will start coming to life and maybe we'll be hearing some of you on 160 meters. In June, 1987, radio amateurs in Minnesota provided communications for the Great River Ride, a three-day bicycle trek to raise funds for the American Lung Association. The ride took place along the Mississippi River from Prescott, Wisconsin to Winona, Minnesota. Radio amateurs KB9BN, N9BSN, WD9EID, WD9HT, K9JE, K9JA, K9F, and W9MAT used two-meter radio and the WD9HT/R, WB9BUZ/R, KB9S/R, and KB9HAD/R repeaters to maintain communications throughout

NOW — ALL KANTRONICS KPCs and KAM ARE TCP/IP NETWORKING COMPATIBLE INCLUDE THE PACKET MAILBOX AND COME WITH 32K RAM

EXTRA FEATURES — NO EXTRA CHARGE

That's right! Now all Kantronics packet units* include the Personal Packet Mailbox™, come with 32K RAM, and are TCP/IP Networking compatible — ALL AT NO EXTRA CHARGE. And there's more . . .

KAM and KPC owners** — you can add the Packet Mailbox and TCP/IP compatibility for the special low price of just \$15.00.

At Kantronics we're committed to keeping you current. Check below and see — we offer more features and the best customer support around.

KPC-2™ This low cost/high performance Kantronics TNC features a built-in HF/VHF modem, the Personal Packet Mailbox, full duplex operation, and multiple connect capability. The serial RS-232/TTL port allows easy interfacing with all computers, even Commodores. KPC-2 is TCP/IP Networking compatible, includes 32K RAM, and uses only five front panel indicators for easy operation. Like all Kantronics units, KPC-2 is fully compatible with existing TNCs.

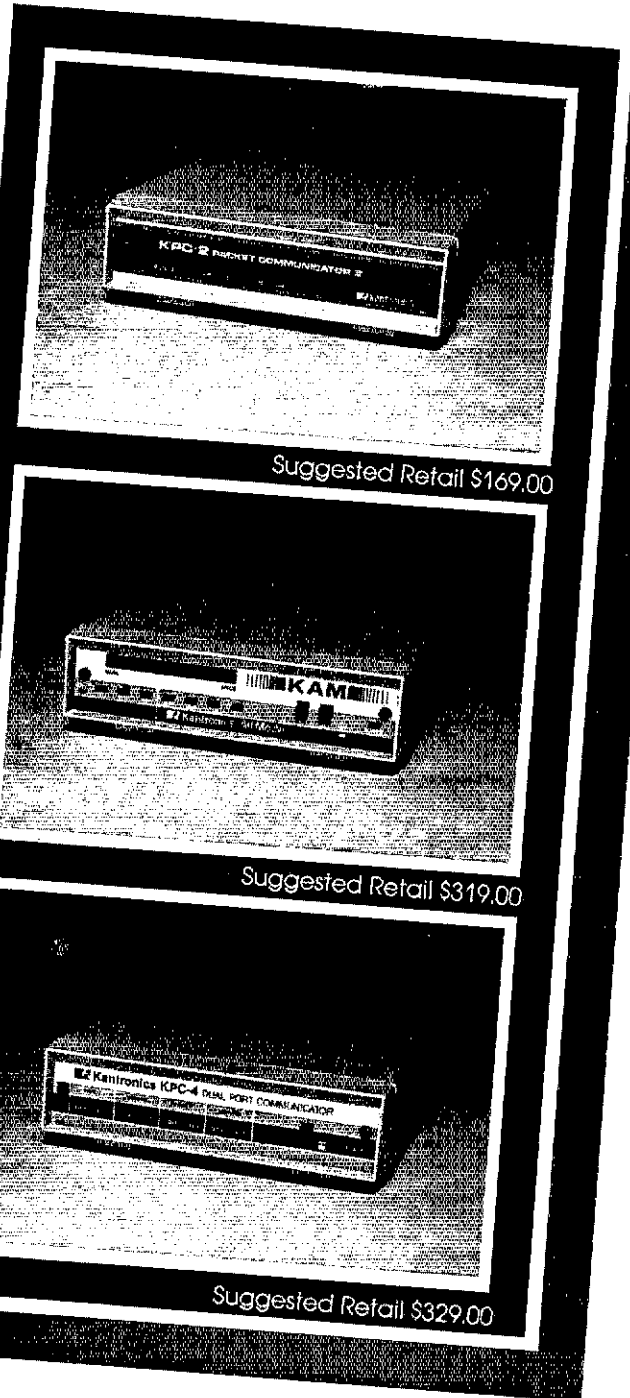
KAM™ KAM is the fully programmable All Mode unit that lets you operate VHF Packet, HF Packet, CW/RTTY/ASCII/ and AMTOR. But that's not all . . .

Only KAM's dual VHF/HF radio ports work together for simultaneous Connects, Digipeating, and VHF/HF GATEWAY operations. And now KAM is TCP/IP Networking compatible, comes with 32K RAM, and has the Personal Packet Mailbox ALL STANDARD.

KAM includes watchdog timers on each port, an RS-232/TTL serial port, and a bargraph tuning indicator for HF operation. KAM even comes with an external modem connection point for optional 2400 b/s packet operation. For the greatest degree of sensitivity and flexibility, turn to KAM, Kantronics All Mode.

KPC-4™ Only KPC-4 features simultaneous Connects, Digipeating, and Gateway functions on two fully functional VHF radio ports — each of which includes a watchdog timer. What's more — you can add 2400 b/s operation to port 2 with Kantronics optional 2400 Modem™.

KPC-4 includes the Personal Packet Mailbox and 32K RAM (expandable to 64K), and is TCP/IP Networking compatible. The RS-232/TTL serial port assures easy interfacing with any computer. Make KPC-4 your GATEWAY into packet flexibility.

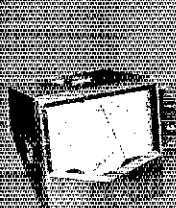


Kantronics
RF Data Communications Specialists
1202 E. 23 St Lawrence, Kansas 66046 (913) 842-7745

* KAM, KPC-2, KPC-4, and KPC-2400 units shipped 7-31-87 or later.
** KPC-1 (Packet Communicator), KPC-2, KPC-4, KPC-2400

Superior Communications Accessories

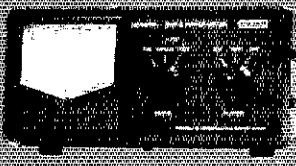
Cross Needle SWR/Power Meters*



CN-500 Series COMPACT METERS
1.8-250 MHz
60-238



CN-400 Series BASE/MOBILE METERS
3.5-950 MHz
90-239 N-Type Back Lit



MS-600 Series BASE METERS
1.8 MHz-2.5 GHz
90-239 N-Type Back Lit

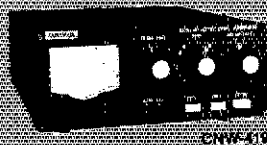
HEAVY DUTY POWER SUPPLIES*



5-6 A-36 A Max with Variable 1-30 VDC



LINEAR AMPLIFIERS*
144-148 MHz for hand field and mobile use



ANTENNA TUNER*
1.8-30 MHz (17 bands)
200 W CW (3.5-30 MHz)
100 W CW (8-3.4 MHz)
ENW-611

COAXIAL SWITCHES*

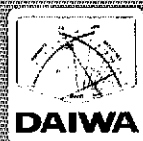


AUDIO FILTER*

Four stages Variable bandwidth Filter sharp reception - Better in weak signals - Pilot Tone Decoder circuitry



1.8-1500 MHz with SO-239, N-Type and BNC Connectors - SWR below 1:2 - Insertion loss less than 0.2dB - Unused terminals grounded for your protection - Rated up to 2.5 kW PEP - High dB Terminal Isolation



DAIWA Electronics Corporation
1908A Del Amo Blvd. • Torrance, CA 90501
(213) 212-6057 • (213) 212-6058

*Specifications subject to change without notice • All models and types not represented

the 105 to 165 mile route. Several of the hams rode their bikes as ride leaders and participating fund raiser, using their hand-helds to radio first hand reports from the bikers. Communicators involve scheduling rest and water stops, directing mechanics to bikes needing repairs, and observing and reporting on health and welfare of the 200 or so bikers. Well most of you know that there have been some changes in our section. Starting out, this is the last column that I'll be writing, and for those ham clubs that were so gracious in sending me their newsletters, I thank you. Your new Section Traffic Manager and the editor for the QST Section News is KA0EY, Jim Swisher, of 10800 Mississippi Blvd, N.W. Coon Rapids, Minnesota 55433. Jim is taking the place of Kenny Broshofski, KD0CI. He's stepping down after four plus years in serving as STM. Thank you, Kenny, for the hard work and some very hard decisions you have made for the section. The new MSN/1 Net Manager is W0UCG, Jack and W5N/2 Net Manager is N0GNN Lynn. I have also stepped down from MSPN/E Net Manager and Asst. Traffic Manager position. At the time this was being written, KC0T, George, and KD0CI, Kenny, will be acting as Net Manager for the MSPN/E. Congratulations to my neighbor WA0TFC, Karl, from Cleveland (Minnesota that is) who is the Amateur of the Month. Keep up the hard work. I'm sad to report that WB0LRK, Clark Eid, of Fertile, and K0QWU, Arnold Berkland, of Stillwater, are Silent Keys. Our deepest sympathy to family and friends. I would like to close in saying that I enjoyed working with everyone. I started checking in with the phone net back in October 1983 and I've seen a lot of changes and people come and go. Thank you and 73s, Dave Kendall, KA0BY, for a long time of being a club for their newsletters: W0BAM Marshall RC, Ground Wave, Mankato ARC, New Ulm ARC, and the Scotch Hams.

NET	FREQ TIME	QNI	QTC	SESS	MGR
MSN/RTTY	3620 6:30pm	5	1	1	WA0LUT
MSN/1	3685 6:30PM	382	138	31	KA0EY
MSN/2	3685 10:00PM	301	56	31	KD0NH
MSSN	3710 8:00PM	287	51	31	KA0SBY
MSPN/N	3860 12:05PM	428	218	31	WB0WJ
MSPN/E	3880 5:30PM	831	156	30	KA0BFF
MNAMWXNT	3860 6:15PM				K0CGI
PICD NET	3925 9:00AM	2891	349	123	W0BAC

MIN EMERGENCY FREQ: 3860 BULLETINS: 3685 & 3860
MN/MSU: 3620 Traffic: WB0N/1 603 KA0EY 415
KA0EY 345, W0FCO 185, KA0BFF 145, W0UCG 128, KT9I 117, N0CL5 95, W0DM 72, KD0NH 65, W0GRW 64, KA0SBY 63, KD0CI 45, KA0BFF 40, KC0T 35, K0CGI 34, N0GP 28, NT06 20, W0GUF 19, N0HW 19, KA0CDC 16, KA0AJF 14, K0BBQ 8, W0KYG 3, Total: 2569.

NORTH DAKOTA: SM, Bill Kurtti, N0AFP—The Grand Forks Hamfest will be Oct. 17. It will feature VC tests, ARRL Forum, swap tables, etc. WX nets are to resume on Oct. 20, with W0GFE in charge. The Jamestown repeater has been moved to 147.18+600. Special trx to KC0FT for his rescue of KA0OBY. Who says that ham radio can't save lives? The Peace Gardens Hamfest was successful with many new upgrades. They are Advanced: N0GUU, KA0ZED, W0BATT; Technician: KA0BSE, KA0ZVY, W0BIB, KA0PZD, KA0ZZA, K0BACA, KA0WQG, K0BAMJ, K0B00B, K0B0AQ; and Gaylord Bennett went from no license to General. The long drought was broken with over 2 in. of rain during the hamfest. Next year how about having official hamfest raincoats? Congratulations to W0BMY for being N Ham of the Year. Let's get the hams dug for that new lower below the ground freezes. Traffic: KA0FSM 52.

NET	FREQ TIME	SESS	QNI	QTC	MGR
Goose River	1.930 9A(SUN)	4	93	2	W0CDO
DATA	3.885 6:30DAILY	27	252	33	KA0FSM
WXNETS	3.885 9A, 12:30:5P				resume on Oct.20/W0GFE

SOUTH DAKOTA: SM, R.L. Cory, W0YMB—SEC: KA0KPY. STM: KD0YL. ASM: N0ABE, WA0PPR. Codington County Civil Defense Director was pleased with the efforts and turnout of 14 Lake Area Radio Klub members that helped track a storm thru the area. Conditions on 80 meters have been bad, and summertime activities have taken their toll on the S. Dakota CW net. It is, however, operating and would like more checkins. So jump in there and send a QRS if the speed is too much. If you would like to send a QRS in this column, have your SEC send me the info. Rapid City ARC had a very nice picnic at Canyon Lake Park for their July meeting and was attended by over 60 people. Minnehaha County ARES has adopted 145.76 as their simplex Alert freq. here should be no transmitting on this frequency except by the Alert Transmit stations or spotter of the week. Traffic for July totaled 981 messages handled. Traffic: N0DPF 520, K0EHRM 144, K0ZBJ 122, K0AIE 105, W0MZI 31, KD0YL 31, KA0KPY 20, W0YMB 8.

DELTA DIVISION
ARKANSAS: SM Joel M. Harrison, W5IGF—ASM: K5UR. SEC: N5BPU. STM: W9OK. ACC: N5SD. SGL: W5LCI. TC: W5FLO. CO Coord: N5LD. W5LJ. COC: K5TML. Repeater Frequency Coord: W5SFP. The Mensa Hamfest at Queen Wilhelmina State Park was another big success, and I enjoyed seeing each of you. If you have never been to this hamfest, mark your calendar for the first weekend after Labor Day, 1988, and I'll see you there. Welcome to Bruce Vaughn, N5SQ, who has assumed the duties of OO Coordinator, and Nelson Bailey, K5TML, who has been appointed Public Information Officer. We are still in need of stations to check in to OZK, the Arkansas CW Net, and to be liaisons to RN5. OZK meets each evening at 7 PM on 3591 kHz. Use your antenna tuner to get things matched up at that frequency if the antenna is not resonant. I have just returned from a business trip to Taiwan, where I visited some of the BV amateurs.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: K5CCK. SEC: N5ADF. ACC: K5DGP. SGL: K0SGL. TC: N5JM. COC: K5KJ. Packet: N5SS. The recent Shreveport Hamfest sponsored by the Shreveport Amateur Radio Association was an outstanding double-header. It was the 10th Anniversary of the Shreveport ARA coupled with the 25th Anniversary celebration of 10-10 International, and it turned out to be a humdinger and our biggest amateur radio get-together in LA this year. The 10-10ers had representation from England, Canada and all over the U.S., and it certainly looked like old home week reunion. The hamfest was held in the Shreveport Civic Center which is an ideal facility. There were plenty of new equipment dealers and lots of swap tables to empty your pockets. At their annual banquet Sydney Lance-N5G5V Shreveport ARA President, presented the Golden Key Award to J.D. Alexander, W5VMY, for his outstanding contribution to amateur radio. The Golden Mike Award for the outstanding contribution to the Shreveport ARA was presented to John Sullivan, WA4KUK, K5UJC, N5HVS, KC5T, K5EXV and W5JHY received certificates of appreciation for their work over the past year. Traffic: CAND Jul 87, LA, rep 100% by W5V5 & K5VW, DRN-5 rep 100% by K5WOD, W5W5BZ, W5V5, K5VW, W5SS5B & N5HJE.

MISSISSIPPI: SM: Jim Davis, K5KZ—ASM: W5TRD. SEC: W5DKD. SGL: N5CY. ACC: K5VXV. PIC: W5NSM. BM: W5EVP. TC: K5SDE. COC: K5K5. STM: K6SW. VHF/UHF COORDINATOR: N5DWU. Congrats again to Geo. Hancock on upgrade to Extra. No call yet. Congrats to new Extra W5JK.

ARRL Central Division Convention HAMFEST

Saturday, October 31 Sunday, November 1
8 a.m. to 2 p.m. - both days

Norris Sports Center - St. Charles, IL

All Indoors • Commercial Exhibits • Flea Market • ARRL Booth
FCC License Exams • Contests • Demonstrations • Hot Food
Admission: Adv. \$3 - Gate \$4 Talk-In: 145.47 (-600) & 145.21 (-600)



Sponsored by the
Fox River Radio League

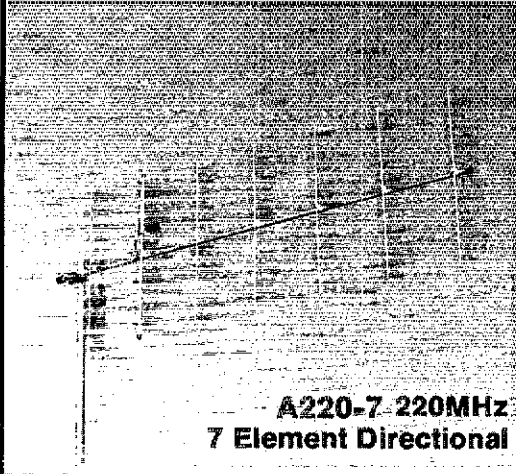
Tickets
P. Fors, N9FXQ
104 May St.
W. Chicago, IL 60185
312-231-8841

Dealers
G. Isely, W9GIG
736 Fellows St.
St. Charles, IL 60174
312-584-4925

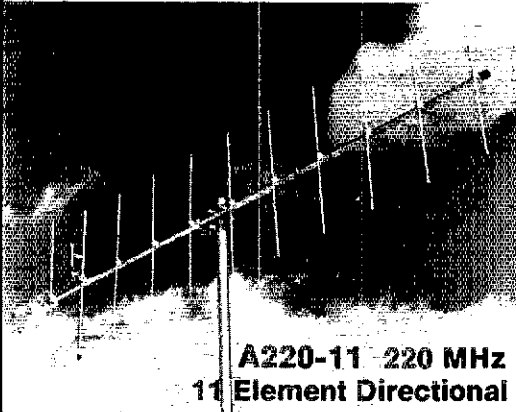


CUSHCRAFT ENHANCERS FOR THE NEW NOVICE BANDS

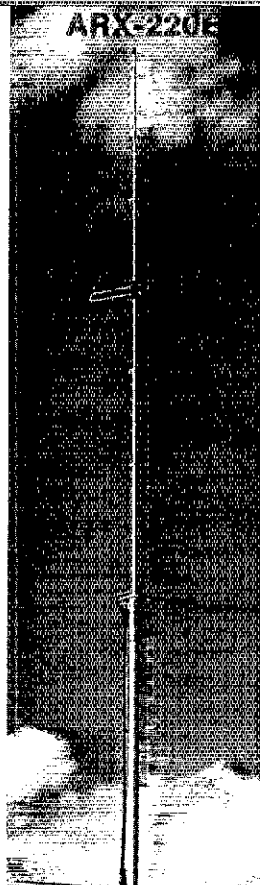
2.5 MHz BAND
VERTICAL



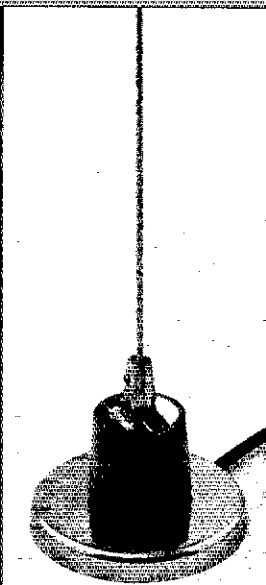
**A220-7 220MHz
7 Element Directional**



**A220-11 220 MHz
11 Element Directional**



**220MHz
Omni-Base**



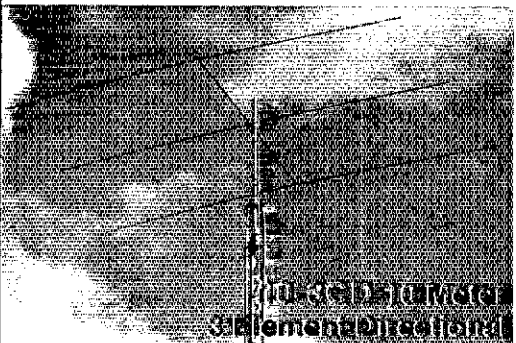
**CS-220
220MHz Mobile**



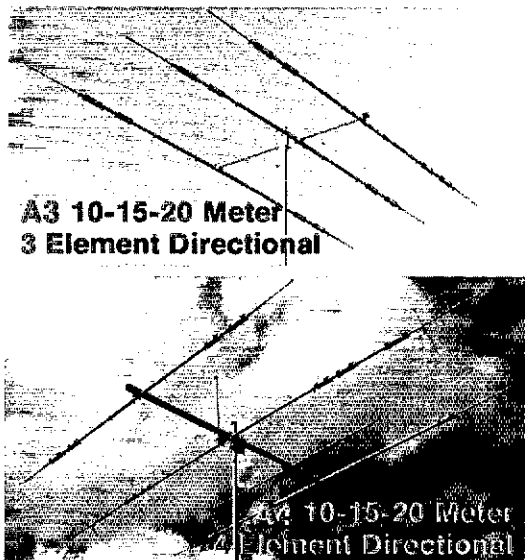
220MHz Portable

Make the most of your new privileges.

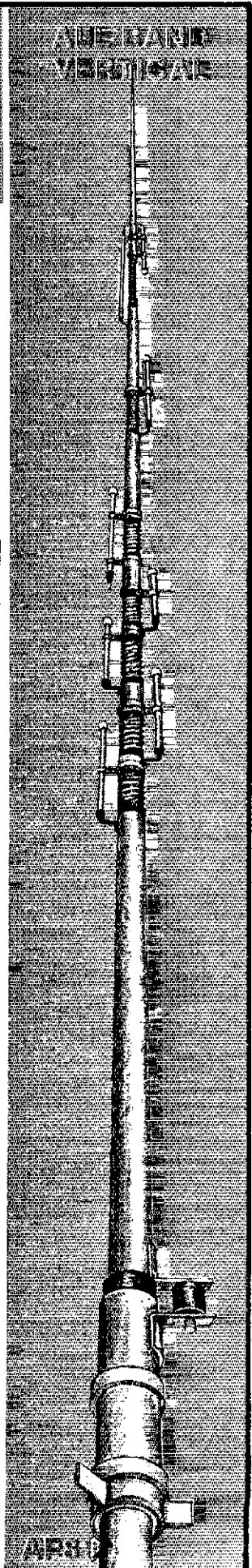
For the best performing station, select Cushcraft fixed, mobile, and portable antennas. They are the popular choice because of their performance, durability, and ease of assembly. More hams choose Cushcraft than any other brand of amateur antennas.



**A3 10-15-20 Meter
3 Element Directional**



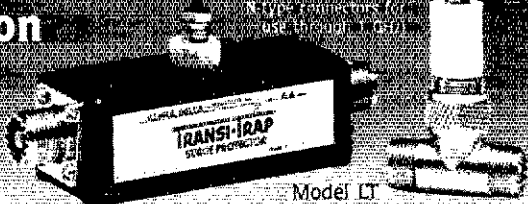
**A4 10-15-20 Meter
4 Element Directional**



cushcraft
CORPORATION

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

Get lightning, EMP and static protection for receivers, transceivers, amplifiers...



With EMP Series Transi-Trap® Surge Protectors

Model R-T and LT EMP Series Arc-Plug® cartridges are designed to protect against nuclear electromagnetic pulse (EMP), as well as lightning surge voltages.

The EMP Series design is based on the National Communications System Technical Information Bulletin 85-10 covering EMP protection for communications equipment.

All Transi-Trap Protectors feature "isolated ground" to keep damaging arc energy from the chassis.

Don't hook up your coax without one! The 200 W models are most sensi-

At your Alpha Delta dealer. Or order direct in U.S.; add \$2 for postage and handling. MasterCard and VISA accepted. Ohio residents add Sales Tax.



See Data Sheet for surge limitations.

ALPHA DELTA COMMUNICATIONS, INC.

P.O. Box 571, Centerville, Ohio 45459 • (513) 435-4772



Congrats to N5ILY on election as President of JARC. K5DPG announced his candidacy for Delta Div. Director. DRN5 (WB5YD) represented 100% by N5AMK; SESSIONS 31, QTC 591. Mississippi represented by N5AMK and K1SZ. MTN, SESSIONS 31, QNI 167, QTC 75. MISS/LOU/EMERG/NET (W5EO) SESSIONS 1, QNI 104, QTC 2. Lauderdale Co ARES, (W5HLD) SESSIONS 5, QTC 2, QNI 92, DRILLS 5, MAG SEC NET (K6Z) SESSIONS 4, QNI 70, NE MISS FM NET (N5SM) SESSIONS 31, QNI 348, QTC 11. GOSBN (W5JHS) 31 SESSIONS 1188 QNI, QTC 18. Rankin County ARES Net (W5A) SESSIONS 31, QNI 188, QTC 18. K8SW, N4OZB 181, K1SZ 67, W5WZ 24, W5CQO 6, K5FZ PKT BBS 7.

TENNESSEE: SM, John C. Brown, N4OZB—ASM: WA4LS, ACC: WA4GLB, OOC: W9FZW, SEC: WA4GZ, SGL: WA4GZZ. STM: N4HJ & TC: W4HJ. By this time you know or soon will know who your new Section Manager for the next two years will be. This Section Manager has determined that seven years is enough for him. I have enjoyed the task, very much. Like any job or position, it has had its ups and downs. The greatest thing is getting to meet and talk to all the fine people of the Tennessee Section. If I never did meet and talk to you, it sure wasn't because I did not want to. So I guess I will have to say that is and was my loss or I am the loser on that count. The above statements are also passed along for the Section Staff also. I am sure that the incoming Section Manager will appoint a new and different staff. As most of you remember, I have commented from time to time about getting your outside antennas and towers ready for the coming weather. I can't make a firm check of my own tower, and behold a near tornado did a number on my not-very-old Rohn 45 tower by falling a 5/8th inch bolt and setting loose the guys on one side. It left a TV tower only 50 feet away. It was only 50 feet and the amateur tower reached up to near 125 feet. The "eye" bolt failure could not be foreseen. That should be a warning to make an occasional inspection of your outside fixtures. The installation was about five years old. All new from the ground up. The last harvest of the 1987 season is or will have happened by this time. Chattanooga on the 4th week-end of October and the McNairy County Harvest at Selmer, TN on 31 October and 1 November. The Memphis one on 10 & 11 October and Tri Cities on 17th. The Section traffic was a bit light this period, with only 12 stations reporting. W9FZW 148, WA4FMR 139, K4VWQ 67, W4DDK 58, N44ZB 10, K4SKDB 17, W4PFP 16, K4UJQ 14, W4HIKU 13, N4OZB 10, W4TYV 8, and W4PSN 7. Many thanks to all that submitted reports. I have been informed by the Section Traffic Manager that N4OZB has been appointed as TN Slow Net Manager. I am sure he will need all the assistance he can get. Sure he will do a fine job. Just noted that I have missed the section activity for past two periods on traffic: LF Sessions 142, QNI 8531, QNI 201; VHF Sessions 128, QNI 5571, QTC 1155; CW Sessions 65, QNI 335 and QTC 199.

GREAT LAKES DIVISION

KENTUCKY: SM, John Themas, W4AT—SEC: W4B4NHQ. STM: KA4MTX. PIC: WA4SWW. The Georgetown Harvest this year was excellent as usual. I wish to thank all of you who came to the ARRL Forum; the room was packed with many appointees. We discussed emergency planning, Jump Team and SET planning. W4B4NHQ, our SEC, shared with us several ideas on emergency work. The SET is this month (October), and I know you would like to see us have a good one. Contact your DEC or EC and make plans to pass test messages for the official agencies we serve. An envelope drill with your local club would be a good way to test our abilities. Please remember to send your SET results to your EC, DEC or W4B4NHQ.

NET	QNI	QTC	SESS	MGR
MKPN	1023	117	31	WD4RWU
KTN*	1160	73	61	W4L.BG
KNTN	184	41	38	KB4OZ
KYN	300	119	62	K4AVX/K2BQ

*KTN for June and July. Station Activity Reports: (July) K4AVX 60, K14QH 42, KA4MTX 34, KC4WN 29, N4PEK 14, WA4AVV 11, WD4CQF 3.

MICHIGAN: SM, James R. Seeley, WB8MTD—Silent Key, with deep regret: K8BBY. SEC: WB8BGV announces the two new ARES appointments: KA8VLN, EC for Jackson County; and N8AYO to a new post. DEC for the eight-county Grand Traverse area. Thanks to KC8SE for many months of good service as Jackson EC. STM: WB8SIW announces the appointment of N8HSC as the new NM for 2EMTN. By all indications the U.P. Harvest was a success, with the section unable to work able to meet and talk to all the fine people of good work accomplished and an overall feeling of satisfaction with the trip. My apologies to the whole U.P. gang for my forced non-attendance for the second year in a row. Special thanks are in order to former STM: W8RHU for filling in for WB8SIW, who also was unable to attend. Non-hams seldom are mentioned in this column, but there is an individual whose work with the amateurs in the Grand Traverse area has been notable: Congratulations to Grand Traverse Emergency Management Coordinator Joe Corden on being named 1987 Coordinator of the Year at the Annual MI Emergency Management Conference in Frankenmuth. Congrats to L. Anse Cruise AYC for the Tuned Circuit Contest winning a world-wide rating of EXCELLENT—the latest Amateur Radio News Service annual Bulletin Contest. AFRNS provides a worthwhile service for newsletter writers. I would encourage all clubs to sign up with them. As my eight-year "tour of duty" as your SM draws to a close—you all know by now that I did not file for reelection—there is one thing more than any other that concerns and saddens me: the all-to-evident developing rift in our public service cadre. I worked diligently over the years to do my part to help erase the line that often tends to divide our traffic and emergency services efforts in twain. The line has reappeared, with even some bitterness expressed here and there, for reasons that are not very clear to anyone, least of all to me. It doesn't need to be. To the extent that our course is divided, our effectiveness in meeting our Part 97 commitment to public service is weakened, and this is not good. I urge everyone who is involved primarily with traffic handling and everyone who is involved primarily with emergency operating to once again start looking for ways in which to help each other, not compete against or squabble with or ignore each other. Let's get reacquainted with the benefits and pleasures of being on a winning team. (We were there once, we can be there again. Traffic: K8BCPS 513 (BPL), WB8YDZ 115, KB8GT 97, K8GXV 76, WD8KQC 68, WB8YU 56, K8OCP 49, W8RHU 43, W8SWX 42, W8BHB 41, W7LVB 39, N8CNY 37, WB8HX 32, WB8MTD 31, WB8TA 19, K8BUE 29, K8BEO 24, WB8BGV 24, W8BMBJ 21, W8URM 13, N8HWL 12, W8YZ 11, W8VZ 10, N8EXS 7, W8BTT 5, W8BHV 5, K8ZJU 4, W8CUP 3.

OHIO: SM: Jeffrey A. Maass, K8ND—ASM: N8AUH, SEC: W8MPYV, STM: K8JL, SM: W8ZJM, ACC: KJ3O, TC: K8BMU, OOC: AD8I, SGL: N8CJ.

NET	QNI	QTC	SESS	TIME	FREQ	MGR
B(N/E)	198	92	31	1845	3.577	N8EVC
B(N/L)	183	93	31	2200	3.577	K8TVG
B(N/R)	199	72	31	1800	3.605	W8EK
BSSN	229	120	56	0945,1900	3.873	K8OZ

DIPOLE TRAP ANTENNAS!

PRE-TUNED - ASSEMBLED ONLY ONE NEAT SMALL ANTENNA FOR ALL BANDS! EXCELLENT FOR APARTMENTS! IMPROVED DESIGN!

FOR ALL MAKES AMATEUR TRANSCEIVERS! GUARANTEED FOR 2000 WATTS SSB INPUT FOR NOVICE AND ALL CLASS AMATEURS! CW-AM-FM

COMPLETE with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron and supports, center connector with built in lightning arrester and static discharge, sealed, weatherproof, traps. "1X5" w/ 3 oz. Low SWR over all bands - Tuners usually NOT NEEDED! Can be used as inverted V+ slopers - in attics, on building tops or narrow lots. WORKS ON NEW WARC BANDS! THE ONLY ANTENNA YOU WILL EVER NEED FOR ALL BANDS! NO BALUNS NEEDED!

160-80-40-20-15-10 - 4 trap - 169 ft. No. 1060E... \$134.95
 80-40-20-15-10 - 2 trap - 104 ft. - No. 998E... \$59.95
 40-20-15-10 - 2 trap - 54 ft. - No. 1001E... \$99.95
 20-15-10 meter - 2 trap - 28 ft. - No. 1007E... \$97.95

SEND FULL PRICE FOR PP DEL. IN USA. (Canada is \$6.00 extra for postage etc.) order using VISA - MASTER CARD - AMER. EXPRESS - Pl. 1-308-236-5333 week days. We ship in 2-3 days. (Per Chk 14 days). All antennas guaranteed for 1 year. 10 day money back trial if returned in new condition! Made in USA. FREE INFO. AVAILABLE ONLY FROM WESTERN ELECTRONICS Dept. AQ Kearney, Nebraska, 68847

NEMAL ELECTRONICS

Your Authorized Distributor For BELDEN

INTRODUCTORY SALE

Belden Nomal 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 96%	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 Bi)	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 6-22 Ga	19.00	.21
8C1620	2-16 Ga 6-20 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	.65
PL259AM	Amphenol PL259	.89
PL259TS	PL259 Teflon/Silver	1.59
UG210	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 33181
 Telephone (305) 893-3924

8-Pole Crystal Filters

• SSB • CW • AM •

For Kenwood, Icom, and Yaesu Products.

We offer a 2 year warranty to the original owner. Our filters offer the lowest leakage characteristics and best shape factor in the industry.

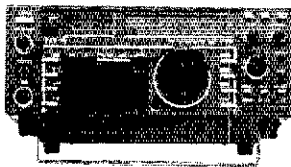
Order via telephone: MasterCard, VISA, and COD orders accepted. Send SASE for New Catalog.

International Radio Inc.

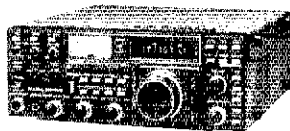
747 S. Macedo Blvd.
 Port St. Lucie, FL 33452
 305-879-6868

ICOM

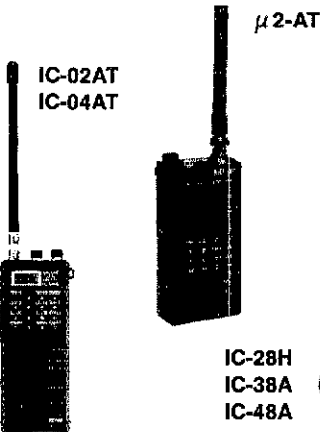
KENWOOD



IC-735



IC-751A



IC-02AT
IC-04AT

μ2-AT



IC-R7000



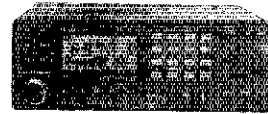
IC-28H
IC-38A
IC-48A



TS-711
TS-811



TS-940S



TM-2550A
TM-3530A



TS-440S
TS-430S

TH-215A
TH-205A
TH-21BT
TH-31BT
TH-41BT



R-5000
R-2000

NEW!



TM-221
TM-421



TR-751A

MFJ

Antenna Tuners

Keyers & Accessories



PUBLICATIONS:

- ARRL
- AMECO
- Radio Amateur Callbook
- World Radio TV Handbook

*Friendly Service
Texas Style!*

For Orders & Quotes
CALL TOLL FREE
1-800-423-2604

For Other Information AND
Texas Residents Call:
(512) 454-2994

**AUSTIN AMATEUR
RADIO SUPPLY**

5325 N. IH 35
Austin, Texas 78723

Mon-Fri 9:00-5:30
Sat 9:00-1:00
Central Time



ASTRON CORPORATION

Power Supplies

BENCHER PADDLES



2M Amplifiers

concept

B&W Accessories

Columbia Cable

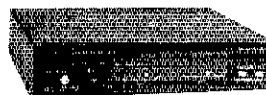
Welz Meters

ANTENNAS

PACKET

- **BUTTERNUT**
HF6V—HF2V—HF4B
- **Cushcraft**
AP8—A3—ARX-2B—215WB & More
- **HUSTLER**
Mobile HF—6BTV—G6-144B
- **Larsen Antennas**
- **DIAMOND DISCONE ANTENNAS**
- **VAN GORDEN**

AEA



PK-232
PK-64A
PK-87

Isopole Antennas



YAESU
Now In Stock

MFJ

MFJ-1270-B
MFJ-1274-B





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 MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					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 MARR 550 motor base and motor drive



FREE STANDING CRANK-UP TOWERS

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					Top	Bot.	
TX-438	38'	21'6"	2	355	12 1/2"	15"	\$ 925.00
TX-455	55'	22'	3	670	12 1/2"	18"	\$1395.00
TX-472	72'	22'8"	4	1040	12 1/2"	21 1/2"	\$2295.00
TX-472MDP*	72'	22'8"	4	1210	12 1/2"	21 1/2"	\$3695.00
TX-489	89'	23'4"	5	1590	12 1/2"	25 1/2"	\$3995.00
TX-489MDPL*	89'	23'4"	5	1800	12 1/2"	25 1/2"	\$5995.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive 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 MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					Top	Bot.	
HDX-538	38'	21'6"	2	600	15"	18"	\$1195.00
HDX-555	55'	22'	3	870	15"	21 1/2"	\$2095.00
HDX-572	72'	22'8"	4	1420	15"	25 1/2"	\$3595.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 1/2"	\$5495.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	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 MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					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.

CALL FOR FREE CATALOG



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.

K2RAG Antenna Products PERFORMANCE +

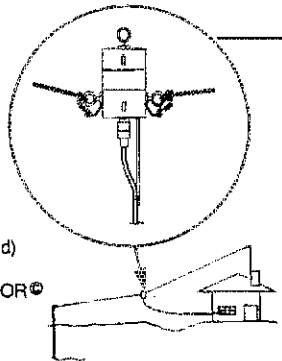
THE NEXT GENERATION BALUN

K2RAG Balun Models:
\$24.95
RAG-1.1 (50/75 balanced - 50/75 unbalanced)
RAG-4.1 (300/200 balanced - 75/50 unbalanced)

- Broadband 1.8 to 30 MHz
- Exclusive ANTENNA FEEDLINE PROTECTOR eliminates damaged coax connections
- 2000 watt PEP rating
- First balun with rejection at T.V. frequencies

Handbook of Ham Radio Antennas also available for \$4.95 - FREE if you order product now.

Please send check or money order. Add \$3.00 for postage and handling.



Antenna Systems Inc.
14465 SW Hazelhill Dr.
Tigard, OR 97224
503-684-5320

ONN 139 30 31 1825 3.708 WDBKBW
OSN 247 88 31 1810 3.577 N8AEH
OSSBN 1839 836 93 1030,1615, & 1830 3.9725 WB8JGW

OSSN 172 65 31 0645M-F 3.577 KA8GVJ
OSSN 172 65 31 0800S-SN 3.577 KA8GVJ
Ohio Section ARES NET 1800SN 3.876 WD8MPY
Ohio hamfest in October: Springfield 10/4; Marion 10/25. VE exam sessions: Maumee 10/10; Mentor 10/10; North Olmsted 10/10; Portsmouth 10/10; Lima 10/11; Akron 10/24; Marion 10/25. Contact me for details. A sad note: Frank Tompkins, WBHL, who served as VE contact person for the Goodyear (Akron) exams, became a Silent Key, and will be missed. The new contact is Reid Simmons, KV3A. I can provide names and telephone numbers for contacting the VE Teams offering the exams listed in this column. Congratulations to the Milford ARC, which has qualified to continue as an ARRL Special Service Club! The Ohio Area Repeater Council (OARC) has published an Ohio Repeater Directory, which lists all Ohio repeaters from 6 meters up. This book includes those repeaters whose listings missed the deadline for the current ARRL Repeater Directory. Contact WB8JRL, KB8HD, WB8SMK or any OARC officer for a copy; cost is \$1. The Central Ohio ARES and the Delaware ARA (Delaware County ARES) joined together to provide communications for the Bud Lite Triathlon, which covered portions of Franklin and Delaware Counties. They provided coordinating communications for event administration, Red Cross first aid, ambulances, the Coast Guard, Columbus Police, Delaware County Sheriff, and State of Ohio Forestry officials. Each group reported benefits of conducting the event jointly, gaining familiarity with each others' organizations. Great idea! The Canton ARC held a hidden transmitter hunt recently, in which organizer WB7UY added a few additional roadblocks to success. Seems that when KC8OU found the antenna in a tree and pulled the coax up from under the sod, the transmitter was sitting inside a beehive! WB7UY assured him that the hive was inactive, and the transmitter was retrieved! The coax was buried a month in advance of the hunt, to allow the telltale clues to be grown over by the sod! Clever idea, and some advanced planning is evident in the CARCI Also a CARC project: KB8JZ and KB8XD keep close tabs on the Calbook, and when a Stark County Amateur disappears from the listing, they make contact with him/her and assist in getting the license renewed. They recently "recovered" an Amateur this way! Congratulations to Joe Phillips, KBQOE, who was recently appointed by Great Lakes Division Director George Wilson, W4QYI, to serve as one of his Assistant Directors. The AD serves as the Director's eyes, ears, and (sometimes!) mouth in a local area. Congratulations also to Scott Yonely, KC8SS, who has been appointed to serve as District Emergency Coordinator (DEC) for ARES District 6 (North Central Ohio). The Amateur Radio stations listed below have helped to uphold our responsibility to the public and have reported handling radiogram traffic during the month of July: WB8EYQ 352, WB8JGW 266, WDBRFN 232, AD8I/PBBS 229, K8TVG 191, W8BO 184, NB8BS 184, WB2CL 176, K3JDI 133, K8GVJ 126, KP8J 125, N8AHS 124, KB8HB 124, NB8EE 120, KB8EC 101, WB8ZK 99, KB8CM 95, KB8ND 92, W8CP 85, WB8BYW 84, WB8CJ 80, KV8OH 79, W8BRIB 79, KB8FW 74, N8RWA 71, N8AEH 67, N8FBE 68, K3RC 64, W8BHW 62, N8HRW 52, W8ASSI 48, W8BKWC 44, WDBKWF 43, N8EFB 42, W8OXT 42, K8BWI 41, K8BCGF 36, K8BOCF 35, WB8YFD 35, W8JLHJ 31, W8FPA 30, K8OZ 29, W8AHD 28, K8CVC 27, K8C8Y 27, K8IOW 28, K8DXL 28, K8DHD 25, K8TNT 25, W8ADYS 24, N8GJU 24, K8EF 23, W8BKC 23, W8SMW 22, N8CON 21, K8ES 21, K8CKY 20, W8BKWD 20, W8JLW 18, NK8B 17, N8GOB 17, K8UJYM 17, N8B8 16, K8BIC 16, K8B8B 14, W8BHL 13, N8CB 12, W8BHZ 12, K8SOS 12, K8ALV 11, N8CJS 10, K8DZ 10, N8PFI 10, N8UH 10, W8AJS 10, W8BRL 10, W8BRY 10, K8BRY 10, W8VY 10, W8DZ 10, N8BIF 9, K8CJY 9, K8ZLW 9, N8AJU 8, W8SATN 8, K8PKR 8, W8RCS 7, K8BANC 6, W8GQ 6, W8PWG 6, N8AC 5, N8CW 5, W8JAW 5, K8ACB 4, N8ES5 4, N8GIC 4, N8HIL 4, K8BWH 4, W8ZM 4, N8GJY 3, W8RG 3, W8SDH 3, W8UDY 3, K8AVY 3, K8ZP 2, K8AVT 2, K8EEN 1, N8HFB 1, K8FJ 1, (Jun.) N8AEH 41, K8DHD 36, N8GOB 8.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydataryn, WB2VUK—ASM & STM; K2ZM, SEC: WA2ZYM, BM: WB2XIR, PIO: KB2TM, TC & OO/RF: KC2ZO, ATC: WA2WGM, SGL: KB2HQ, NWS ED: WB2NHC
NET TIME/DAY FREQ. NET MANAGER
ESS 2200Z 3.690 W2WSS
NYS/E/L 2300/200Z 3.677 KU2I
NYS/M 1400Z 3.677 N2EIA
NYPON 2100Z 3.913 KA2JBD
CDN 2230Z 146.34/94 WB2ZCM
HVN 2330Z 144.535/135 N2FTF
SDN 0130Z 147.66/05 K2ZVI

NET REPORTS (QNI/QSP): AESN 48/4 CDN 518/81 ESS 291/52 HVN 400/52 NYPON 475/211 NYS/E 411/212 NYS/L 419/282 NYS/M 323/204 SDN 205/67. CLUB NEWS: Albany ARA has their next test session set for Oct. 10th. Catskill ARA is holding their ARRL night on Oct. 13th. Overlook ARC had their Pizza Party on 15 July. At their exam session on Jun 20 N2CJL WA2ZCF K2ZJN K2ZYG upgraded. PEARI had elections: Pres-N2EGS VP-WB2EAG SEC-N2EPT TRESB-WB2PDV DIRS-K2LGB WB2HOL. Trustee-K210, Saratoga RACES is running their next Novice class in the fall and will have an exam session on Dec 5th. Yonkers ARC will have their annual electronics fair on Oct. 4th. With the establishment of the Divisional Cabinet and the holding of Club Presidents meetings, more opportunity for input to the ARRL board has been provided. Please take advantage of this and give your input either through your club president or directly to WA2DHF or me. Your suggestions, criticisms and comments are needed and solicited. am still looking for a volunteer for A.C.C. Contact me if interested. JULY TRAFFIC: NQ2H WB2VUK KA2MYJ K2ZVI N2HIF, JULY TRAFFIC: N2HIF 312, WB2VUK 200, NQ2H 134, N2FTF 81, K2ZVI 78, W2WSS 77, WA2JBO 72, K2ZM 63, KA2MYJ 49, WB2EAG 42, KA2TQW 22, WA2YBM 10, W2CJO 6.

NEW YORK CITY-LONG ISLAND: SM, Walter Wenzel, KA2RGI—ASM; K2IZ, ASM/VE; W2NL, AOC; KA2WIJ, SEC; KA2LAD, OOC; NB2T, TC/RF; WA2YNH, STM; K2MT, PIO; N2GQR. The following are traffic nets in and around the Section:
NET FREQ TIME MGR
NCVHF 145.745/8 1930M-F K2HPG
SCVHF 145.370/8 2000M-F,SN KA2JMA
BAVHF 145.350/8 2000DY K2YOK
NYPON 3913 kHz 1700DY KA2JBD
NYS/M 3677 kHz 1000DY WB2EAG
NYS/E 3677 kHz 1900DY KU2I
NYS/L 3677 kHz 2200DY KU2I
ESS* 3590 kHz 1800DY W2WSS
BBS 145.010 Packet Node Station AI2Q.

*Independent Net, recognized by NTS, all times are local, please note that AI2Q is the Packet Node Station and that all incoming NTS traffic should be routed through him. Don't forget the SET on the weekend of Oct 17th and 19th. Try to

WORLD WIDE RECOGNITION

For Sale:

Twenty eight year old manufacturer of compact communication antennas. Founded in 1959 by the late Will Monola, W3WBA.

Mini-Products, Inc., has long been recognized as the world's leader in high quality, high efficiency compact antennas. Instant name and logo recognition and excellent world-wide reputation and sales to both amateur and military markets.

Sale of this closely held corporation to include; All patent rights issued and pending, production machinery, inventory, extensive distributor network state-side and world-wide, military portfolio, supplier and vendor listings.

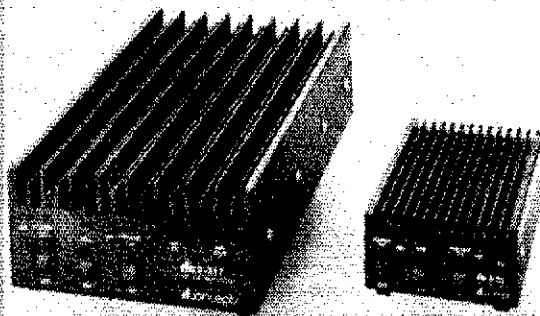
Available options to include; State — university research and development program and approximately 3,000 square foot manufacturing facility.

For more information and prospectus call;

Mary Monola-Gamble, 414 Connecticut Drive, Erie, PA 16505, Ph. 814-454-4946.



rfconcepts



RF CONCEPTS IS MOVING FORWARD WITH THE LATEST IN DESIGNS, QUALITY AND A 5 YEAR WARRANTY ON PARTS AND LABOR. 6 MONTHS ON THE RF FINAL TRANSISTORS. *rf concepts was founded by the two original co-founders of Mirage, Everett L. Gracy, W4SCBA and Kenneth E. Holladay, K6HCP.*

144 MHz			220 MHz		
RFC 2-23	2W	IN = 30W OUT	RFC 3-22	2W	IN = 30W OUT
" 2-217	2W	IN = 170W OUT	" 2-211	2W	IN = 110W OUT
" 2-117	10W	IN = 170W OUT	" 3-112	10W	IN = 120W OUT
" 2-317	30W	IN = 170W OUT	" 3-312	30W	IN = 120W OUT
" 2-417	45W	IN = 170W OUT			

All Amplifiers have GaAsFET receive pre-amps and high SWR shutdown protection.

CALL YOUR FAVORITE DEALER FOR UPDATES

rfconcepts

INQUIRIES: 2006 Humboldt St., Reno, NV 89509/(702) 827-0133 — FACTORY: 8911-A Murray Ave., Gilroy, CA 95020/(408) 847-7373

CB-TO-10 METERS

We specialize in CB radio modification plans and hardware. Frequency and FM conversions, books, kits, repairs, high-performance accessories. Our 11th year! 16-page catalog, \$2.

CBC INTERNATIONAL, P.O. BOX 31500AA
PHOENIX, AZ 85046

APPLE II CONTEST PROGRAMS

Keep The Contest Log on Your Apple II
CQWW - ARRL DX - OTHERS (WRITE)

- Contest Log Keeper
- Print QSL'S
- Instant Dupecheck
- Running Score
- Display of Countries and Zones Worked
- Print Log
- Print Checklist
- Edit

1500 QSO's Per Band Disk Drive Req'd
Printer And Clock Card Desired

Jack L. Schultz, W2GGE Programs Customized
2 Huxley Drive For Each Contest
Huntington, NY 11743 \$39.95 PPD

Anniversary Sale!

One Day Only!

**SATURDAY
OCT. 31, 1987
9am til 5pm**

ICOM personnel to demonstrate new equipment.

See the new line of ICOM equipment.



**Win!
Grand Prize:**

**ICOM
IC-900
Multi Band Mobile**

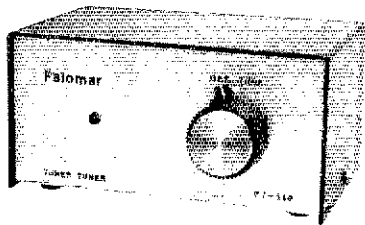
Includes:
Controller Unit, Interface Unit, Speaker, Mic, and Fiber Optic Cable (Band Units Optional)

Prize drawings each hour. Come and register to win!
(No purchase necessary to win.)

**JUN'S
ELECTRONICS**

3919 Sepulveda Blvd.
Culver City, California 90230
(213) 390-8003 or (800) 882-1343

TUNER-TUNER™



- Tune your tuner without transmitting.
- Save those finals!
- Operate easier, faster.

Do you use an antenna tuner? Then you need the new Palomar Tuner-Tuner to tune up your tuner without turning on your transmitter. The Tuner-Tuner connects between your tuner and your rig.

Here's how it works:

1. Turn on the Tuner-Tuner. You'll hear a loud S9+ noise.
2. Tune your tuner until the noise drops out completely.
3. Turn off the Tuner-Tuner.
4. Start transmitting. SWR will be 1:1.

What could be simpler? You can tune up while listening to the other station call CQ. No need to move off frequency to tune up. No need to cause interference while tuning. No need to operate your rig into anything but 1:1 SWR.

Users say:

"I cannot tell you how pleased I am with the Tuner-Tuner. What a fantastic product! I would recommend the Tuner-Tuner to anyone." — W06P

"It performed exactly as claimed. It represents one of those simple but clever ideas whose time has come." — CQ Magazine

"I picked up my Tuner-Tuner which I ordered through my dealer, and I am delighted with it. What a useful and clever invention!" — N4MNS

Order yours today! If you use a tuner you need a Tuner-Tuner.



Model PT-340 Tuner-Tuner only \$99.95 + \$4 shipping in U.S. & Canada. Calif. residents add sales tax. FREE catalog on request.

PALOMAR ENGINEERS

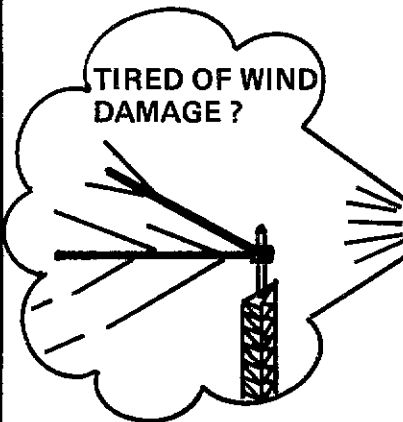
Box 455, Essex, NJ 07026
Phone: (609) 474-8810

**NOW
FACTORY
DIRECT!!**

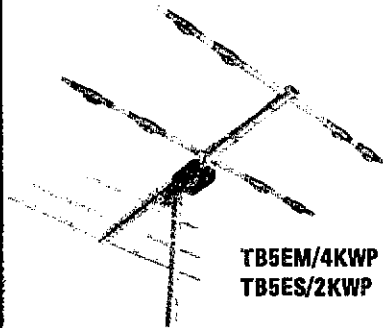
STEP UP TO TELREX ANTENNAS ANTENNA SYSTEMS

"INVEST" in a Telrex antenna!

Why gamble with shoddy antenna construction when Telrex makes available a professionally designed quality product.



Antennas that last "Decades"
(not months)



TB5EM/4KW
TB5ES/2KW

Some of the WORLD'S finest.

TB4EC 10, 15, 20 Mtr.	\$320.00
TB5E 10, 15, 20 Mtr.	\$475.00
TB5EM 10, 15, 20 Mtr.	\$550.00
TB6EM 10, 15, 20 Mtr.	\$655.00
20M326 3 elem. 20 Mtr.	\$410.00
20M536 5 elem. 20 Mtr.	\$695.00
20M646 6 elem. 20 Mtr.	\$1075.00
15M532 5 elem. 15 Mtr.	\$550.00
15M846 8 elem. 15 Mtr.	\$995.00
10M523 5 elem. 10 Mtr.	\$375.00
10M636 6 elem. 10 Mtr.	\$725.00
2MVS814, 2 Mtr. phased	\$289.00

F.O.B. New Jersey

Prices subject to change.



For data on the complete line of Telrex antennas phone (anytime) and leave your call sign, or write.

Phone: 201-775-7252

Write: Telrex P.O. Box 879
Asbury Park, N.J. 07712

participate. Anyone interested in getting a station appointment, please contact Walt, KA2RGI. Radio Central ARC will hold their "Ham Expo 87" on Sunday, Dec 27 from 10:00 to 5:00 PM at the Community College in Selden. For further info please contact Andy, W2ZFXN. Congratulations and welcome to new PIO N2GQR. Hall of Science ARC is looking for control operators for WB2JSM, contact Arnie WB2YXB or Tony WB2OLB to schedule your session. Good luck to KD2SX who is moving to Rhode Island. Congrats to Burt, K2KLN on his new position as Assoc. Prof. of Clinical Pediatrics at Columbia University College of Physicians and Surgeons. Burt has also been promoted to Assoc. Attending Pediatrician at Columbia Presbyterian Medical Center. LIMARC will continue to conduct exam sessions on the second Saturday of the month at the NY Inst. of Technology, Rt. 25A, Old Westbury, in Saiten Hall, Rm 2, applicants are reminded to bring 2 forms of ID, original and a copy of their FCC license, check for \$4.50 made payable to ARRL/VEC, 2 pens/pencils and a calculator for the math questions, for further info please contact Joe Kolb, W2NL. Grumman ARC will be conducting exams on the first Wed. of the month, for further info contact Howard, W2QUV at 516-354-6861. Suffolk County ARC is also conducting exams on the 2nd Sat. of the month at the Islip Arts Bldg. Rm 105 at Suffolk Community College in Selden, for further info contact George, W2VNV at 516-751-0894. Traffic: N2AKZ 165, K2YQK 146, K2MT 67, KB2KE 64, KA2ZYX 52, W2GKZ 40, K2HPG 29, NF2N 26, N2GPA 24, NB2D 22, N2GQS 19, K2TWZ 15, N2ETO 14, N2GNQ 10, KA2JMA 10, KA2JUI 8.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASM (VE Liaison); N2XJ, ASM (FO info); NW2L, SEC; N2BMN, STM; KA2F, OO/ACC; KA2BZS, ACC; KY2S, SGL; W2KB, TC; K2BLA, BM; N2CXX, PIO; WB2NQV (PH 735-8550), Appointment endorsements for the next two year term starting 1/01/87 follow: DEC: Hunterdon County N2EP and N2BMN, N2CJA, N2WJM, N2JQ, W2CC, W2ZEE, W2DHF, and WB2MJC, OO K2JO, N2S N2DXP, ATC WABDSQ, ORSs KB2HM, W2CVV, W2SQ, and WB2KLF. One new appointment effective 8/87 is OBS (Packet) KD6TH. For the period ending 9/87 eleven appointments were cancelled. NNJ Field Organization Appointees please note: Each month existing appointments completing a two-year term are reviewed for endorsement or cancellation. The actions taken are based on the recommendations to me from our section level leadership officials. In most cases the reported reason for the cancellation recommendation are due to lack of recent activity. Please make sure that each of your functional activities are reported separately to each of the next level leadership officials responsible for the functional area of each of your appointments. Congratulations to the following who were newly licensed or upgraded during July sessions conducted by: NNJ VE Board, and Bergen ARA. Also included is the June session reported from the Ocean/Monmouth ARC: Novice: P. Divia, A. Simon, B. Solov, M. Junchava, and J. Thomas. Technician: KB2DBT, KB2DMA, KB2DLN, KB2KDW, KB2DWT, KB2DZB, W. Otto, D. Harding, G. Katkowski, KA2DOQ, KB2DOB, WA2PPI, KA2KHZ, KB2CQE, A. Daniel, R. Clevarz, and KB2BCP. General: KA2RJM, KB2OMJ, KB2AB, KB2CZL, and KA2OCT. Advanced: N2HIP, KA2YK, KB2BWS, R. Volk, KB2BN, WA2HA, KB2BKB, WA2LVA, KA2YA1, KB2BJH, KA2TAM, KB2CFO, and KB2DEQ. Extra: KA2WLE, KA2ZUQ, and KA2ZYF. Sorry to have to report Silent Key, Ed Solov, K2SE, of Wayne, Ed was well known for his activities in Emergency Communications, was a former DEC of Passaic County, and as the leader of the Ramapo Valley Emergency Net (RAVEN). Traffic:

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI		
NJM	WB2ZJF	3695	1000	Dy	31	146	197		
NJPN	W2CC	3950	1800	Dy	35	102	313		
NJNE	KA2F	3695	1900	Dy/P	24	94	153		
NJNL	WA2EP1	3695	2200	Dy/P	24	99	129		
DETN	K2S	147.12	2000	Dy		Not	Received		
DETN	WD2AHD	146.885	2030	Dy	31	39	155		
NJNVE	WB2FTX	146.895	1930	Dy/P	28	20	142		
NJNWL	WB2ANK	146.49	2230	Dy/P	27	38	142		
NJTNT	WA2EP1	223.88	2100	Dy	27	38	136		
NJNS	WB2PKG	3735	1830	Dy	31	65	148		
NNJPL	W2QNL	146.01	24hr	via	WA2SNA-1	69	---		
SAR/PSHR	N2DXP	84/61, N2XJ	146/79, W2RFX	111/89,	KA2F	120/111, WD2AHD	29, K2VX	90/101, WA2EP1	118/105,
					KA2INE	49/70, W2XD	10, W2CC	14, NR20	39, W2QNL
									161/110.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, W8EJL—ASM; WB0AVW, SEC; KD0BG, STM; KC0XL, ACC; NU0P, OOC; WA0QMU, BM; KD0IR, TC; KD0AS, PIO; N0BDF, N0BDF has been appointed as the new section Public Information Officer. Mike brings his experience in broadcasting to the position. Many of our numbers assisted along the route of this year's RAGBRAI. The Fort Dodge Amateur Radio Club reported adding in local coordination as well as handling third party traffic for many of the bikers. The volume of RAGBRAI traffic handled on packet provided a new test of the statewide system, showing many strengths as well as a few areas in need of enhancement. KF0Z has replaced new Californian W0VX as president of the Eastern Iowa DX Association. W0IZ has worked 245 countries in 1987, well over the amount needed for double Golden Jubilee of DXCC. Congratulations to the following who upgraded recently to Extra: KE0JC, W0HBK; Advanced: N0EL, W0BVL, W0BWL, W0BZNN; General: W0BUKZ, KA0YUZ; and Technician: KA0WPK, KA0WQS, KB0ATB, KB0ATA, KA0ZHU, KA0PLR, KB0AZR. 45 of KA0VPM's latest sixth grade Novice class have received their licenses. The Iowa-Illinois Amateur Radio Club has been helping install stations for these newcomers. W0NSN and W0AJA became Silent Keys. Traffic: W0SS 293, KA0ADF 151, W0GP 145, W0YLS 30, KA0GSA 71, W0BAVW 30, W0BMCX 24, W4JL 22, K0BRE 17, W0BW 9, N0GIK 8, KA0VBA 3.

KANSAS: SM, Robert M. Summers, K0BXF—SEC; W0CHJ, STM; W0OYH, ACC; K0BXF, TC; W0BNQM, BM; K0JDD, SGL; N0BLD, Net Mgr's CW-W0BZCN; Voice-W0RFP; RTTY-KA0CJF; Slow Speed CW-W0MYM; WX Net-W0ADHC; PTK-R. Open; DEC's W0AG, W0EJL and W0BUT. The ARES rescue plan is nearing the complete stage. Commitments from active hams for all but two of the revised DEC positions have been received. Hopefully the plan can be put into action sooner than originally anticipated. We are still trying to compile a list of ALL known radio clubs in the state. Why not drop your SM a note telling of YOUR club affiliation. Net activity for June—K0BN QRI 955 QTC 108, KPN 428/24, KMWN 648/598, KWN 673/573, CSTN missing at report time, QK5 188/53, QK5-SS QNI 27 QTC 11. No report on KS RTTY. Vacation time is the prime activity for quite a few this past month. The most active ham of the month has been W0CHJ, our new SEC. Steve has been compiling a fair list of activities going on in the state and has forwarded the info to League HQ. Look for more to come in the months ahead. Field Day activity was down this year, any one like to report the reason why?? Reserve Oct 10 and 11 for State Convention at Wichita. A KS SECTION MEETING is planned. Traffic: K5SU 187, W0FIR 171, N0GZT 102, K0BXP 91, W0OYH 64, N0B0Z 64, W0FDJ 62, W0QMT 53, K0XN 39, W0MYM 22, W0EHOZ 18, W0CHJ 11, W0PB 10, N0DJT 4.

AMERITRON®

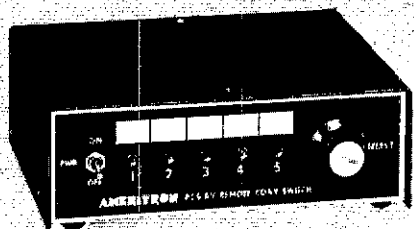
AL-80A LINEAR AMPLIFIER

Setting a new standard of efficiency in moderately priced kilowatt amplifiers



The Ameritron AL-80A combines the time proven economical 3-500Z with a heavy duty tank circuit to achieve 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

The AL-80A will provide a signal output that is with 1/2 "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost. Size: 15 1/2" D. x 14" W. x 8" H. Weight: 52 lbs.



Remote COAX Switches

**RCS-4
FOR CONVENIENT
INSTALLATION**

No control cable required.
Selects one of four antennas.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms.
Power capability: 1500 watts average, 2500 watts PEP maximum.

**RCS-8V
FOR SPECIAL
APPLICATIONS**

Selects up to five antennas.
Loss at 150 MHz: less than .1 dB.
VSWR: under 1.2 to 1 from DC to 250 MHz.
Impedance: 50 ohms.
Power capability: 5 kW below 30 MHz, 1 kW at 150 MHz.

Available at your dealer - Send for a catalog of the complete AMERITRON line.

OTHER AMERITRON QUALITY PRODUCTS:
AL-1200 and AL-1500 AMPLIFIERS - 1500W CW OUTPUT
AL-84 AMPLIFIER - 400W CW OUTPUT

AMERITRON® DIVISION OF PRIME INSTRUMENTS, INC.
9805 WALFORD AVE • CLEVELAND, OHIO 44102 • (216) 651-1740

YAESU
Our 30th Anniversary.

TEN-TEC, INC.

ICOM

AEA	NYE VIKING
ALINCO	PHILLIPS ECG
AMECO	RADIO AMATEUR CALLBOOK
ARRL	SAMS PHOTOFACTS
ASTRON	SAMS COMPUTERFACTS
BARKER & WILLIAMSON	SANGEAN
BENCHER	SAXTON CABLE
BUTTERNUT	SIGNAL CABLE
COVERCRAFT	SMILEY ANTENNA
DAIWA	SPECTRUM COMMUNICATIONS
DRAKE	SULTRONICS ANTENNA
ENGINEERING CONSULTING	TAB BOOKS
HUSTLER	TEN-TEC
ICOM	TRAC ELECTRONICS
KANTRONICS	TRIPP-LITE
KENWOOD	TORRESTRONICS
LARSEN	VALOR-PRO AM
LUNAR	VAN GORDEN
M-FJ	VIBROPLEX
MIRAGE	WACOM PRODUCTS
MOSLEY	YAESU U.S.A.



9,000 SQ FT STORE & WAREHOUSE
LOCATED WHITEHALL, PA ACROSS
FROM WHITEHALL AND
LEHIGH VALLEY MALLS

SPECIAL OF THE MONTH OCTOBER 1987 ONLY

YAESU - \$237.00 FOB
FT-23 R/TT
W / DTMF KEYPAD ENCODER



CALL TOLL FREE

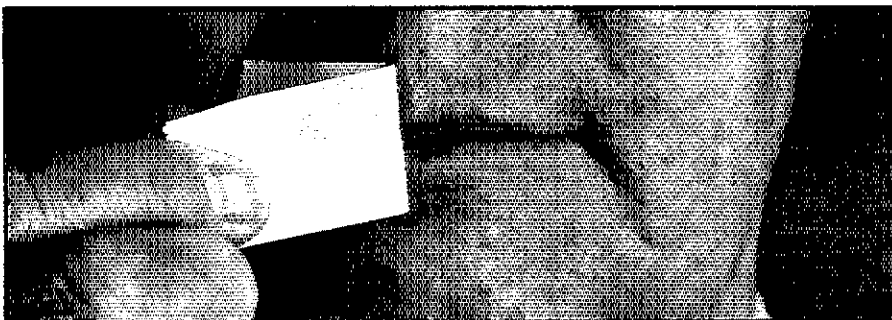
800-262-3220



WE SHIP APO/FPO
215-820-0112

NORTHEAST ELECTRONICS
SUPPLY COMPANY, INC.

P.O. BOX R-A
WHITEHALL, PA 18052



Now that you can speak, talk to Larsen.

Novice Enhancement opens up a whole new way for novices to communicate. To make the most of it, talk to Larsen Electronics.

We'll tell you how Larsen antennas can greatly improve your powers of communication. We'll also explain how Larsen 220 and 1296 MHz antennas are designed to give you the best performance.

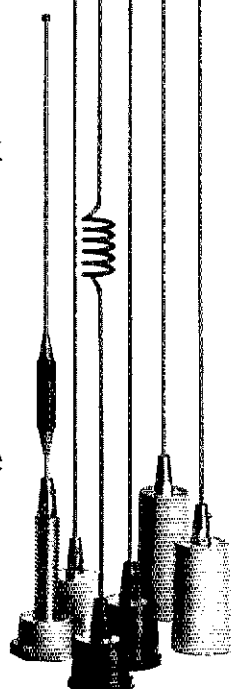
Talk to your Larsen amateur dealer today, and see if Larsen performance doesn't speak for itself.



Larsen Antennas

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 Avenue, Vancouver, B.C. V5Y 1K3 604-872-8517.



MISSOURI: SM, Ben Smith, K0PCK—SEC: K9OCU, STM: K0SI, BM: WB0TEG, SGL: K0BUD, OOC: WB0RHK, ACC/PIC: KT5Y, TC/RFI COORDINATOR: K4CHS. The Kimberling City ARC operated a Special Event Station at a shopping center in that city during the Aquafest weekend. One hundred eighteen messages were sent from the booth. Club members participating were: W0QGN, K0BRET and N0BG. Twenty one amateurs from the Kansas City area assisted with communications for the Hospital Run. K0S5Y was Net Control and the PHD Club was in charge of the amateur operation. As of August 1 Mark, N0BKE will resign as Net Manager of MTTN. Understand Mark is moving to the land of sixes. I want to thank Mark for his work as Net Manager of MTTN and he will be missed on both the CW and Phone Nets in the Section. K0SUN will be taking over as Net Manager of MTTN. I hope he will receive a lot of support by stations checking in. The net meets Monday through Saturday on 3730 kHz at 8:30 PM. W0DTU has been elected to the permanent board position of the Kansas City ARC. W0DTU is also the trustee of the 145.41 repeater and K0BWX trustee of the 146.91 repeater for the club. Field appointment for the month, OES, K4CHS.

Silent Key Report, K0KKN.

NET	SES	QTC	DAY	TIME	FREQ	MGR
ARC	65	298	DLY	7:00/9:45	3.585	K0SI
MOSS	31	864	DLY	6:00	3.983	K0ORB
MEOW	31	613	95 DLY	5:30	3.963	K0OSQ
HBN	23	245	24 Mon-Fri	12:05	3.880	K0OSQ
MOFON	5	35	12 WED	8:15	222.424.02	A1B0
PHD	4	117	11 MON	9:00	146.43	W0BKHJH
RRABN	30	393	7 DLY	8:00	146.191.79	K0BLLN
CMEN	6	116	3 WED	9:00	146.181.75	K0PCK
ZAEN	5	65	3 TUE	8:00	147.841.24	N0BE
ARESN	5	60	1 THU	9:00	147.885/255	N0FQW
CARL	4	25	1 WED	8:30	146.46	W0BWLJU
LOZBC	27	437	0 Mon-Sat	6:00AM	146.131.73	N0HVO
SL04H	4	266	0 MON	8:00	146.011.81	N0NEK
LSZFM	1	08	0 FRI	9:00	146.131.73	N0HVO
KARES	4	60	0 SAT	9:00AM	146.37/97	N0JAA
TCN	5	58	0 THU	9:00	147.091.69	N2BF
JCCCN	6	57	0 WED	8:00	146.407.00	W0SRI
SARN	4	40	0 TUE	9:00	146.437.03	W0ENW
CMOYL	4	20	0 MON	8:00	147.285/886	N0HVO
PHDTEN	5	39	0 MON	8:00	29.375	NS0B

Traffic: W0BMA 370, A1B0 220, N0DN 201, K0SI 161, W0BHTN 120, W0BJX 109, K0PCK 96, K0BAS 75, K0ORB 70, N0BG 60, W0CUD 39, K9OCU 36, KT5Y 26, N0BKE 24, W0B0JB 17, W0BELL 16, K0BAJ 8, K2ONP 3.

NEBRASKA: SM, Vern Wirka, W0BQGM—STM: Jerry Kohn, W0DEGK, SEC: Michael Ruhrdanz, N0FER. The July 1987 Victoria Springs Hamfest was well attended. Three packet stations were operational in the park campground during the hamfest. Formal written traffic was relayed via packet radio across the Nebraska section. Nebraska State Civil Defense Radio Officer, Les Myers, K0SCM, reports the State Emergency Operations Center in Lincoln has added packet radio capability to the Amateur Radio facilities. Many Nebraska amateurs were active in public service activities this past summer. Some of the larger events included the state track meet in Omaha, the Nebraska State Games in Lincoln, The Fourth of July Parade in Seward and the Oregon Trail Days in Scottsbluff, to name only a few of the many events. The Lincoln Amateur Radio Club annual auction is scheduled for November 1, 1987 in Lincoln. Traffic: K0DKM 293, K0C0B 85, W0BQGM 10, N0BA 3, W0DCRD 3.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, K21Z—ASM: KB1H, STM: K1EIC, SEC: N1DGS, OOC: N4H, ACC: NK1J, PIC: W01CMF, TC: W1HAD, SGL: K1AH.

NET	NM	SESS	QTC	QNI
CN	K1EIR	53	88	178
CPN	NK1J	31	59	251
WGN	W01GXZ	31	97	295
CSN	W01GXZ	23	36	143
NVTN	K1CE	28	39	122
CSTN	K1CE			
RTN	K01JAN	31	59	151
10 MTR RCN		4	3	54

A BIG CONGRATULATIONS to K3ZJJ for all of his contributions to the section during his tenure. Also Congrats to K1ZBD upon his 50th year of membership with the ARRL. CT has a new net, this one dedicated to packeters for traffic handling. The CT Section Traffic Node (CSTN) will be on 145.01, using the facilities of K1CE BBS. A special TNX to N1EDD for her coordination of the 1st Annual CT NTS picnic, August 22 in Wolcott. A fine time was had by all. DON'T FORGET the SET will be held Oct 17/18. Remember, "He who fails to prepare, prepares to fail." W01WVN has been selected Ham of the Year by the members of Tri-City ARC. Remember, it is YOUR club. Input is desired. Requests from clubs and individuals on a continual basis. Information may be provided via the mail or the K1CE BBS. K3ZJJ & K020GQ spent part of the summer mountaintopping QRP HF CW & 2 mtr fm. W1NRE ATV rpt now on the air 439.25 in/421.25 out with 25 watts. Color test patterns are sent for 15 mins. every half hour 5pm to midnight local time. First place 4A class, in New England, unofficially belongs to ECARA with 8748 points. SCARA has a new rpt on 449.825 atop the VA Hospital in New Haven. GNARC has a new rpt on 446.025. K1REC/R now sporting a new call K10F/R. With great sadness we report that K1PU1 is a Silent Key. KM1E has relocated to ME. NARL recently held a successful picnic at Church Hill Park. SCARA & G0C3 ops are working on the installation of an emergency alerting system for their repeaters. Includes using modified wx radios and a tone activated squelch. GUD JOB gang, I would like to thank everyone who has written and phoned to welcome me back as SM. I appreciate your kind words and look forward with renewed enthusiasm to carrying on the fine tradition of the CT Section. 73 K21Z. Traffic: W01GXZ 209, K1EIC 153, K01GWE 145, N1EDD 128, W1EFW 126, W1VOL 48, N1DMV 46, NK1J 39, K1CE 35, K04ZC 32, NK1N 32, W1BDN 21, K1AGE 20, N1BOW 13, KY1F 13, NM1K 12, W01NLD 9, W02SGI 7, K01OCZ 6, W1QV 5, W1CUH 4.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KY1T—ASM: K9HI, SGL: K3HI, OO/AA: AG1F, SEC: KB1PA, PIC: K1HLZ, BM: KB1AF, STM: KW1UJ, TC: K01JU, ACC: K01KCU, EMASS Hot Line 437-0111, Westlink 449-2236.

NET	MGR	FREQ	TIME/LOC/DY	QTC	QNI
EMRI	N1AJ	3638	1900/2200	DY	187
EMRIPN	W01FCD	3880	1730	DY	148
EM2MN	NK1Q	145.23	2000	DY	131
NEEPN	K1BZD	3945	0830	SN	5
HHTN	NG1A	04/64	2230	DY	153
EMRISS	N1CVE	3715	1600/2030	DY	44
CITN	KB1AF	745/045	1930	DY	81

Congratulations and a warm thank you to new OES and District Emergency Coordinator KW1P. Carl will be providing Stoneham & the surrounding area with a wealth of emergency preparedness expertise. Bulletin Manager KB1AF reports that

(continued on page 108)

HARDLINE

7/8" -50Ω

\$150/Foot

A.G.W. ENTERPRISES

Route 206-RD 10
Vincentown, N.J. 08088

DISCOVER THE ULTIMATE POTENTIAL OF YOUR STATION
609-268-8166

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, try 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 SASE GETS DETAILS



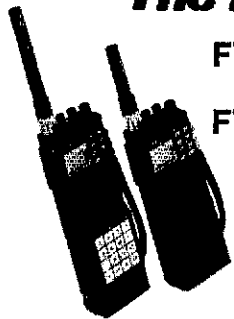
R&L ELECTRONICS 575 main st. HAMILTON! OHIO 45013

Large
Stock

YAESU 
The radio.

KENWOOD

 **ICOM**

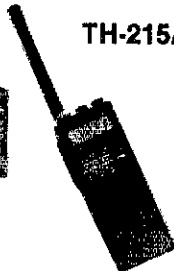


FT-23R

FT-73R

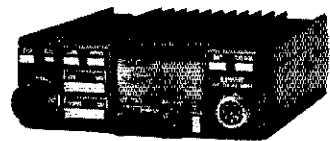


FT-767GX HF/VHF/UHF



TH-215A

IC-28A/28H IC-38A



for all of the 1987 **SUPER DEALS!!!**

WE STOCK ALL MAJOR LINES OF AMATEUR RADIO EQUIPMENT, ANTENNAS, TOWER, AND RADIO ACCESSORIES.



COD'S WELCOME!

1-800-221-7735

STORE HOURS

Monday-Friday
10:00 A.M. to 6:00 P.M.
Saturday 10:00 A.M. to
3:00 P.M.

CALL OR WRITE FOR OUR FREE CATALOGUE

WE SERVICE WHAT WE SELL!

513-868-6399

**INDUSTRIAL QUALITY
REPLACEMENT BATTERIES
FOR COMMUNICATIONS**
Nickel-Cadmium, Alkaline, Lithium, etc.

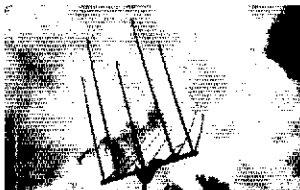
Repair Packs For
ICOM*, KENWOOD, YAESU,
SANTEC, AZDEN, TEMPO,
CORDLESS PHONES...AND MORE!

NEW! I.C.E. PACK \$49⁹⁵



E.H. YOST & CO.
7344 TETIVA ROAD
SAUK CITY, WI 53583
(608) 643-3194

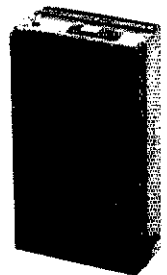
**DELTA LOOP
ANTENNAS**



- Delta design, full wave DX performance on your favorite band
- High Quality construction using 6061-T6 Aluminum and Stainless Steel hardware
- Excellent Gain, FB Ratio and SWR
- Designed to survive adverse weather
- Easy assembly - fixed or portable
- Mounts alone or above your yagi
- 2-3 element monoband models
- 10 - 12 - 15 - 20 meter bands
- 10 - 15 meter duoband model
- Phone or write for details on our "Big Horn" series of antennas

Delta Loop Antennas
44 Old State Road, Unit #18
New Milford, CT 06776
(800) 223-3718 (203) 355-3718

**SUPER
PERFORMANCE
BATTERIES**



SUPER ICOM BP-7S, 13.2 volts, 900 ma, double the capacity of the Icom BP-7, 5w output.
SUPER ICOM BP-8S, 9.6 volts, 1200 ma, 50% more capacity than the Icom BP-8.

Both are base charge only, BP-7S or BP-8S \$65.00*

Exact replacement FNB-2 Nicad pack for YAESU FT-404R/207R/208R with case. \$24.00*

Inserts for:

Kenwood PB-25 \$25.00* Icom BP-3 \$20.00*
Kenwood PB-25H, PB-26 \$27.00* Icom BP-5 (500ma) \$25.00*

*Add \$3 shipping & handling, CT residents add 7 1/2% tax.

Complete line of NICAD packs for Icom, Kenwood, Tempo, Santec, Azden, Cordless Telephones, Alkaline, Nicad, Mercury and Lithium Cells. All battery packs include a 1 year guarantee. Commercial Radio Packs also available.

Send SASE or call today for a complete catalog. Dealer inquiries invited.

PERIPHERAL inc.

149 Palmer Road • Southbury, CT 06488
(203) 264-3985

**Crystal
Filters**

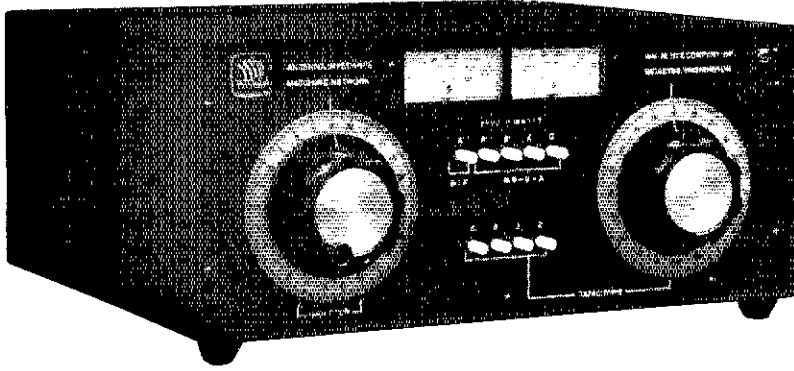
For most Ham Rigs from:
KENWOOD - YAESU - HEATHKIT
Also DRAKE R-4C7 Line, COLLINS 75S3-B/C,
and ICOM FL-44A, 52A & 53A Clones

Finest 8-pole Construction
ALL POPULAR TYPES IN STOCK
CW - SSB - AM

ASK ABOUT OUR MONTHLY SPECIALS
Phone for information or to Order.
VISA/MC or COD accepted.

FOX-TANGO Corp.

Box 15944, W. Palm Bch, FL 33418
Telephone: (305) 683-9587



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 2 $\frac{1}{2}$ " recessed, backlighted meters show SWR and power continuously. Precision Jewel meters.

Antenna Switch. 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. Infiltrator 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.

TO ORDER CALL YOUR FAVORITE DEALER

Amateur Electronic Supply
Ham Radio Outlet
Madison Electronics
EGE
Henry Radio
R and L

Barry Electronics
C-Comm
Missouri Radio
Quement Electronics
Michigan Radio
Ham Station

OTHER

NYE VIKING PRODUCTS: Straight Keys, Squeeze Keys, Code Practice Sets Electronic and Memory Keyers, Phone Patches, 2KW Low Pass Filters, Automatic SWR and Power Meters for HF and 2m (plus a model for the blind), 200w PEP 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



NCJ NATIONAL CONTEST JOURNAL

Meet KPAI and N4ZZ

Phone and CW NA Sprint Results

Contest Skills for the Eighties

ARRL DX Contest High Claimed Scores

July/August 1987

Volume 15, Number 4

NOW AN ARRL PUBLICATION!

The *National Contest Journal* is best described by the editorial in the July/August issue. The *NCJ* is:

- An open forum for the debate of issues concerning the Contest and DX fraternity. This includes the healthy exchange of views which may not match the "official" ones.
 - Articles on the wide variety of subjects which make up the successful Contesters and DXer. Do you know everything you need to about antennas, propagation, geography, linguistics, psychology, hardware, software, governments, statistical analysis, and so on?
 - Coverage of all contest and operating events regardless of sponsoring organization. Expect to see items regarding the CQ Magazine Contests, 73 Magazine, etc.
 - A one-stop information source on rules proposals and changes, high-claimed scores, score rumors, foreign contest results, etc.
 - Contest record-keeper for the USA. This includes Sweepstakes records by section, Field Day by category, CQ WW, CQ WPX, and ARRL DX Contest records by category and call area.
 - The originator of the North American Sprints and the North American QSO Parties, two contests which provide a test of skill without testing physical endurance.
- Most of all, the *NCJ* is *you!*

NCJ Subscription rates for 6 issues (one year)

U.S. \$10

Canada and Mexico \$11 (First Class)

Elsewhere by airmail \$12

() VISA () MasterCard () Am. Express

Signature _____

Acct. No. _____

Good from _____ Expires _____

Name _____

Address _____

City _____ State/Pv. _____ Zip/PC _____

2 METER AMPLIFIERS • ATV CONVERTERS

DISCOVER THE WORLD OF FAST SCAN TELEVISION:



• AMATEUR TELEVISION CONVERTERS

ATV-2 430-450 MHz..... \$ 44.95 Kit
ATV-3 420-430 MHz GaAs-Fet..... \$ 49.95 Kit
ATV-4 902-928 MHz GaAs-Fet..... \$ 59.95 Kit

Available in: Kit or Assembled/Tested
Add \$ 2.00 For Shipping and Handling

RF Amplifiers Per Motorola Bulletins HF/VHF

Complete Parts list for:

140 Watt or 500 Watt HF Amplifiers per Motorola Bulletins:
AN-758, AN-762, EB-27A, EB-63

- **CAMBION RF CHOKES**
0.15 uh, 0.22 uh, 0.33 uh..... \$ 1.70
4.7 uh, 10.0 uh..... \$ 7.95
- **MIXERS**
5BL-1 DBL. Bal Mixer..... \$ 5.30
5BL-1X DBL. Bal Mixer..... \$ 7.95
- **FERROXUBE DEVICE**
VK205-20/AB RF Choke..... \$ 1.20
54-560-65-3B Ferrite Bead..... \$.20
- **POWER SPLITTER/COMBINER**
2-30 MHz, 500 Watts (2 Part or 4 Part)



UPGRADE TRANSFORMERS PER MOTOROLA BULLETINS

We Also Stock Hard-To-Find Parts:

KEMET CHIP CAPACITORS
METALCLAD MICA CAPACITORS
SEMICONDUCTORS
RF POWER TRANSISTORS

For detailed information, please call or write for our free catalog.



CCI Communication Concepts Inc.

121 Brown Street • Dayton, Ohio 45402 • (513) 228-0677



ONE CALL
SERVICE

C·COMM

EVERYTHING
UNDER ONE ROOF

800-426-6528

TOLL FREE - Including Alaska and Hawaii.

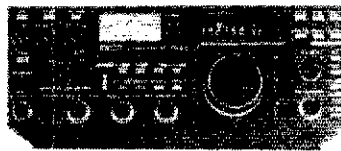
 ICOM

IC-735



HF LINE

IC-751A



 ICOM

IC-761



ICOM TRANSCEIVERS MEAN TOP PERFORMANCE AND GREAT VALUE

KENWOOD

TM 221A / TM 421A
45W 2M OR 35W 70 CM



NOW
TM-321A 220MHz

KENWOOD

TS 440S / AT



MOST POPULAR TRANSCEIVER

KENWOOD

TH215A
2M

TH-315A
220MHz

TH 415A
440MHz



VERSATILE

RELIABLE

KENWOOD
QUALITY

HANDHELDS

CALL C-COMM FOR A COMPETITIVE QUOTE ON KENWOOD EQUIPMENT

 ICOM

VHF/UHF LINE

 ICOM



IC 900

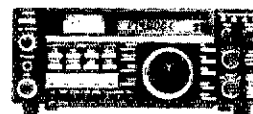
- Multi-Band
- Fiber Optic Remote Cable
- Mounts Anywhere

COMPACT MOBILES



FOR
144 MHZ THROUGH 1.2 GHZ
IC 28/38/48/1200

DELUXE BASE STATIONS



FOR VHF/UHF
IC 575/275/375/475

- Micro-Size Handheld
- Automatic Battery Saver Circuit
- 2 Meter and 440 mhz



IC2AT/4AT

FREE UPS GROUND SERVICE ON MOST ITEMS.

APPLIES TO TRANSCEIVERS AND RELATED ACCESSORIES

800-426-6528

COMPLETE
REPAIR SERVICE
AVAILABLE

K7HBN
George
Sales



W7GAB
Dale
Sales



K7DS
Frank
Sales



NY7X
Joe
Service



NW7U
Scott
Sales

• CALL TODAY

• ORDER NOW
FOR FAST SERVICE

C·COMM

6115 15TH NW
SEATTLE, WA 98107

STORE HOURS:

Mon.-Fri. 9:00a.m.-5:30p.m.
Saturday 10:00a.m.-4:30p.m.

PRICES, SPECIFICATIONS, AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION

C·COMM

(206) 784-7337

WASH. RESIDENTS ADD
APPLICABLE SALES TAX.



WACOM DUPLEXERS

Our Exclusive Bandpass-Reject Duplexers
With Our Patented

B_p B_r CIRCUITSM 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



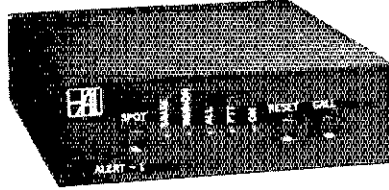
WACOM PRODUCTS, INC.

P.O. BOX 21145

WACO, TEXAS 76702 • 817/848-4435



ALERT-1



Emergency MARS Alerting Device

The Alert-1 is designed to comply with the USNMC MARS Specification 2093/8 NMC 120-84. It is used to alert MARS operators to special situations or conditions.

- Receive State, Region, or National MARS alert calls
- Can be used to transmit alert calls
- Simple connections to your transceiver
- Operates on 12 VDC
- Factory wired & tested
- Priced at only \$199.95

To order or for more information contact:

HAL Communications Corp.
P.O. Box 365
Urbana, IL 61801-0365
Phone (217) 367-7373

EMASS Official Bulletin Stations sent a grand total of 443 bulletins during the month, with packet stations K1BOG, N1BZF and W1ZHC topping the list. FBI Technical Coordinator KA1IU sez that ATC AE1X continues to be of technical help to Amateurs in the southeastern part of EMASS, particularly w/RFI and computer related topics. KA1KF has stepped down as FCC Amateur Auxiliary Coordinator, after several VY productive years of service to the Amateur community. I hope you all can appreciate the huge amount of effort that he has given to the FCC Auxiliary, Long-time Official Observer AG1F has taken over as Auxiliary Coordinator and will no doubt provide EMASS Amateurs the benefit of his superb experience and abilities in this important function. After 23 years W1W reports that the Marchwood Wireless Association lunch group still meets every Friday at 1130 AM with Officers WB1FLO as Prez, and WB1GXS as Treasurer. Section Tlc. Manager KW1U reports that EMASS nets handled 549 pieces of traffic during the month, w/EMRI under the guidance of N1AJJ topping off at 187. 7 EMASS Amateurs made Public Service Honor roll including Tech KA1NOI. Traffic: WA1FCD 545, KN1K 435, KB1AF 381, KY1B 215, NK1Q 195, WA1TB 149, KA1LH 141, KW1U 134, WA1FNM 114, KA1EID 108, W1ZHC 98, N1CVE 90, K1ABO 84, N1AJJ 81, N1BHH 62, K1GRP 57, KA1NOJ 48, NK1O 32, K1COC 30, K1BZO 18, KY1L 14, K1K 9, K1KCU 8, N1EGN 7, KA1AFR 6, K1LCO 6, WA1SNH 6. Have you expressed your opinions to your SM and Division Director of late?

MAINE: SM, Cliff Lavery, W1RWG—ASM: Bill Mann, W1KX—SEC: KB1UVO, STM: AK1B, SM: W1JTH, W1C, KA1FKS—C: W1KX, PIC: KY1E, SGL: K1NH, KQ1L, ASMP: N1AHH. Congrats to Len, K1NBB, having passed certification exam and now being a member Amateur Auxiliary to FCC FOB. Dave, KQ1L, TC, reports that a new international packet radio board went on the air August 1, 1987, at Augusta. This station is operating under KA1FKS-10 and is used on the Maine LAN system to disseminate information to the many packet radio operators. When a station connects, (C KA1FKS-10 V KQ1L-1 or other digipeaters) he is sent a menu from which he can choose a number which will then send information pertinent to the subject, i.e. APRIL field personnel, ten other subjects and more to come. The board is very different from the regular BBS as it is only one way and its function is to provide info about packet radio to Amateur Radio in general. Thanks Dave, W1JTH, Bulletin Manager, reports 60 transmissions of 15 APRIL and five Maine bulletins by six bulletin stations. The following stations participated in comms for the Great Kennebec River WhatEver Race under the direction of KQ1L KA1FKS K1NIT: KA1NHN N1DXM KA1FTO KB1HA N1CVZ W1JTH W1TGY N1CMZ K1OKC W1PXE KA1BL KA1UA KA1LPW KA1MLF N1RP WN1TXD N1AZH N1CIC KA1DLZ KB1QN KA2NIK W1SIN K1HAQ W1CJW W1HTG. Sally, KA8UVQ1, SEC, attended the NVOAD (National Voluntary Organizations Active in Disaster) in Portland and is the APRIL/ARES rep for Maine. She worked with the rep from FEM to organize the Maine chapter. Traffic: KA1JL 148, WB1CBP, KA1DQ 68, K1W 64, W1RWG 40, WA1IE 38 (packet), W1JTH 38, WA2ET 21, W1KX 20 (June 17), KA1ODT 11, NB2K 9, WA1YNZ 9, N1BVM 6, W1BMX 4. PSRR: WB1CBP 93, WA2ET 92, W1RWG 69, NET: SESS CHECKINS TRAFFIC MANAGER Sea Gull 27 871 113 K1GUP Pine Tree 31 258 81 ND1A Aroostock EN 4 77 1 WA1YNZ PBBS no report N1AHH CMEN 9 110 12 W1WCI Me Pub Svc no report KA8UVQ

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—OOC: N1NH, PIC: WA2MBQ. ASM: W1NH, KX1L. This was another very busy summer in the section with surprising activity in license classes. As the result of an intensive PR program and a good set of club activities, G5ARA found that they had a full class of potential Ham ready to start the summer. As of this report, the class half way through the course with about 15 students. The Mt. Moriah Club in Salem has completed a course for a group of YLs some of whom are already working on upgrading. We are experiencing about 15-20 new licensees in the section each month in the wake of Novice Enhancement. This steady increase is due to the excellent and continuing efforts of clubs and the dedication of instructors. Many contribute to the effort with individual teaching efforts. Henry, K1CIL, is an exec committee member of NARC and has provided training and testing for several new hams in the Nashua area already this year. Individuals like Henry, club instructor, and supportive club officials are to be congratulated for their continuing support of the hobby. Lakes Region Rpt Assoc Secretary W1LIM reports that the club exec bd met and planned the groups annual meeting in Aug and a membership drive beginning in the fall. G5ARA pres N1E was pleased with the results of the club's first summer outing at Lake Wentworth with another planned in the fall. The July meeting of MAPPA was held in Lebanon and included election of new officers—Pres-Bob N1BNY, VP-John N1BIF, Sec/Treas-Carl N1CB. Upgrading of the WA1TLN digi is now in the works for the group. The Mt. Moriah club held another VE session with 16 out of 21 applicants upgrading including 5 unlicensed applicants. The VE program continues to flourish in NH. This highly successful program is being helped by the efforts of Ken Karvin, K6UXO, Ken took on the task of coordinating the various VE exams around the state, gathering data and reporting the results of testing. He spearheaded the test program operated by NARC and has been the spark that has encouraged and supported clubs trying a VE session for the first time. Now, Ken and his wife Norma will be leaving us to return to California for new business opportunities. We wish them well and I want to thank Ken for all his efforts and dedication and the time that he willingly gave to make the VE program work. Thanks, Ken and Norma and good luck Don N1AKS who has taken over the coordinating job and the challenge of maintaining the high quality of the program in the NH section. On a lighter note, I attended 3 very different events in July. NARC Activities Coord K1LGO set up a softball game and pool party-I foolishly agreed to play and, although our team won't, it took me a week to recover. I attended the Heavy Hitter's Hamfest and got to see many section members. The weather was blistering and we were glad to be under cover for most of the activities. Finally, Dot and I hosted about 45 club members and families for a camping weekend at our home in VT. This was "Podunks" and we had a super wx and a relaxing weekend. NET/IME/FREED/MOH: GSPN/6 PM/242/MIA/YZM. N1B77 M0357/N1NH. N1B77 PM M-F/2330/KB1X1. G5FM/8:30 PM/146 475/K6UXO. Traffic: G5FM 181, N1HN 133, N1HNT 21, W1PEX 718 BPL, N1CPX 334, K1TCY 250 BPL, W1FYR 179, KK1E 122, N1NH 89, W1ALE 81, N1AKS 66, WB1HBB 46, N1ALM 40, KA1OU 34, W1TN 30, KA1NXT 28, KA1HPO 22, K1PQV 20, WB1GXM 16, K1IM 16, K3IOG 16, KA1LMR 14, KA1BW 14, KA1PFS 6, WB1RE 10, KA1GOZ 8, KA1JOU 7, KA1PFS 6, N1DOA 2.

VERMONT: SM, Frank I. Sultor, W1CTM—ASM: KD1R, STM: AE1T, SEC: W1KRW, PIC: WA1YOY. The Burlington ARC Hamfest again provided 900 of us the opportunity to share

(continued on page 114)

RFI KIT

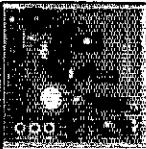
Use ferrite beads and toroids to keep RF out of your TV, stereo, telephone, etc.



Free catalog and interference tip sheet on request.

PALOMAR ENGINEERS

Box 455, Escondido, CA 92025
Phone: (619) 747-3343



MorseMaster II

As featured in Feb., 1987, QST — The affordable, self-contained, full-featured, automatic Morse training computer. The MorseMaster II does it all for \$54.95 (kit), or \$69.95 (assembled, 90-day warranty).

\$2.50 shipping in US. GA residents add 4% tax. Visa and MC accepted.

Stone Mountain Engineering Co., 404-879-0241
Box 1573, Stone Mountain, GA 30086

1-800-678-COAX ORDER LINE

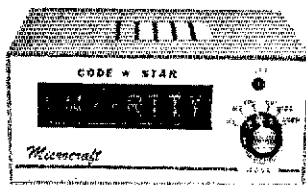
BELDEN 9913 Low Loss 185/500 Ft. or 36'/ft.

AMPHENOL Connectors		
UG-21D	N-type Male Cable End	\$3.00
UG-21D	Female for 9913 cable	\$3.75
PL-25W	UHF Plug (silver)	\$1.25

COAX PLUS SAME DAY SHIPPING
259 Main St
West Orange, NJ 07052 201-678-2629

CODE ★ STAR--PRICED FROM \$129.00

- ★ Ideal for Novices, SWLs 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 ★ START Kit... CS-K \$129.00

ASCII Port Kit... CS-1K \$49.95

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 5130, Thiensville, Wisconsin 53092

here is the next generation Repeater

MARK 4CR

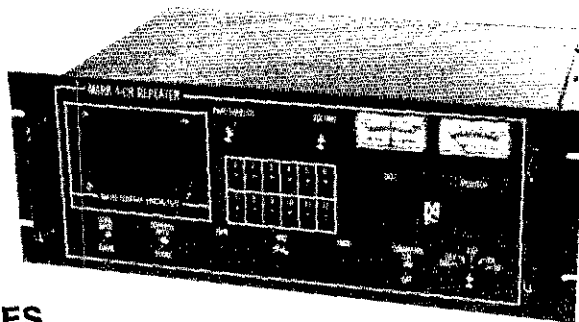
No other repeaters or controllers match Mark 4 in capability and features. That's why Mark 4 is the performance leader at amateur and commercial repeater sites around the world. Only Mark 4 gives you Message Master™ real speech • voice readout of received signal strength, deviation, and frequency error • 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.

The **only** repeaters and controllers with REAL SPEECH!

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.

2 meters, 220, and 440!



MICRO CONTROL SPECIALTIES

Division of Kendecom Inc.
23 Elm Park, Groveland, MA 01834 (617) 372-3442

Telex 4932256 KENDECOM
FAX 617-373-7304

CONFERENCE PROCEEDINGS

21st Central States VHF Society Conference held in Arlington, Texas, July 23-26, 1987. 28 papers covering everything from use of TVRO dishes for moonbounce to a solid state amplifier for 5.7 GHz. 166 pages.

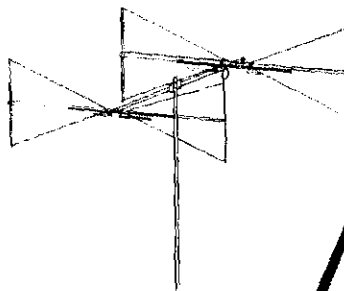
6th ARRL Computer Networking Conference held in Redondo Beach, California, August 29, 1987. The latest concepts on networking, high speed modems and other packet-radio technology are discussed in 30 papers that were prepared for the conference. 174 pages.

MICROWAVE UPDATE 1987 held in Estes Park, Colorado, September 10-13, 1987. 17 papers on equipment, antennas and techniques for 902 MHz through 10 GHz. Much information on construction of 2.3, 3.4 and 5.7 GHz gear. 136 pages.

Proceedings booklets are \$10.00 each plus \$2.50 per order for postage and handling (\$3.50 for UPS.)

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST.
NEWINGTON, CT 06111

The HF4B "Butterfly"™ A Compact Beam for 20-15-12-10 Meters



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

BUTTERNUT

HF ANTENNAS FROM

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

Wonderful Wireless Widgets Fwom Woodbidge



ege inc

EGE VIRGINIA
14803 Build America Drive, Bldg. B
Woodbridge, Virginia 22191
Information: (703) 643-1063
Service Dept. (703) 494-8750
Store Hours: M-Th. 10-6
F 10-8
Sat: 10-4
Order Hours: M-F 9-7
Sat 10-4

EGE NEW ENGLAND
8 Stiles Road
Salem, New Hampshire 03079
New Hampshire Orders,*
Info & Service: (603) 898-3750
Store Hours: MTWTF: 10-4
Th-F: Noon-8

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

LACOMBE DISTRIBUTORS

Our associate store:
Davis & Jackson Rd., P.O. Box 293
Lacombe, Louisiana 70445
Info & Service: (504) 882-5356



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

ege inc

**Buyer's Guide/Catalog
Available—Send \$1.**

Antennas

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

Antennas in Stock
for Mobiles, Base Stations,
and Handhelds

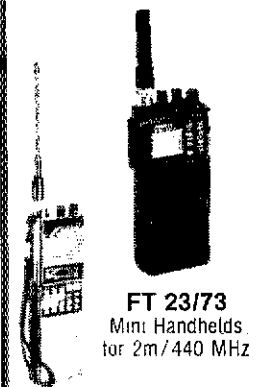
Everything from mini rubber
duckies to huge monobanders

**ASK FOR PACKAGE
DEALS ON ANTENNAS
AND ACCESSORIES**

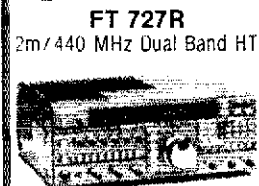
Also...

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

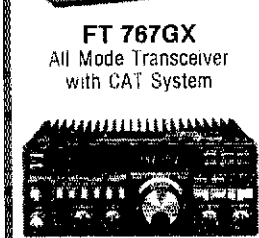
YAESU



FT 23/73
Mini Handhelds
for 2m/440 MHz



FT 727R
2m/440 MHz Dual Band HT



FT 767GX
All Mode Transceiver
with CAT System



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



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

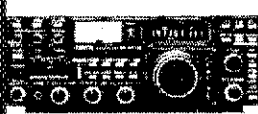
Towers

**UNARCO-ROHN
TRI-EX
HY-GAIN**

Ask for package quotes on
complete tower assemblies
including Phillystran, guy
wire, antennas, rotators, etc.

ROTATORS
Kenpro, Alliance, Daiwa,
Telex Hy-Gain

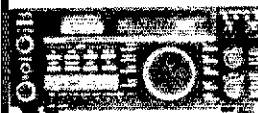
ICOM



IC 751A
HF Transceiver with
General Coverage Receiver



IC 3200
2m/440 MHz Mobile



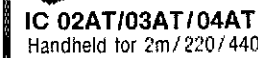
IC 275A
All-mode Transceiver



R 7000
General Coverage Receiver



Micro 2AT
Mini 2m Handheld



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

Computer Stuff

Packet Controllers
Kantronics and MFJ

Amateur Software
Ham Data Software for
Commodore Computers
Ask for Descriptions

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

KENWOOD



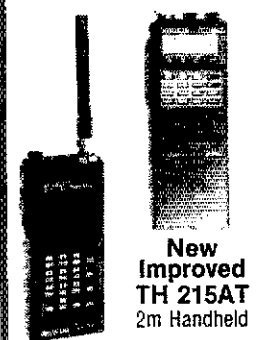
TS 440S
HF Transceiver
with Antenna Tuner



TS-940S
HF Transceiver with
General Coverage Receiver



TM 221A/321A/421A



**New
Improved
TH 215AT**
2m Handheld



TH 21BT/31BT/41BT
Mini Handhelds
for 2m/220 MHz/440 MHz



R 5000
General Coverage Receiver

Accessories

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

ANTENNA TUNERS
Amp Supply, Ameritron, MFJ

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

**NEW
ALINCO
ALR-24T**
Dual-band
Mobile
2m/440 MHz

**TOR
TEN-TEC**



**Corsair II
Model 561**
HF Transceiver



Paragon
Amateur Transceiver with
General Coverage Receiver



ALR-22T
Compact 2m Mobile

More Radios

KDK
FM 240 2m Mobile
SONY
Receivers

**REGENCY
BEARCAT**
Scanners

MIDLAND
CB Radios

COBRA
CBs, Radar Detectors, Phones

UNIDEN
CBs, Radar Detectors

WHISTLER
Radar Detectors

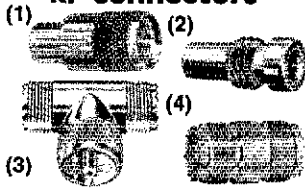
For Orders & Quotes Call Toll Free: 800-336-4799
In New England (except NH): 800-237-0047 In Virginia: 800-572-4201

ege inc

Radio Shack Parts Place™

HAMS—DEPEND ON SHACK® FOR STATION ACCESSORIES

RF Connectors



- (1) PL-259, #278-205 2/1.99
- (2) Reducer for RG59/RG8M, #278-204 2/99¢
- Reducer for RG58, #278-206 2/99¢
- (3) M-358 "T" Adapter. Useful for phasing lines. #278-198 2.99
- (4) PL-258 Coupler. Joins two PL-259 plugs. #278-1369 1.49

Made in USA Coax



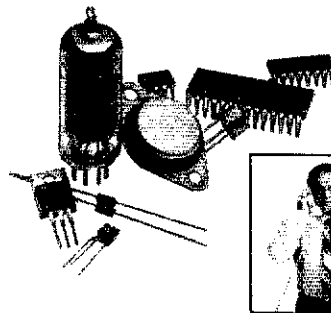
NEW RG8! Sealant Tape

Low As **16¢** Per Foot

Type	Cat. No.	Per Foot
8/AU	278-1323	.36
RG8/M	278-1328	.21
RG58/U	278-1326	.16
RG59/U	278-1327	.16

Sealant Tape. Molds around connections to weatherproof coax and rotor hookups. #278-1645 ... 2.49

Save With Our "Hotline" Order Service



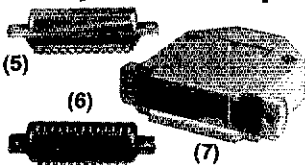
Save Postage! We Deliver to Your Local Radio Shack

Save Time! Delivery Time on Most Items is Just One Week

Over 200,000 Substitutions

Your Radio Shack store manager can special-order a wide variety of parts and accessories not in our regular catalog—tubes, ICs, transistors, crystals and more. There's no minimum order for this convenient service!

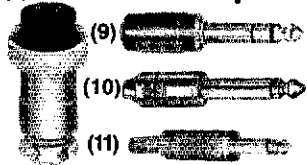
Computer Hookups



9 and 25-Position Subminis

Fig.	Type	Cat. No.	Each
6	D-Sub 25 Male	276-1547	1.99
8	D-Sub 25 Female	276-1548	2.99
7	Hood for Above	276-1549	1.99
—	D-Sub 9 Male	276-1537	1.49
—	D-Sub 9 Female	276-1538	2.49
—	Hood for Above	276-1539	1.99

(8) Audio Hookups



- (8) 8-Pin Mike Plug. Fits popular transceivers. #274-025 2.19
- (9) Headphone Adapter. 1/8" stereo plug to 1/4" mono jack. #274-348 1.89
- (10) Shielded Adapter. 1/8" plug to 1/4" jack. #274-325 1.49
- (11) 1/4" Shielded Plug. #274-1545 1.79

Experiment With Communication LSIs



NEW! 5⁹⁵

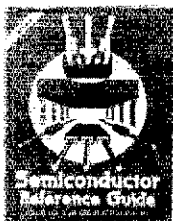
Build Your Own Custom FM Monitor
TDA 7000 FM Receiver. Combines RF mixer, IF and demodulator in one monolithic IC. Use to build a small, low-cost repeater monitor, NOAA weather receiver or FM broadcast receiver, with a minimum of external parts. Built-in mute, PLL system with 70 KHz IF. #276-1304



12⁹⁵

Complete DTMF Receiver on a Chip
SSI 202 Touch-Tone Decoder. A complete DTMF receiver in one 18-pin DIP. Excellent for Ham radio autopatching, repeater and remote-station control. Features built-in switched-capacitor filters—no input filtering needed. Single 5VDC supply. With data and circuit examples. #276-1303

Semi Sub & Ref Guide



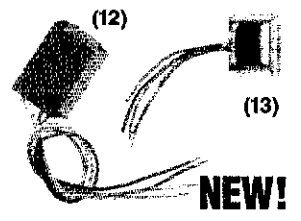
NEW!

3⁹⁹

Latest 1988 Edition

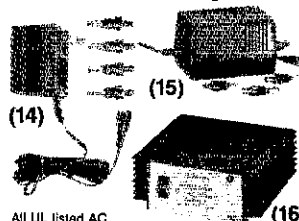
Semiconductor Reference Guide. Sub section lists over 80,000 device types and their low-cost Radio Shack equivalents. You also get detailed data on Radio Shack ICs, SCRs, LEDs, diodes and optos. #276-4011

Audio Transformers



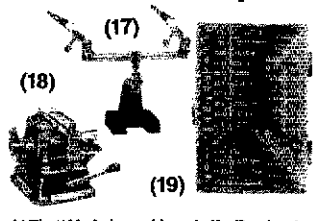
- (12) 1:1 Transformer. Impedance: 600 to 900 ohms. Isolation: 100 megohms at 250 VDC. #273-1374 3.49
- (13) Audio Output. 1000-ohm center-tapped primary, 8-ohm secondary. #273-1380 1.29

AC to DC Adapters



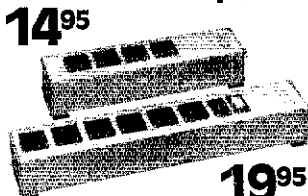
- All UL listed AC
- (14) 120 VAC to 12 VDC. #273-1652 10.95
 - (15) High-Current 120 VAC to 12 VDC. 1 amp. #273-1653 18.95
 - (16) Regulated 12 VDC Power Supply. #22-120 39.95

Workbench Helpers



- (17) "Helping Hands" Project Holder. #64-2093 7.49
- (18) Vacuum-Base Mini-Vise. Mounts instantly. #64-2094 ... 3.29
- (19) 16-Pc. Tool Set. Screw/nutdrivers, hex keys. #64-1961 8.95

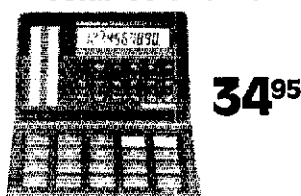
Power Strips



Safe way to add extra outlets to home or workshop. Circuit-breaker protection. Six-foot cord with 3-prong plug. Rated 15 amps.

- 4-Outlet Grounded Strip. #61-2620 14.95
- 6-Outlet Grounded Strip. Lighted on/off switch. #61-2619 19.95

Solar Scientific



- Works in Almost Any Light
- Nine Physical Constants

Radio Shack EC-4018 will help you master ticket-upgrade math! Features horizontal design, memory, random number, trig and 10-digit mantissa. #65-982

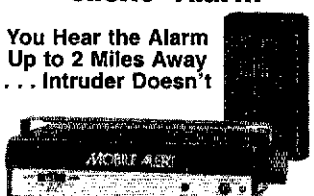
28-Range FET VOM



NEW! 49⁹⁵
High Input Impedance Rivals the Finest VTVM

Deserves a spot on every Ham's workbench—well-suited to electronics troubleshooting. Features a big 5" meter with mirrored scale and single-knob range/function control. Audible continuity test, 10-megohm input sensitivity. Battery extra. #22-220

"Silent" Alarm



You Hear the Alarm Up to 2 Miles Away ... Intruder Doesn't

Stop thief! Complete security system protects your mobile rig when you're out of the car. In-car transmitter signals hand-held receiver or optional siren when it detects an intrusion attempt. Can also be used as a pager system. Receiver battery extra. #49-791 79.95

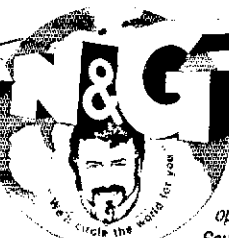
Over 1000 items in stock: Binding Posts, Capacitors, Chokes, Diodes, Enclosures, Fuses, Inductors, Jacks, Knobs, Lamps, LEDs, Motors, Optoelectronics, PC Boards, Rectifiers, Relays, Resistors, SCRs, Solder, Switches, Tools, Transistors, Triacs, Wire and more!

Radio Shack®
A DIVISION OF TANDY CORPORATION

Prices apply at participating Radio Shack stores and dealers

WE MOVED! NEW LOCATION! MIAMI'S LEADING DISCOUNT DEALER . . . 1 MILLION DOLLAR NEW LOCATION FACILITY, WITH 17,000 SQ. FT. TO SERVE YOU.

"Serving South America & The Caribbean Since 1956"

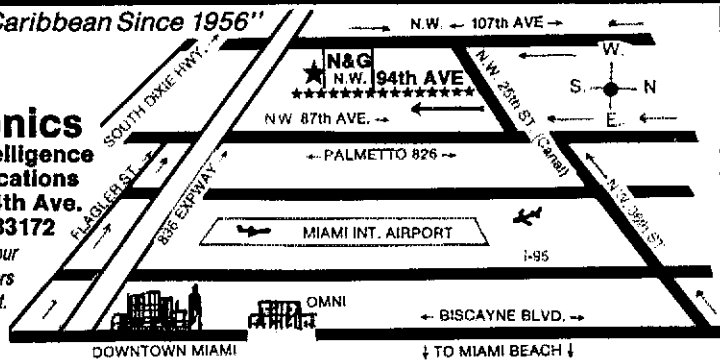


N&G Electronics
Counter Intelligence & Communications
 1950 N.W. 94th Ave.
 Miami, Fla. 33172

open 24 hrs. a day for our South American customers upon request.

Dade
(305) 592-9685
Broward
(305) 763-8170
 Telex 9102401958 • Answer Back NG DIST UG

Open 9-6 Mon.-Fri.
 Sat. 9-5

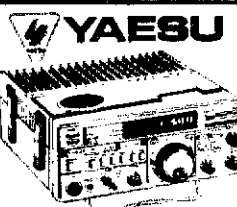


the latest state of the art communications. All major brands

- Marine
- Aircraft
- Amateur
- Commercial
- Counter intelligence equipment
- Night vision equipment
- Money counters



the latest in counter intelligence equipment



YAESU FT-757GX
 all mode transceiver



ICOM IC-751
 the new standard of comparison

NOSOTROS LE ENTREGAMOS SU ORDEN A cualquier EXPORTADOR, EMBARCADOR, o al Aeropuerto Internacional de Miami GRATIS! . . . Llámenos desde cualquier parte del mundo y le preparemos su ENVIO a SU PAIS.



The RC-85 Repeater Controller . . . the affordable controller for your repeater.

The RC-85 controller offers the high tech basics of repeater control, plus! Of course, much of what we consider to be the "basics" aren't found *anywhere else, at any price.*

Remote programming lets you configure the operating characteristics of your repeater and change them at any time — without a trip to the hill. Non-volatile memory remembers your parameters, even after a power loss.

Synthesized speech makes it easy for users to interact with the repeater. Commands are acknowledged and information is available to users through remotely programmable ID, tail, and bulletin board messages. The new, larger speech vocabulary is ideal for repeater groups, emergency and public service needs. And since your repeater talks, it's friendly and fun to use.



The patch provides ten Emergency autodial numbers and 190 user loadable autodial slots. With toll restrict, "cover tone", and more.

The remote base port lets you hook up a transceiver to your repeater for remotely controlled linking to other repeaters and simplex channels. With full frequency control! Frequency agile linking is invaluable for public service uses, and it's fun!

There's even more ... a talking S-meter so users can check how well they're getting into the repeater, a site alarm for security, paging, and remote control outputs for controlling equipment at the site.

Any repeater can be brought up-to-date at a price that's right with ACC's RC-85 Repeater Controller.



advanced computer controls, inc.

2356 Walsh Avenue, Santa Clara, California 95051
 (408) 727-3330

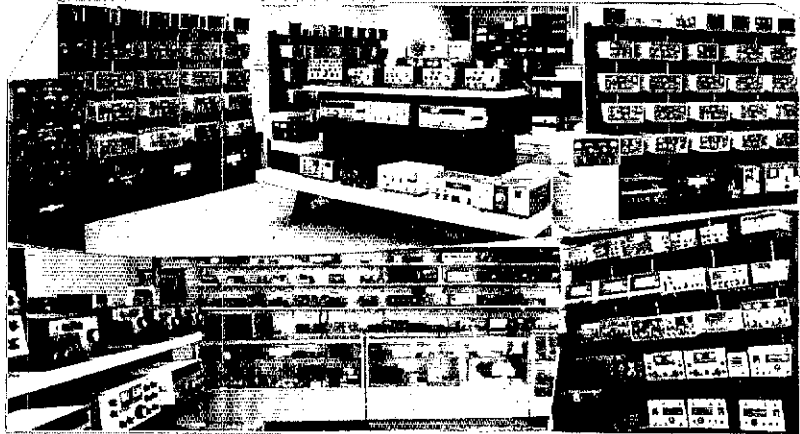
ASSOCIATED RADIO

8012 CONSER BOX 4327
OVERLAND PARK, KANSAS 66204

VISA-MC
AMEX-DISC.



BUY — SELL — TRADE
ALL BRANDS NEW AND RECONDITIONED



**WE'LL BUY YOUR EXTRA RIG
OR ENTIRE STATION**

Call 913/381-5900

**DISCOUNT PRICES
SEND \$2 FOR CATALOG
AND WHOLESALE LIST**



**** NEW ****
"I learned all of my code and theory while driving to and from work, it was easy."

If you don't have time to read books & take notes at home for the theory exams or spend hours copying code practice you can learn them by simply listening at your leisure. You will learn not only the exact questions and answers on your test but the detailed theory behind each one. You will thoroughly understand what you are being asked and why the answer is correct.

New Novice, New Technician/General, Advanced, Extra.
Theory courses on audio cassettes. \$19.95 ea.
Learn code non stop all the way from scratch through Novice to Extra class speed (0 to 23 words per minute) with one course. Code is learned at a high rate with wide spacing between characters. A completely structured course which will take you in easy steps to your license class speed. Simply listen at your leisure.

Code course on audio cassettes. \$19.95
VEC type code General or Extra Exam tape C90 \$7.95 ea.
Shipping 3.00 per theory or code course. Exam tapes \$1.00. Check, MO, Visa or MC. Courses shipped same day received.

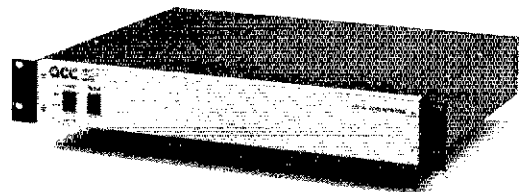
AMATEUR RADIO SCHOOL KB6MT
Jerry Zillak KB6MT (7 years instructing students)
2350 Rosalia Drive, Dept. A, Fullerton, CA 92635
(714) 990-8442

"The Digital Voice Recorder echos your thoughts"

ACC's Digital Voice Recorder allows you to remotely record your voice over the air using digital storage in its huge memory array. PCM recording results in the highest possible fidelity, so you're proud of how it sounds on your repeater.

The DVR's voice mailbox gives your repeater users computer bulletin-board like capability from any radio with a 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, and special events. And you can make your repeater the friendliest around. With its no-compromise high quality PCM digital audio processing, even famous celebrities can sound like they're live at your repeater site!

The DVR connects easily to your RC-850 or RC-85 controller. 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 it for yourself.



**advanced
computer
controls, inc.**

2356 Walsh Avenue, Santa Clara, California 95051
(408) 727-3330



rf enterprises

We Specialize In Antennas & Towers • We Ship Worldwide

ANTENNAS hy-gain

TH7DXS / TH5Mk2S Triband Beams
Explorer-14 / TH3JrS Triband Beams
204BAS / 205BAS 20 Mtr. Monobanders
155BAS / 105BAS 15 & 10 Monobanders
Discoverer 7-1 Discoverer 7-2 & 7-3 Kit
14AVQ / WBS / 18AVT / WBS
18HTS Hy-Tower / LC-160 Coil
2BDQ / 5BDQ "Full power" trap dipoles
V2S / V3S / V4S Verticals
215S (70 cm) / 216S (2 Mtr) NEW!!
218S Complete OSCAR System
BN-98 balun COMPLETE Telex/Hy-gain Inventory!

CALL FOR PRICE

cushcraft

A3 & A4 Beams..... \$215.00 / 289.95
A743 & A744 30/40 Mtr Add-ons..... 74.50 / 74.50
A3SK & A4SK Stainless Kits..... 34.95 / 41.95
AP8 Vertical..... 135.00
AV4 & AV5 Verts..... 94.00 / 100.00
40-2CD 2-el. 40 Mtr. Beam..... 295.00
Monobanders for 10, 15, & 20 in stock! CALL!
617-6B 6 Mtr. BOOMER..... 198.95
A50-6, A50-6..... 81.95 / 104.95
A147-11, A147-20T..... 47.50 / 59.95
215WB & 230WB 15 & 30 el. 2 Mtr..... 81.95 / 219.95
3219 3.2 wavelength, 144-146 MHz..... 94.00
4218X 4.2 wavelength, 144-146 MHz..... 101.00
220B & 424B Boomers..... 94.00 / 81.95
Large Inventory of other antennas & accessories!

KLM

KT34A / KT34XA..... \$395.00 / 585.00
Monobanders for 10 to 90 Mtrs! CALL
2M-13LBA / 2M-16LXB.....
220-14X / 220-22LXB.....
432-20LXB / 432-30LXB.....
2M-14C / 2M-22C.....

SALE PRICES

BUTTERNUT

HF6V 90-10 Vertical..... \$115.00
HF2V 80 & 40 Vertical..... 112.00
HF4B Compact 10-20 "Butterfly" Beam..... 189.00
VHF / UHF Verticals and Scanner Ants. In stock.
ACCESSORIES
RMK II Mtg Kit / STR II Radial Kit..... 42.95 / 29.95
TBR-160S Coil / SC-3000 Scanner Ant..... 47.95 / 54.95
All other accessories in stock.

Mosley

TA-33..... \$249.00 CL-33..... \$284.95
TA-33 Jr..... 199.00 TA-40KR..... 89.95
Pro 57..... 469.00 Pro 67..... 619.00

ALPHA DELTA

DX-A / DX-D Slopers..... \$46.95 / 57.00
DX-D / DX-DD Dipoles..... 79.95 / 69.95
Delta-4 / Delta-4N Coax Switches..... 65.00 / 75.00
Transit-traps in stock.

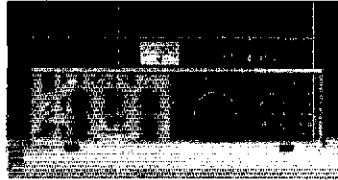
HUSTLER

6BTV / 5BTV Verticals..... \$127.95 / 106.00
G6-144B / G7-144B 2 Mtr Verts..... 86.95 / 114.95
HF Mobile Masts, Resonators, & Mounts
CALL!

Larsen Antennas

VHF & UHF Mobile Systems

TONNA ANTENNAS



TEN-TEC

Model 585
PARAGON

NEW! 200W Full featured
HF Transceiver. Microprocessor
controlled. General coverage.

OTHER TEN-TEC PRODUCTS:

Model 561 Corsair II
Model 425 Titan Linear Amplifier
Model 579 Century/22 - 50W CW Transceiver
Model 229A 2KW Antenna Tuner
Model RX-325 General Coverage Receiver
Model 2510 Satellite Station
Model TT-920 VHF Aviation Transceiver

ASTRON CORPORATION

DC supplies from 4 to 50 amps. In stock!

RS-12A..... \$67.95 RS-20A..... \$84.95
RS-35A..... 129.95 RS-50A..... 136.95
RS-20M..... 102.95 RS-35M..... 146.95
RS-50M..... 206.95 VS-50M..... 224.95



TUNERS



MFJ

MB-V-A (NYE)

Meters, Keys, Switches, PACKET!



KDK FM-240

SANTEC

ST-20T

WELZ Meters

AMPLIFIERS

MIRAGE

rconcept

VHF & UHF Linear Amps

THL AMERITRON



HF Linear Amps

ROTORS

TELEX

HDR-300..... CALL
T2X..... CALL
HAM IV..... CALL
CD 45 II..... CALL
AR-40..... CALL

KENPRO

KR-400 / -400RC... \$149.00 / 174.95
KR-600 / -600RC... 234.95 / 249.95
KR-500 / -500B... 189.00 / 259.95
KR-2000 / -2000RC 449.95 / 479.95
KR-5400A / -5600A... 315.00 / 399.00

ALLIANCE HD-73... \$109.00 U110... \$49.95

MICROWAVE MODULES TRANSVERTERS, CONVERTERS, PREAMPS

TOWERS

HY-GAIN

Crank-up towers. Self-supporting, steel, galvanized, with base & rotor plate. Rated at 9 & 16 sq. ft. All accessories available.

HG-37SS / HG-62SS (9 sq. ft.)..... \$Call
HG-54HD / HG-70HD..... (16 sq. ft.)..... \$Call

Free shipping on Hy-gain towers and all Hy-gain antennas and rotors ordered with tower.

ROHN

FREE STANDING: Rated at 10 & 18 sq. ft.

HBX40..... \$215.00 HDBX40..... \$272.00
HBX48..... 289.00 HDBX48..... 355.00
HBX56..... 369.00 BX64..... 409.00

Galvanized, self-supporting towers with base and rotor plate. Today's best tower buy. Freight additional.

GUYED TOWERS:

25G..... \$51.00 45G..... 115.00
TB3 Thrust Bearing..... 51.95

All accessories in stock. Freight additional.

FOLD-OVER TOWERS:

FK2548..... \$395.00 FK2568..... \$1059.00
FK2568..... 1105.00 FK4544..... 1315.00
FK4554..... 1405.00 FK4564..... 1495.00

Fold-overs shipped FREIGHT PREPAID in U.S.

Prices 10% higher in western states.

ROOF TOWERS & CLIMBING BELTS..... Call

TOWER HARDWARE

Guywire: 3/16 EHS / 1/4 EHS, per ft..... \$0.15 / 0.16
CCM Cable Clamps: 3/16 / 1/4..... 0.39 / 0.49
Turnbuckles: 3/8" E & E / E & J..... 6.95 / 7.95
1/2" E & E / E & J..... 12.95 / 13.95
Thimbles: 1/4" (3/16 & 1/4" cable)..... 0.39
Earth Anchor: 4 ft. Screw-in..... 13.95
Preformed "Big Grips": 3/16 & 1/4..... 2.49 / 2.99
Guy Insulators: 500 D / 502..... 1.69 / 2.99

PHILLYSTRAN GUY SYSTEMS

HPTG-2100 / -4000 / -6700 Cable..... 0.24 / .40 / .67
Cable Ends: 9901LD / 9902LD..... 7.95 / 9.50
Socketfast Potting Cmpd..... 14.50

WIRE & CABLE

BELDEN COAX

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

COPPERWELD ANTENNA WIRE

Solid: 12 ga. / 14 ga..... 0.10 / 0.08
Stranded: 14 ga..... 0.08

ROTOR CABLE

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

AMPHENOL CONNECTORS

PL-259: std / silver / teflon..... 0.89 / 1.25 / 1.45
UG-21B (8261) Type N Male..... 2.95
T's, angles, adaptors, jacks, & BNC in stock!

COAX AVAILABLE IN PRECUT LENGTHS WITH CONNECTORS ATTACHED.

ANDREW HELIAX

LDF4-50A 1/2" Cable..... 1.75
LDF5-50A 7/8" Cable..... 4.00
Connectors In stock.

BENCHER • B & W • WELZ • VGE SHURE 444D MICS • ARRL BOOKS

ALINCO

1-800-233-2482

INFORMATION TECHNICAL MINNESOTA & CO.

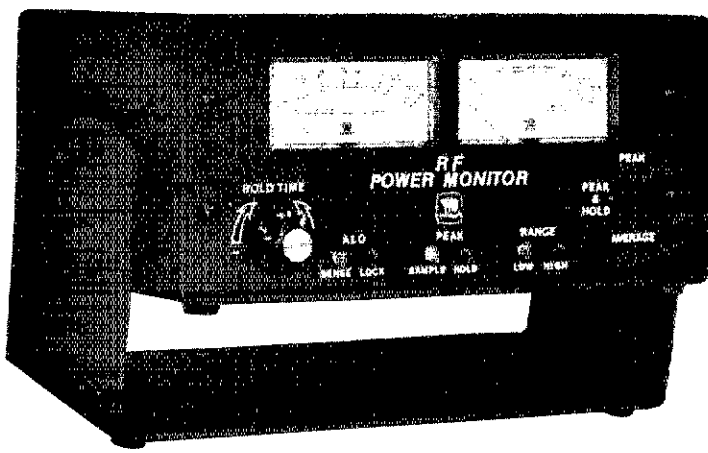
218-765-1254

TELEX: 4033032 RPT-UI

rf enterprises

P.O. Box 41
Marquette, MN 55455

Circle 6 on Reader Service Card



NEW From NYE . . . The RF POWER MONITOR SYSTEM

Attractive, durable and value packed.

THIS IS NOT JUST ANOTHER WATTMETER

Check these features.

Peak, average or peak and hold readings at a flick of a switch. Utilizes a special sample and hold analog memory circuit which is capable of displaying for up to 20 seconds, the correct peak — power reading of a single 1ms pulse. Automatically switched power scales to 5 KW.

Built-in adjustable ALO — This lockout circuit for your amplifier will operate from either SWR or reflected power.

Interchangeable calibrated couplers for many frequencies and power levels.

Separately metered fully automatic SWR display.

H.F. couplers include forward biased full-wave detection system.

Backed by the NYE full two year warranty.

±5% of full scale accuracy guaranteed.

This efficient monitor circuit is powered by heavy nicad batteries which are charged by the applied RF. A separate charger is also supplied for fast charging and backlighting of meters. Available in two models: the RFM-003 or RFM-005 depending on power scaling needed. Write or call for details.

OTHER NYE VIKING PRODUCTS

Antenna tuners, including the famous MB-V-A, phone patches, straight keys, squeeze keys, electronic and memory keyers, code practice sets, 2 KW lowpass filters, all band antenna and more

Ask for a free catalog.

**WM. M. NYE
COMPANY**
1614-130th Ave. N.E.
Bellevue, WA 98005
(206) 454-4524



TO ORDER, CALL YOUR FAVORITE DEALER

Amateur Electronic Supply
Ham Radio Outlet
Madison Electronics
EGE -
Henry Radio
R and L

Bary Electronics
C-Comm
Missouri Radio
Quement Electronics
Michigan Radio
Ham Station

For reliability...



... and increased resale value, rely on Cover Craft Dust Covers.

Try our low-cost protection for ALL your equipment . . . before it's too late.

- Protects equipment and investment.
- Great looking.
- 100's of designs.
- Extra strength heavy gauge vinyl.
- Machine stitched.
- Satisfaction guaranteed.

See your dealer or contact:
COVER CRAFT
Div. of Amherst International Corporation

540 N. Commercial St., Manchester, NH 03101 • (603) 644-3555

FROM \$8.95

Section Manager. He has been active in Amateur Radio since 1978 and has served as an Asst. EC, OBS and is currently the editor of Spokane's VHF club newsletter. He was also the manager of the 1983 Division Convention in Spokane. His address is West 5006 Houston, Spokane, 99208. Kyle's job is to be the Section representative in the Spokane area and a contact person for ARRL members within the Inland Empire. I'm sorry to report that WB7VSK has resigned as DEC for the Spokane area. Don has done a fine job through the years, and his active service will be missed. One of his last official activities was coordinating the efforts of Spokane amateurs dealing with the Hangman Hills fire in July. This fire, started by a tree branch falling across a power line, leveled over 1000 acres of residential homes and caused millions of dollars in damage. A Spokane-Review editorial stated, "It was the ham radio operators who often were the best source of specific information for residents of the burning area." It was a job well-done by all amateurs in the affected area. W7BUN will be starting his radio theory class, "DC to IC," the first of this month. It will be at the RCT clubhouse each Saturday 9AM. The focus is radio theory, rather than simply passing exams. Contact W7BUN to sign up. Angela, KC7EC, will also be starting Novice classes at the same time. Lee, W7JEU, will be starting radio classes in the Olympia area. Contact him at (206) 866-3979. The 148.78 (Kamak Butte) and 147.28 (Pikes Peak) repeaters are now linked on a permanent basis providing solid coverage for all of Southeastern Washington, Northeastern Oregon, and Western Idaho. Contest season begins this month with the CQWW on the last full weekend. Still some time for last minute adjustments to antenna systems and equipment. Hope you all enjoyed the Washington State QSO party last month. 10 Meters has been opening nicely, providing lots of action for Novices. N7CAK is now forwarding ARRL bulletins to Seattle, Tacoma, Portland, Everett, Wenatchee, Tri-Cities, and Spokane. Westside amateurs are invited to participate in the Amateur Information Service on the Bellevue repeater (224.18). Topics of discussion may be any item related to amateur radio. Contact Jerry Austin, K5LIE, for additional information. The most common question for the FCC office and your Section Staff is "When and where are the next amateur exams?" I would very much appreciate each club sending me a postcard with their anticipated examination schedule and info on upcoming license classes. Between April 15 and June 15, our Section gained some 420 new hams. Many thanks to the clubs and people who made this possible by donating their time and resources. Public Service Activity: King County ARES-367 hours. Traffic: W7IGC 220, W7W0W 161, K7EXZ 147, W7L.G. 144, N6EQZ 108, N7GJL 75, KR7F 58, W7GB 52, W7APL 47, W7L 30, K7JW 28, W7PI 14, K7UQH 14, W7YEN 14, K7AJT 12, W7A7PIN 11, W7IEU 10, N7DIP 6, K7PMD 6, N7IJU 4, K7CLL 3, Category 2: KH7L, KD7ME.

PACIFIC DIVISION

NEVADA: SM, Joe Lambert, WB8XD—LVRAC is sorry to lose Bob, K6PIY as VP (he is moving to Calif.), but pleased to announce Goldie, N7CXD as their new VP. Congrats to KDJJP who has been appointed to fill the vacancy on the WADG Board which was created by the resignation of N7ISU. So, Nevada is sorry to lose Bill, W4HMV, to Wash. D.C. area. He will be missed. TARA will miss Barry as their VP, and have appointed Pat, N7ZD, Bob, W4G9YK took over as newsletter editor. TARA's W7CC is offering pre-meeting code classes. Great Ideal FARS in So. Nevada will start Novice classes in Oct. Contact NW7O (456-6366). K7HRW's Novice Classes in Reno area are beginning Sept. 1. His last VE exam was very successful with 33 out of 44 passing. Next exam August 22. Welcome new EGs: K7CEE, N7GXJ, N7ZG, W7SRM. DON'T FORGET THE PACIFIC DIVISION CONVENTION IN SAN JOSE, CA OCT. 2,3,& 4. SEE YOU THERE!

PACIFIC: SM, Army Curtis, AH6P—Aloha and hana adai to all of the Pacific. Hams from the Koolau and EARC clubs combined forces to provide communications for the annual Kailua Fourth of July parade. Those participating were KH6IS, KH6KL, NH6GT, NH6IE, KH6JCA, N4ESX, KH6NJ, WH6BMX, NH6JY, WH6BKO, KH6CI, AH6AO, AH6BW, KH6PP, KH6BI, and WX4J. On Guam, 7 members provided comm for the Liberation Day parade and race on July 21. On Maui KH6MX, NH6EW, and N6CL provided public service comm for the annual Waialuku Jr Tennis Tournament July 27-28. WH6C PBBS is now on 145.01. Speaking of packet, KH6HU advises that Waimea High School will be on packet this next school year. Also from Kauai KH6PH upgraded to advanced. From Hilo, NH6JR upgraded to advanced. Congrats! EARC Net reports QNI 373, QTC 26. Traffic: KH6S 35, N4ESX 23, KH6H 21, KH6PP 14, WX4J 10, AH6P 4.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Many thanks to those who have responded to the appeal for volunteers in the spring Section Letter. More who have the time and qualifications are needed. The news this month is the ham response to the big forest fire in Alpine County, near Woodfords. Keith, K6QIF, an ATC (Packet), Deane, N6BA, Section EC, and Les, W4EGQC handled traffic at the Sacramento end of the Office of Emergency Services and Tahoe Amateur Radio Association (TARA) members Bob, W6ITR and Al, W6S1M were at the high mountain end. The Amador County Sheriff's office provided help to Alpine County with (among other Deputies) Dave, K6BNT. But, because of the surrounding mountains, they could not communicate back to their home office by sheriff's radio so other hams and a high mountain 2 Meter repeater came to the rescue. District EC Dave Carlson, K6BNS arranged for Harry, K6ELF and Asst EC Tim, K6BGY to provide the home end of the link. Doubly unfortunate (the timing and the happening), just as Bill, W6BN, the Amador County EC was wanted for arranging the fire emergency communications his wife, Aloha, K6BLUX was involved in an automobile accident (not her fault) and was taken off to the hospital. As it turned out, Aloha was not seriously injured and others filled in (not for Bill). DON'T FORGET THE SECTION NET. First Sunday each month, 8PM, 146.085. Traffic: N6LUY 354, W6BZC 64, K6SRF 58, W6WJZ 55, W6RFF 30, W6SZUD 20, W6BSRQ 8.

SAN FRANCISCO: SM, Bob Smith, N6A1—Congrats to REXDA, they Doubled the QSO count from SCRA. Well Shouldn't They? Total Pts. in 4A was 7900, this should put them in the top 10 nationwide. Picnics and Potluck are in vogue Next Month, watch your CLUB newsletters and local PACKET BBS's for details. Put SEPT 19 on your Calendar for the SCHA Flea Market and Auction in Sebastopol. Talkin on 146.73, with exams, food, door prizes from 8am till it's over! Humboldt and Del Norte Counties are in Net-Rom Packet with the WEAK LINK in W6AMT-7. Two new Net Rom Nodes will soon cure this problem in Mendocino County. Brock, W6RNL, is back handling traffic in Eureka after a short rest. GL LADD RC is providing communications for the 100th Anniversary for the Blind Bike-A-Thon and is looking for help. Newest Section Appointee is Jack, K6AYB, as OO in San Francisco, he has been living in the South Bay and just recently moved to SF. Don't Forget, YOUR LOCAL CLUB needs YOU—Get out and support YOUR HOBBY AND YOUR LOCAL Club! July Traffic: W6RNL 186, N6FWG 54.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—

KENWOOD

...pacesetter in Amateur Radio

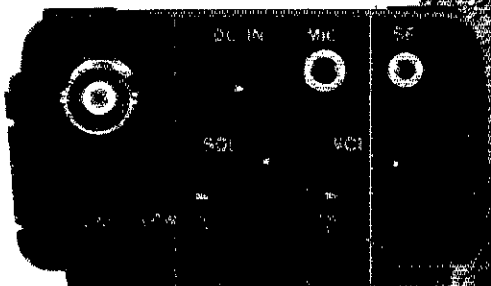
220 MHz
TH-315A
Here Now!

This HT Has it All!

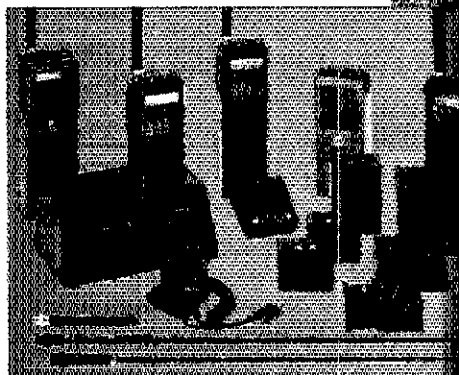
TH-215A/315A/415A Full-featured Hand-held Transceivers

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m, TH-315A for 220 MHz, and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let you go from hamshack to portable to mobile with the greatest of ease!

- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-315A covers 220-225 MHz, TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS decoder optional.
- **10 memory channels store any offset, in 100-kHz steps.**
- **Odd split, any frequency TX or RX, in memory channel "0"**
- **Nine types of scanning!** Including new "seek scan" and priority alert. Also memory channel lock-out.
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power saver ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts applied, RF output is 5 W! (Cable supplied!)
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.

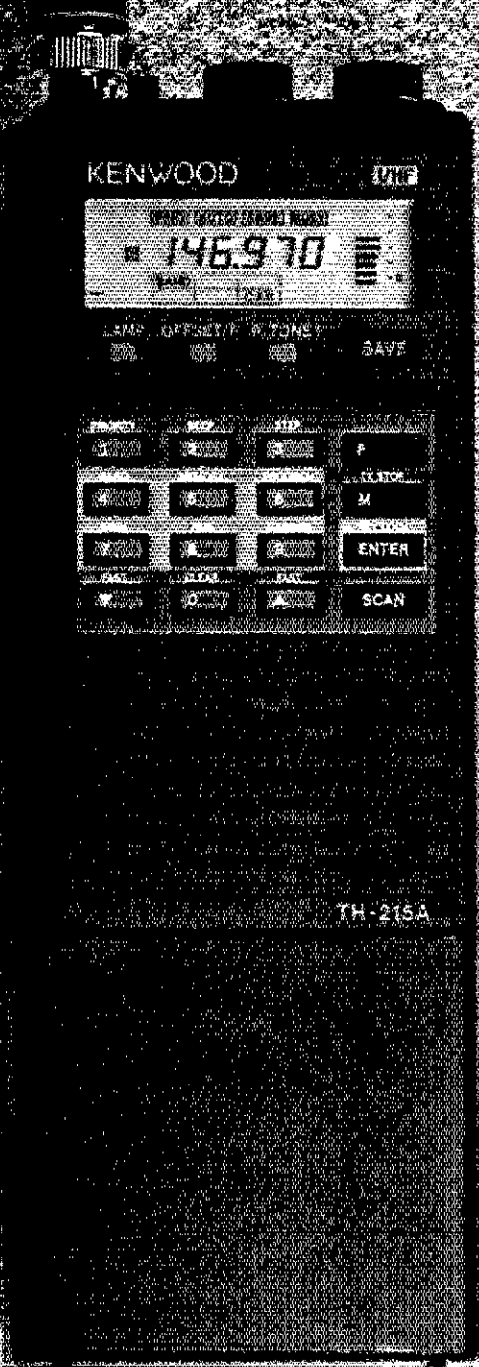


- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, DC cable, dust caps.



Optional Accessories:

- PB-1: 12 V, 800 mAh NiCd pack for 5 W output
- PB-2: 8.4 V, 500 mAh NiCd pack (2.5 W output)
- PB-3: 7.2 V, 800 mAh NiCd pack (1.5 W output)
- PB-4: 7.2 V, 1600 mAh NiCd pack (1.5 W output)
- BT-5 AA cell manganese/alkaline battery case
- BC-7 rapid charger for PB-1, 2, 3, or 4
- BC-8 compact battery charger
- SMC-30 speaker microphone
- SC-12, 13 soft cases
- RA-3, 5 telescoping antennas
- RA-8B StubbyDuk antenna
- TSU-4 CTCSS decode unit
- VB-2530: 2m, 25 W amplifier (1-4 W input)
- LH-4, 5 leather cases
- MB-4 mobile bracket
- BH-5 swivel mount
- PG-2V extra DC cable
- PG-3D cigarette lighter cord with filter

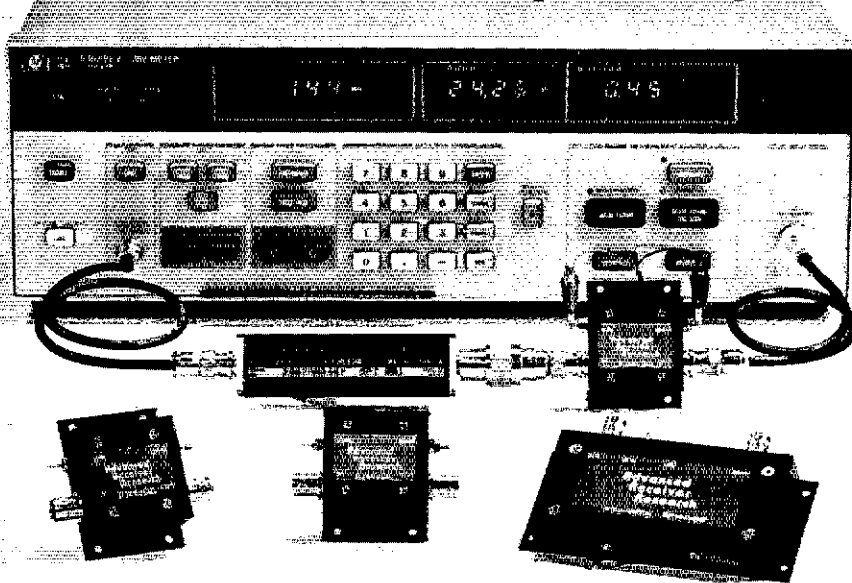


KENWOOD

KENWOOD U.S.A. CORPORATION
22015 Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

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

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
P50V	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
P220V	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
P432V	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)						
SP28V	28-30	<1.2	16	0	DGFET	\$59.95
SP50V	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144V	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$87.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220V	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$87.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432V	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

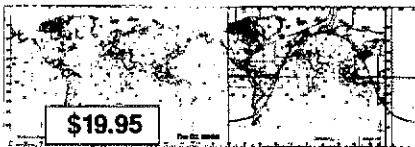
Every preamplifier is precision aligned on ARR's Hewlett Packard HP8070A/HP346A state-of-the-art noise figure meter. RX only preamplifiers are for receive applications only. Inline preamplifiers are rf switched (for use with transceivers) and handle 25 watts transmitter power. Mount inline preamplifiers 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



Looking for DX? You need The DX EDGE®



Large Plastic Slide Version

- Used around the world everyday.
- Times, bands, places for best DX
- Daylight/darkness areas of the world
- Sunrise/sunset times anywhere, any time
- Gray line/Long path
- Large map & 12 slides
- Ideal for 40, 80, 160.
- Great circle slide to show antenna direction.

\$3 each. Specify latitude.

All ppd in U.S., Canada. Add \$4.00 elsewhere. air mail. Add tax in NYS US funds only

Please make check or M.O payable to the DX EDGE and mail to:

The DX EDGE, P.O. Box 834, Madison Square Stn. New York, N.Y. 10159.

An information flyer is available free of charge. A product of Xantek, Inc. ©Xantek Inc. 1986

Commodore 64 and Commodore 128 are trademarks of Commodore Electronics Ltd.



The Super DX EDGE Commodore 64™ and 128™ Version

- Real time DX help in the finest graphics
- MUF & Great Circle Bearings
- Automatic real time gray line updates
- Pinpoint any QTH in the world
- QTHs keyed to DXCC list & 40 Zones
- Requires 1541 (or 1571) disk drive
- Complete & easy instructions

\$34.95

SEC: WC6U. STM: N6AWH. TC: WA8EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. Appointments renewed: WA6SHO-EC; N6MXG and K6PMG-ORS; WA6EXV-TC; KV6W and WB6MDN-PIA; W6XK and WB6TK-OBS. K6L6O is an Asst. Technical Coordinator. Officers of the Mountain Amateur Radio Club are: Pres N6QDD, VP WB6GQO, Sec WB6STO, and Treas KA6BVR. The Club meets the 3rd Thursday in Oakhurst. WB6ML, W6DNG, and WA6OYR are Silent Keys. W6DNG participated in the first Amateur Radio Earth-Moon-Earth contact. WB6ML was active in the W6A and DX Clubs in Central California. WA6OYR helped with ARS. These Amateurs will be missed by all Amateurs. KE6DK and others operated special event station, W6TO, celebrating the 75th anniversary of Clovis. KB6PNK is N6PKG and General. KA6DJR and KB6TAD are Tech. KB6SEZ is Advanced. K6PJV is using a loop antenna on 30 meters with good results. WB6ITM has a TL 922 amplifier. K6PBT and K6YK are active on RS 10 and RS 11. The ARRL Pacific Division Convention is October 2-4, 1987 in San Jose. Traffic: N6MCY 83, WA6YAB 17, W6DPD 2, Total 102. Late reports for June 1987: K6RAU 5, WB6ITM 1. Total 6.

SANTA CLARA VALLEY: Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW. STM: N6LJL. PIO: WB6NLA. ASM: N6JQJ & N6SN. ACC: W6MKM. BM:(vacant) OOC:(vacant). Some of you may wonder how this column gets written and how you might get mention of your clubs or even just your activities. Do you need to go thru "channels"? Do you need to call my secretary? Do you even need to "be somebody"? The answer to all of these is NO! The way this column comes to be is that I get to sit down once a month and write (on my RS mod100 contester!) about what has been happening in the section that I know about. How do I find out what's going on, apart from the things that I am doing? Well, I read all of the club newsletters I get and I do a bit of listening. That's it! Do you have something you'd like to see in this column? All you have to do is let me know about it at least two months in advance, that's all!... the Gabilan ARC held special elections to replace resigned officers... thanks to those who participated in the special events station at at the Gilroy Garlic Festival... NCDXC heard Michel Rousselet FT8XB on his DXpedition to the Kermadecs. Note that NCDXC dues are due... the San Mateo RC meeting about the California Rescue Dogs Assn... EMARC and FARS both reviewed their Field Day performance at their respective meetings... and the Ames ARC discussed the recent Moffet Field Open House and special event station (K6MF)... the IBM ARC heard from Larry Adkins N7EQN on SKYWARN... the UNISYS ARC got an excellent response to the "stray" in June '87 QST, they have located more than 351 other UNISYS hams... the SLACARC is getting on packet radio and is also close to WAS... the Lockheed ARC ran WA6GKY as special event station to celebrate the 30th anniversary of LARC... former SM W6CF has been busy at work (though he very ably edits the NCDXC newsletter)... and former Director, SM, STM etc., Doc W6ZJF attended the ARRL Board meeting... on Friday afternoon pizza bust in San Jose if you can make it. Contact either Rod KB6ZV or myself for more details. 73 'till next month, de Glenn WB6W. Traffic: W6KJL 23, N6LJL 23, KA6SXW 11, W6ZJF 10, W6PRI 9, KB6IW 4, W6CF 4.

ROANOKE DIVISION
NORTH CAROLINA: SM, Rae Eyrhart, K4SWN—SEC: AB4W. STM: K4NLK. BM: K4IWW. ACC: WC4T. PIO: WA4OBH. TC: K4TL. SGL: KE4ML. This month it's time to put the SECTION to the test. The yearly SET—SIMULATED EMERGENCY TEST will be conducted on Oct 17-18. ECs get your drills ready to implement same. Let the SEC, AB4W and HQ know what you did, and sure send a report. Extend forms to HQ shortly after the exercise. DO NOT SEND TO SM. Encourage ALL amateurs to participate and report your scores. THAT'S THE SECRET TO YOUR SUCCESS. This is also hurricane season, so keep your equipment in good working condition and ready for ANY emergency. W4ACA former State AF MARS Director became a Silent Key. Will be missed by all. Enjoy seeing large crowd at Cary Swapfest. Annual BAR-B-QUE Festival in Lexington on Oct 24th with Special Events Station Call K4HOG on air. Exam schedule this month: Kernersville Oct 3rd; Lexington Oct 17th. WB4FR, NK says PETN has moved to its new home (fired) on 145 350 effective Sept 1. Net meets at 8PM. Extend welcome to this repeater, 145.35, to the K4TL Link Rptr System. It fills void in South Central part of Section. Now if only a repeater to join the link in the mountain counties. Interested? Let K4TL know. Also extend a royal r/hel WELCOME to K6DUE of NBC News fame who has moved to High Point from Los Angeles. He has been appointed Asst. Dir. by W4UG. He can offer valuable insight to amateur activities in California. Call him for a possible program in your area. Also welcome G4RKB who became a Tarheel and works in the Raleigh area. This month HQ will begin accepting nominating petitions for election of SM for a two year term beginning next year. If you need any forms contact SM. This month many amateurs in section will receive renewal forms for your state amateur radio plates. If you completed the new form after 10-1-86, you will be eligible. Check your form to make sure the extra \$10 has been deducted. If you have a problem, contact Betty Lewis, Dept Motor Vehicles, Raleigh. NTS Nets—HF—are looking for check-ins on a regular basis from our larger cities. YOU are needed—NOW. Traffic: K4NLK 254, AA4MP 178, AA4ZV 171, AA4TE 168, K4IWW 155, W4NC 118, WB4WII 93, WD4HT 84, KA4TLC 65, WA4MNR 52, K4SWN 48, WD4BCX 45, KB4FWL 43, KA4EYF 30, WB4EF 25, WB4M 20, WB4N 20, K4Y4 19, N4CJJ 18, WB4CY 16, WB4B 16, AN4P 13, W4LJ 13, W4JL 10, K4BWX 9, W2JBD 6, NT4K 5, NAJEO 4, KA4S 4, K4DDY 2. (June) W4NC 81, K4TN 28. (May) K4TN 36. Totals: 33 SARs, 1856 traffic passed. Thanks to all who made this report possible.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—WE WANT YOU! We are a small section, with regard to the total number of licensed amateurs, when compared with other ARRL Sections. We may be an even smaller section when we look at the data of those licensed who are participating in amateur radio activities. Although we have some key job areas to fill (even on my Senior Staff), we really need more of you who now have your ticket and feel that you would like to "repay" your due even if you have only a small amount of time to contribute. There are many very interesting job areas in which you can find a lot of personal satisfaction, ranging from public information to instructor, and from emergency communication or traffic to about any area of a hobby you can and want to take on. In most cases you will find that your effort will benefit both your local group as well as our Section. Contact me at the address on Page 8 of every QST and tell me what you think you would like to do. Traffic: K4TN 151, KB4BZA 99, KA4LRM 65, WB4UDK 43, W4DRF 35, W4IKT 18.

VIRGINIA: SM, Claude Feigley, W3ATO—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. TC: WB4MAE. SGL: W4UMC. PIO: AA4VP.
NET TIME FREQ MGR
VTN 1PM 3907 KB4NGO
V6BN 6PM 3947 K4BFI

KENWOOD

...pacesetter in Amateur Radio

All New Compact HF!

“DX-citing!”

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

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

• **Covers All Amateur bands**

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

• **Direct keyboard entry of frequency**

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

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

Covers 80-10 meters.

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

• **Superior receiver dynamic range**

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

• **100% duty cycle transmitter**

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

• **Adjustable dial torque**

• **100 memory channels**

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

• **TU-8 CTCSS unit (optional)**

Subtone is memorized when TU-8 is installed.

• **Superb interference reduction**

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

• **MC-43S UP/DOWN mic. included**

• **Computer interface port**

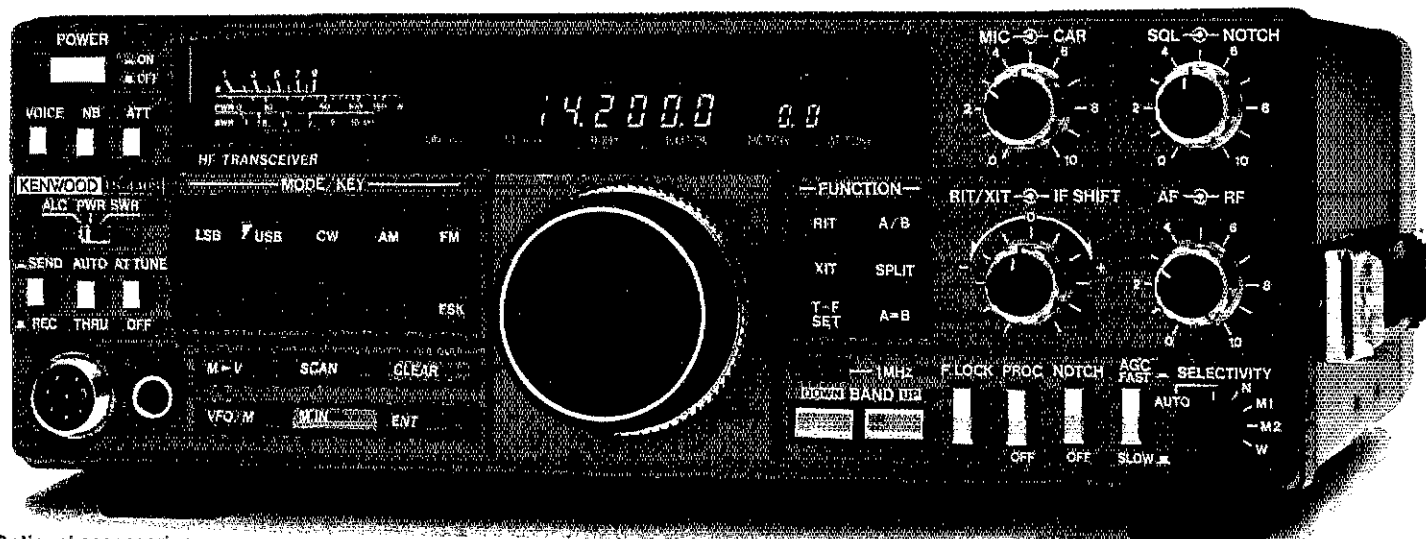
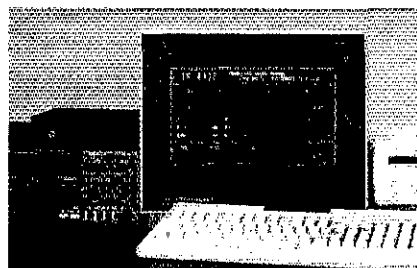
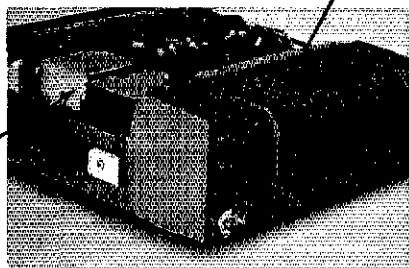
• **5 IF filter functions**

• **Dual SSB IF filtering**

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

• **VOX, full or semi break-in CW**

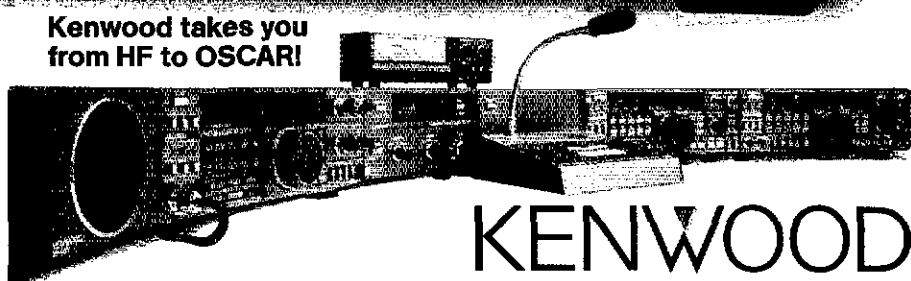
• **AMTOR compatible**



Optional accessories:

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

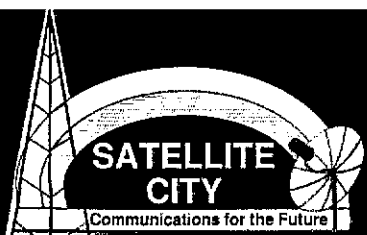
Kenwood takes you from HF to OSCAR!



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

KENWOOD

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



Dan "KBOXC" - Dave "WBOSNM" - Denise "XL" - Maline "YXL" - Mike "SOON"

YAESU

H.F. EQUIPMENT

Table listing various Yaesu HF equipment models and prices, including FT-757 GX, FT-757 HD, FC-757 AT, SP 102 SPI, FT-767 GX, MH-1100, Antenna, 6M/7L, 2M/7C, FRG 88, FRV 8, FRA-7, FRT-7, FRG-9600 60-905, VU-9600 N.T.S.C. V.D/CNVTR, SP 55 Remote SPKR.

YAESU DAY Oct. 17th

* Special Pricing * Door Prizes * Factory Rep * Refreshments

HANDY-TALKIES

Table listing Yaesu Handy-Talkie models and prices, including FT23R, FT23R/TT, NEW FT-33 - In, FT73R, FT73R, FT74 L, NC, FNB, FNB, FBA, FT109F, FT 209 RF, FT 709 RI, FT 727 N.W. Dual Ban, FNB4 "09" Family 500 mAh @ 12V, FNB4A "727" 500 mAh @ 12V, NC15 Quick Charger, PA3 Mobile Adapter, FTS-6 CTCSS UNIT.

MOBILE/PORTABLE

Table listing Yaesu mobile/portable equipment models and prices, including FT 290R/II 2 MTR All Mode, FT-690R/II 6 MTR All Mode, FB4 8 Cell Holder, FT-2700 RH Dual Band, NEW FT 211-R 711 R-311R.

ALINCO

Table listing Alinco equipment models and prices, including ALM 203 2 MTR H.T, ALR 206T, ALR 22T, ELH 230C, ELH, ELH2, ELH7, Technician/G, Advanced Class, Extra Class, Antenna Book, 1987 ARRL Handbook.

1-800-426-2891 METRO 612-754-1200

HOURS M-F 10-8 Sat 10-5 Prices subject to change and availability. 12581 Central Ave. N.E., Blaine, MN 55434

VSN 6:30PM 3680 N4KSO VN(EARLY) 7PM 3680 N4GHI VN(LATE) 10PM 3680 WB4KSG VLN 10:15PM 3947 KJ4MF STVEN 7:15PM 145.82 NT4S STARES 9PM 148.97 KJ4JT. N4EXQ appoints K3CUU as EC for Loudoun County and reports there are 1000 ARES members in the Section. WB4AXY, DEC for District 9 has named WB4BAB, K5SFM, WD0GJO as Asst ECs. The Shenandoah Valley Amateur Radio Club, a Special Service Club, has awarded two \$500 scholarships to prospective electronic students along with a year's membership in ARRL and copies of the new "Tune in the World." W4HU reports the following OOs have been active: KE4EQ, W4HU, WB1RT, K4JDJ, KB4WT, KC4VR and KK4NN. K4KPT has passed his exam and is now a certified OO/AUX station. The section's first registered "Local Interference Committee" has been organized by KC4VR. This group will coordinate interference problems in the Wytheville area. W4E is a new ATC appointee. ARES says over 40 people took the exam at Berryville. Upcoming VE exams: Oct 3-Sterling Park ARC, contact Mike Weber, Oct 4-Virginia State Convention, Virginia Beach, WALK-IN ONLY, contact N4ILC, Nov 7, Shenandoah Valley ARC, contact NC4B. The VA traffic handlers had a FB picnic at the home of N4GHI and N6ANQ. NW4O reports increasing interest in HF PACKET. Several of the EAN net members have been busy on their weekend skees seeking solutions to the problems of Packet net operation, their findings will be available soon. It was a pleasure meeting many of you at Berryville, and I hope to see more at Virginia Beach, Oct. 3-4 and especially at one or more of the following scheduled forums, Saturday, Oct 3 at the AM ARES Forum, 12 PM at the Traffic Handlers Forum and at 2-30 PM at 4 PM a combined ARRL-FCC panel discussion. It is good to hear N4FNT on the traffic nets, good job, Rick! In spite of the summer doldrums and vacations the nets are running smoothly but traffic is down about 20 percent. Totals for the month: traffic handled 4448 with 47 stations reporting. See you all at Virginia Beach Oct 3-4. Traffic: N4GHI 833, K4DOR 456, N4EXQ 394, K4MTX 261, W3ATQ 226, AA4AT 214, KB4WT 208, W4LJS 185, WB4PNY 179, KA4TWH 165, WD4FTK 152, AA4GL 150, KB4NGO 118, WB4KSG 111, WD4ALY 100, WB4ZNS 92, WD4OCW 78, WB4EDB 71, WA4TCE 68, K4JST 56, WB4ZTR 55, K4BR 48, K4JUM 43, N6ANQ 39, NT4S 38, N4GHI 36, N4MIS 28, K4JW 25, K4DAM 23, K4KPT 21, WB4UJHC 21, WA4LTO 20, N4KSO 18, K4BGZ 15, NW4O 12, KJ4VT 12, K4WVW 12, K4MLG 10, N4FNT 9, KB4PW 9, WA4CCK 8, KK4FV 7, WA4TYS 6, WB4KIT 4, W4YE 4, KJ4W 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT-WV Hamfest and ARRL Convention were very enjoyable events on 7/25 and 7/26. W8AH was selected as Outstanding Amateur of the Year for 1987. MARA received plaque for Field Day 1986. W8YP was reelected as NM for WYVN and W8LDY for WYNN. Join your friends or make new ones on the nets listed below. NET FREQ TIME QNI QTC SESS MGR WYVN 3865 6:00 1080 150 31 WRYP WYWD 7235 11:45 617 47 30 W8FZP Hibilly 14290 Noon su 94 12 4 WRYP WYV 3567 7:00 24 34 30 WYNN 2310 5:15 129 32 39 W8LDY W4RN 3540 8:30 167 26 31 K6LG Traffic: K8WNO 271, K8BTX 217, K8BFI 197, K8TFP 139, K2BQ 127, W8FZP 125, K8QEV 97, W8YB 87, N8FXH 69, K8UQY 48, K8KT 21, K8BOGF 13, W8JWX 10, N8SU 6, N8CG 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, K0AJ-ASL; K0MQA-SEC; WB0TUB-STM; KB6Z, ACC: W8DDUV, OOC: K0CUD, PIO: N8FOE, BM: K4BCZW, TC: N8CF, SGL: W8OQFB. The SEC for the Section is WB0TUB who is the former Eastern Slope DEC. Thanks to the many efforts of W8OQFB as SEC, he now moves over to SGL and assumes more duties with SARES. My tax to W8OQFB who is teaching Novice classes for the City of Aurora Fire Department & Police Department. The new Eastern Slope DEC is K4UBJ, the former EC for El Paso & Teller Counties. N8CF reports the DEC for the Western Slope. My thanks to all in Colorado who volunteered their services on the Colorado Convention Committee. The application from Colorado to host the 1989 Nat'l ARRL Convention lost by one vote to the City of Dallas. The Rocky Mountain Division Section Manager meeting was held in WIMU this year, and was a combination meeting of the Northwest Section Managers and the Rocky Mountain Division's. Barcrest will be held in Boulder, Colorado, hope to see you all at this annual Swapfest. 73, K0QJ. NET: Colorado QNI 899, QTC 58 Inf 114, QNF 877, 31 sess. CWN: QNI 91, QTC 64, QTC 424, 24 sess. CWXN: QNI 1135, QTC 787, QNF 2790, 31 sess. IN4, QNI 100, QTC 430, QNF 1109, 31 sess. NCTN: QNI 294, QTC 106, QNF 412, 32 sess. SCTN: QNI 358, QTC 47, QNF 334, 30 sess. Traffic: N8BQP 1967, K8ONI 262, K8BZ 134, W8BFFV 102, K8HOA 82, W8NFW 65, N8HMM 51, K8W5E 22.

NEW MEXICO: SM, Joe T. Knight, W5PYD-ASM; K5BIS-SEC; K6VEJ-DEC; W5DSCB, STM: ND5T, NMs: WA5UNO K6LL W5ONR, TC: W8GY, ACC: K4BEM, Southwest Net (SWN) meets daily on 3583/7093 @ 0230 UTC and handled 177 msgs with 234 checkins. New Mexico Roadrunner Net meets daily on 3939 @ 0100 UTC and handled 57 msgs with 1037 checkins. New Mexico Breakfast Club meets daily on 3939 and handled 160 msgs with 918 checkins. Yucca 2-mtr Net 78/18 handled 74 msgs with 247 checkins. Caravan Club 2-mtr Net 68/06 handled 0 msgs with 143 checkins. 3CAT Net 68/06 handled 5 msgs with 617 checkins. Info Net 13/73 with 130 checkins. Flagstaff (F1) Tullnall was a grand success with approximately 75 participants. What one of our biggest WIMU Local Div. Conv. at Jackson Hole, WY, was also a big success with 468 attending. Good to see W1XX, W7RM, GA8X, W6HD, W7QMU and SM's from WY, ID, MT, UT, CO & NM all present. Vy sorry to report the passing of "Miss Bea," K9SMF. She will certainly be missed by all. Traffic: W5DAD 76.

UTAH: SM, Jim Brown, N47G-SEC; Rich Fisher, NS7K. STM: John Sampson, W7QGX. New appointment: Salt Lake Co. EC is Kelly, KD7OD. Anyone interested in SL Co ARES should contact Kelly for info. WIMU was fun, as always. Utah has the baton for next year - see Elaine Jones for info on how you can help if you haven't seen on Packet the last few months, there are some surprises in store for you. They have to do with improving multipth digipeating, and it works neat! 73 de N47G. Traffic: WA7KHE 93, WA7MEL 59, N7ASY 32, N7IE 26, N7ULC 26, N57K 18, N47G 16, W7QCX 11.

WYOMING: SM, Jim Haisler, N7GVY-ASM; Steve Cochran, W47H. SEC: Jim Anderson, W7TVK. Well, we're back from a very successful WIMU 87, and a special thanks to Dan, K7MM, and Cheryl, K47QDE, for providing the leadership and organization. My appreciation goes out to all the people who challenge our communications! There are a lot of impressive things going on, but I'd venture to say that very few humans know that if your club, etc. has any ideas, please let me know and an effort will be made to take some action. Would a Section net like the Montana net on 3910 Sunday AM be a good idea for Wyoming? Should we all get on Packet? Well, I've got to

head for the farm. 73 for now, and I'll double up on the net reports next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph E. Smith, WA4RNP-STM; N4JAW, SGL: KA4WVU, BM: KF4VU, OOA/AUX: AA4BL, TC: N4AU. ATC: WB4BYQ, ACC: WA4RNP, "act" SEC: WA4RNP. This is the month for the "SET" (Simulated Emergency Test) on the 17th and 18th so please find a club or emergency group and work with them as they test their emergency preparedness and equipment in the exercise. You will enjoy it and learn a lot in the process. Packet radio has picked up a lot and should be a viable "tool" for message handling in the future. We have a new Net Mgr for the ATNM in the person of WD4E, Bob Kuhn. My thank to K4JMG, Mac for 18 months as Mgr. Traffic: CAND Reports 544 messages in 31 sessions with DRN5 rep 1000x, W4JCH, W4JW, W4JX, W4JY, W4JZ reports 640 messages in 52 sessions with Alabama rep 92% by WA4JDH, W4CKS, NW4X, W4VVC, and W4WJF. RN5 reports 509 messages passed in 62 sessions with Alabama rep 94% by WX41, W4CKS, W4QAT, WA4ZPZ, WA4LLQ, NW4X and W4PIM. AEND reports 56 messages passed in 31 sessions with other nets rep by WA4JDH, W4CKS, WD5NVL, WX41 and N4DCS. AENB reports 43 messages passed in 31 sessions with RN5 rep by WA4JDH, W4CKS, NW4X, WB4LLQ, WA4ZPZ, W4PIM and W4QAT. AENM reports 68 messages passed in 34 sessions. Brass Pounders League: WA4JDH, K4JJE, K4SHR, WA4JDH, W4PIM, W4CKS, and WA4RNP. TOS: WA4JCH, WA4JW, WA4JX, WA4JY, WA4JZ, WA4P39, NW4X 86, WA4RNP 28, WA4OZ 28, WA4VY 18, W4DGH 8.

GEORGIA: SM, Eddy Kosobucki, K4JNL-ASM-ACC; WA4ABY-SEC; NC4E-STM; W4WQL, ASTM (Packet) W4QO, BM: W4WQL, OOC: N4A1, PIO: WB4DEB, SGL: W4B7T, TC: WD4PAH, I promised I would give you a GA section packet up-date in this issue. I must apologize because during the month of July, I had to work almost everyday so that I could return on the 30th. And that I did. I am now officially retired & can devote a lot more time to you FB hams in the GA section. This will give me time for more club visits, hamfests etc. As of Oct 1st, I have appointed WA4ABY as ASM & Sandy will also continue as ACC. Jim Stafford, W4QO, has consented to be an ASST/6TM & will be the authority on PACKET RADIO. Thanks to these two gentlemen for the help they volunteered on giving the section. On Oct 1st, I will commence my fifth term as your SM. Once again thanks for all the cooperation you have given me in the past. I have a lot of discussions planned for the week & the FAM-VENUE COMPUTER FEST in Lawrenceville on the 31st & Nov 1st. This is the old Stone Mill Hamfest. Making PSHR during July were: WD4COL, AA4JV, WA4LLE, KF4FG, WAHON & KB4JPN. If you don't think your QST is arriving as it should, please contact me so that we can look into it. I have had some complaints & we got them rectified. If you desire an Official League appointment, please send me a letter or post card & I will get the info to you on the various appointments you can choose from. 73 Eddy. Traffic: W4BKK 148, WB4DVK 141, WB4WQL 123, WA4LLE 73, WD4COL 65, KF4FG 45, AA4JV 39, WA4BNO 25, N4MWRV 21, K4AHE 18, K4BAI 14, N4UZ 3, WB4D80 7. (Jun.) WB4D80 11.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI-ASM/PIO; KB4LB, Wimpv, TC: W8RAD, Ed, SEC: WA4PWF, Rucy, BM: W4RPN, Patey, SGL: K4C4N, John, ACC: WD4RQC, Giff, CO/PR: K4JJE, Jim, STC: Robert, F. I have been open to a lot of discussion on the use of PACKET in the handling of N56 messages via this mode. I want to encourage the use of PACKET in the submission of SARs and PSHR monthly. Address me at KB4LB's BBS in Sanford, W4UEA has been attending meetings and assembling equipment so he can become more active in this mode. The 4th Region has appointed their PM, and we are hoping to get a handle on the sites for NODES in the Section. Our current feeling is it needs to be two or three stations to be able to interlace with our VHF nets that are serving the Section currently. The National ARRL Meeting in Atlanta was a great success. SMs and other LOs had a chance to meet and talk about similar ideas and some circulation among the attendees. I had a chance to have a chance to see and talk with our top ARRL officials and the FCC as well, made it an outstanding convention. The Jacksonville Hamfest was in a new facility. The meeting rooms were excellent and the exhibit floor was roomy and comfortable. Wide aisles and good lighting can accommodate a much larger attendance in the future. Andy Clark's Florida Skip is moving ahead again, and he's looking for more news from Clubs in the State. He also likes to receive copies of your newsletters, so if you wish, send to him at Box 501, Miami Springs, FL 33266. 73, Roy, N4ADI. Traffic: WX4H 558, N4PL 379, WA4QX 313, W7YVW 204, AA4HT, W7N4GMU 143, K8BLT 142, W4JAE 127, K4A11 122, W4JAE 112, W4DGO 99, KB4LB 97, WC4D 81, N4JAO 77, AA4QC 64, WB4TZR 57, WA4PUL 43, N4ADI 41, W4K1X 36, KA4YLH 37, K4CY 34, N4JHI 33, N4DY 31, K1C4Q 31, WA4SXW 25, KA4KHA 18, N4F40 23, NS4C 20, K14N20, W4AGU 18, N4OP 17, N2AOU 17, WD4FJY 17, WD4HP 14, WB4AWG 12, KF4GY 11, K4JRD 8.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFC-SEC; W4SS, 6TM: K4ZK, TC: K14T, BM: WD4KBW, PIO: WA4WYR, SGL: K4C4N, OOC: W4T4H, ACC: K4EUK, WD4KBW reports 70 bulletins received and 148 sent by AA4BN 19, W4DL 36, WA4EIC 59, W4T4F 7, KA4GUS 13, WD4KBW 11, K4IEK 18, AA4MI 14 AND WA5RLV 41. The Atlanta National Convention was great with many good meetings, but I especially enjoyed meeting so many people. Hadn't seen W4PIM for several years and did run into him. Jack and I are both on Sunday night RN5-First in the Alabama rep and course I am on the 12th. Also, K4K11 has just relayed into QFN a few evenings earlier. WB4DWK sent a detailed report for the Highlands County ARES which was involved in a National Security Exercise, "Operation Broken Arrow." The scenario called for an Air Force C-130 to develop engine trouble while flying between Homestead Air Force Base and Eglin AFB. The plane had diverted to the Avon Park Air Force Range but crashed with a nuclear device as cargo. The Sheriff's Department dispatched two deputies, and the Emergency Management Director implemented the Search and Rescue Annex of the County Emergency Plan. After a brief search, the site was found with 12 survivors and 2 fatalities. Military units were alerted and vehicles were used to relay emergency personnel to the scene. Amateur radio supplied back-up communications for responders and to provide inter-agency communications. All ARES stations involved in the exercise which involved about 125 military and civilian personnel, did a superb job in executing their communications skills. Amateurs involved in Operation Broken Arrow were: N4GXV, W4IEV, KB4DFG, KB4BNO, WA4KYJ, W8OKW, KB4WHY, KE4PM, K14XM, KE4VK, K4ZNB, KBMXZ, WD4HKN, WB4PWC, N4OBU and WB4WDK. While on the topic of emergency exercises, remember that the Simulated Emergency Test is scheduled for October 17 and 18. W4SS and WA4JW are going together to discuss the possibility of having a more intensive exercise this year. It has been a few years since we have conducted a statewide exercise involving the HF nets. KF4RL says that the SEFTN which meets on the Motorola repeater has two backup repeaters courtesy of the Broward ARC and Flacal Millie, Inc. K44YHS reports that he has received the Golden Jubilee DXCC certificate from

KENWOOD

...pacesetter in Amateur Radio

NEW!
45/35 watt
Dual Bander

First Again!

TW-4100A

2 m/70 cm FM Dual Bander

A Kenwood original just got better! Kenwood was the first to develop a 2 m/70 cm mobile radio in a single, compact package. Since then, other companies have imitated the concept, but still have not done it the "Kenwood way." The all-new TW-4100A is more compact, more powerful, and packed with more features than ever before! With many new features and accessories, and backed by Kenwood's experience, the all-new Kenwood Dual Bander is light years ahead of the rest!

- **Selectable full duplex cross band ("telephone style") operation.** Remote base or cross band repeater function possible (a control operator is needed for remote or repeater operation).
- **45 watts on 2 m, 35 watts on 70 cm.** 5 watts (adjustable) low.
- **Frequency coverage: 144-149 MHz** (allows operation on certain MARS and CAP frequencies) and 440-449.995 MHz.

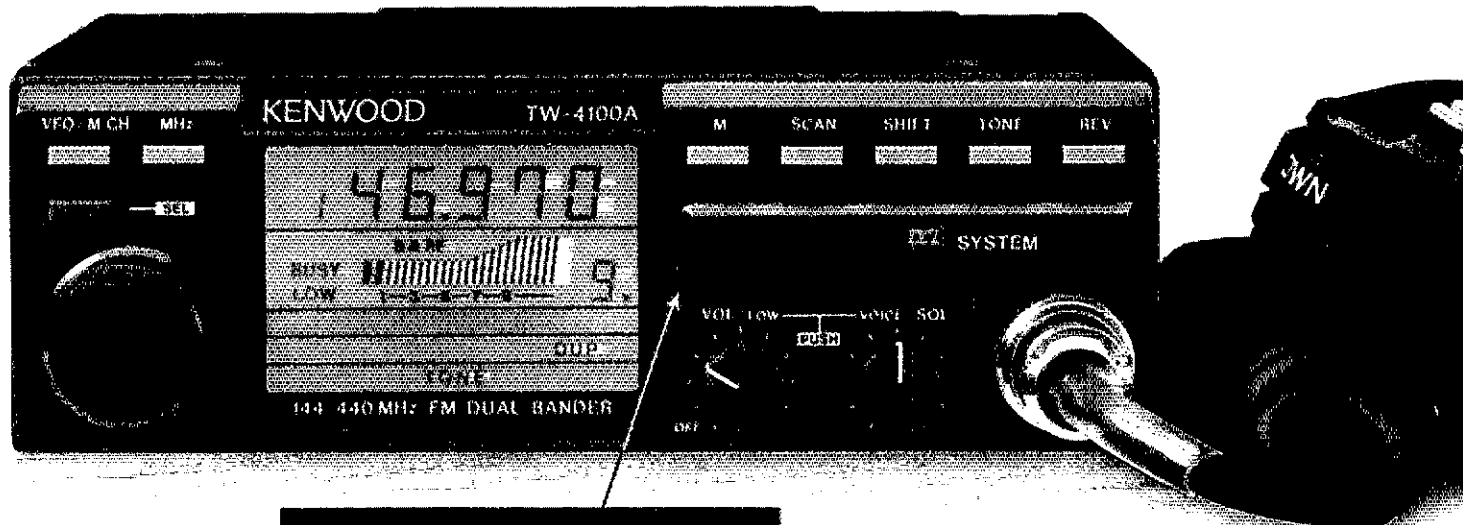


- **New compact size!** Only 5.9" W x 1.97" H x 7.87" D and weighs less than 4 pounds!
- **Proven high performance** Kenwood GaAs FET front end receiver.
- **Easy to operate!** Only 3 knobs and 8 keys on the front panel.
- **Separate antenna ports for VHF and UHF.** Minimizes loss and increases reliability and performance!
- **10 memory channels.** Lithium battery backs up memory. Store frequency, offset, subtone. Two channels store the transmit and receive frequencies independently for odd split or cross band operation.
- **Front panel-selectable CTCSS tone** (when optional TU-7 is installed.)

- **Non-volatile operating system.** Even after memory back up cell dies, all operating features remain intact! No re-programming or "board-swapping" necessary!
- **Programmable band scan and memory scan with memory channel lock-out.**
- **Large, illuminated LCD display and main knob.** For excellent visibility in direct sunlight or darkness.
- **Selectable frequency step for quick and easy QSY.**
- **Voice synthesizer VS-2 option.**

Optional accessories:

- **PS-50/PS-430** DC power supplies
- **MU-1** DCL modem unit • **TU-7** CTCSS encoder • **VS-2** Voice synthesizer • **SW-100B** SWR/Power/Volt meter 140-450 MHz for mobile use • **SW-200B** SWR/Power meter for base station use 140-450 MHz, 0-200 W in 2 ranges • **SWT-1/SWT-2** 2 m and 70 cm antenna tuner • **SP-40** Compact speaker
- **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile microphone • **MA-4000** Dual band mobile antenna with duplexer (shown)**
- **MB-11** Extra mobile mount



• Digital Channel Link (DCL) option.

KENWOOD

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

*Please check FCC regulations on repeater operation
**Mag mount is not Kenwood supplied
Minor modification necessary for repeater operation
Specifications and prices subject to change without notice or obligation
Complete service manuals are available for all Kenwood transceivers and most accessories.

RF TRANSISTORS

2-30 MHz 12V (* 28V)				
P/N	Rating	Net Ea.	Match Pr.	
MRF421	Q 100W	\$24.00	\$53.00	
MRF422*	Q 150W	38.00	82.00	
MRF433	Q 12.5W	11.00	26.00	
MRF449/A	Q 30W	12.50	30.00	
MRF450/A	Q 50W	14.00	31.00	
MRF453/A	Q 60W	15.00	35.00	
MRF454/A	Q 80W	15.00	34.00	
MRF455/A	Q 60W	12.00	28.00	
MRF485*	Q 15W	6.00	16.00	
MRF492	Q 90W	16.75	37.50	
MRF492A	Q 90W	19.75	43.50	
SRF2072	Q 65W	13.50	31.00	
SRF3562	Q 110W	25.00	54.00	
SRF3775	Q 75W	13.50	31.00	
SRF3795	Q 90W	16.00	37.00	
3800	Q 100W	18.75	41.00	
25C2290	Q 80W	19.75	45.50	
25C2879	Q 100W	25.00	54.00	

Q = Selected High Gain Matched Quads Available

VHF/UHF TRANSISTORS				
	Rating	MHz	Net Ea.	Match Pr.
MRF237	4W	136-174	2.70	---
MRF240/A	40W	136-174	15.00	35.00
MRF245	80W	136-174	30.00	68.00
MRF247	75W	136-174	27.00	63.00
MRF248	80W	136-174	33.00	71.00
MRF641	15W	407-512	20.00	46.00
MRF644	25W	407-512	24.00	54.00
MRF646	40W	407-512	26.50	59.00
MRF648	60W	407-512	31.00	69.00
2N6080	4W	136-174	6.25	---
2N6081	15W	136-174	8.00	---
2N6082	25W	136-174	9.50	---
2N6083	30W	136-174	9.75	24.00
2N6084	40W	136-174	13.00	31.00

PARTIAL LISTING OF MISC. TRANSISTORS				
MRF134	\$16.00	MRF497	\$14.25	
MRF136	21.00	MRF515	2.50	
MRF137	24.00	MRF507	2.50	
MRF138	35.00	MRF530	4.25	
MRF140	87.50	MRF754	15.00	
MRF148	34.00	MRF843F	22.50	
MRF150	87.50	MRF846	43.50	
MRF171	34.50	MRF873	24.50	
MRF172	62.00	MRF1946A	15.00	
MRF174	80.00	QC2545	16.00	
MRF208	11.50	2N1522	11.95	
MRF212	16.00	2N3553	7.25	
MRF221	11.00	2N3771	3.50	
MRF224	13.50	2N3866	1.25	
MRF226	14.50	2N4048	11.95	
MRF238	13.00	2N4427	1.25	
MRF239	15.00	2N5589	7.25	
MRF260	7.00	2N5590	10.00	
MRF261	8.00	2N5591	13.50	
MRF262	9.00	2N5641	9.50	
MRF264	13.00	2N5642	13.75	
MRF309	29.75	2N5643	15.00	
MRF317	56.00	2N5646	13.00	
MRF406	12.00	2N5945	10.00	
MRF458	20.00	2N5946	13.00	
MRF475	3.00	2N6255	2.50	
MRF476	2.75	OUTPUT MODULES		
MRF477	12.00	SAU4	55.00	
MRF479	10.00	SAV6	48.00	
MRF492A	19.00	SAV7	48.00	
40582	7.50	M57712, M57737	use	
NE41137	2.50	M57737, SC1019	SAV7	

We stock RF Power transistors for Atlas, KLM, Collins, Yaesu, Kenwood, Cubic, Mirage, Motorola, Regency, Heathkit, Drake, TWC, Wilson, GE, etc.
Cross-reference on CD, PT, SD, SRF, JO, and 2SC P/Ns.
Orders received by 1 PM are shipped UPS same day.
Minimum order twenty dollars. COD/VISA/MC
Foreign Orders Accepted

Call: (619) 744-0728

FAX: (619) 744-1943



RF PARTS

1320 Grand Avenue
San Marcos, CA 92069

ARRL KA4YHS also stated that he now has 1200 consecutive check-ins on the Southeast Florida Traffic Net. N4BQ says that the Fellowship ARC repeater 147.21/81 has been PL'd on frequency 110.9. He emphasized that the club still plans both locals and visitors to use the machine. 73 de WA4PFK, Traffic: W3CUL 2936, W3VFR 932, WA4PFK 74, K4SCL 188, WA4EIC 178, W4NFK 162, W4DL 17, WD4KBW 129, WA4RLV 124, AA4BN 121, WB4WYG 120, WA4RUE 118, K4IA 113, KA4FZ 112, KA4GUS 111, WA9VND 100, K4EUK 99, K4ZK 96, KA4NFX 75, K4JWJ 74, KA4YHS 74, N4ET 66, N4MML 56, W4T4H 48, KA4SIH 44, N4ORZ 44, WB4AID 43, KB4PL 43, WD4CHO 42, KB4MON 42, N4KB 42, WA4HDH 39, K4IHF 37, KF4RL 34, KB4XKJ 31, K4FUJ 31, W4BGCQ 29, W4BTJ 27, AA4CJ 25, K4XWZ 20, K4JJI 20, KF4JA 17, N4OIE 17, K4BAK 15, W4T4F 12, WD4NKK 10, W3JUF 10, W4BMPV 7, K3ALX 7, K4BF 7, K4DGF 7, KB4EWO 6, W41BWW 6, K4QYF 6, W4T4F 6, KA4GDU 6, N4X5 5, WK4F 5, K4OVC 4, N4PFO 3, W4NSY 3, K4BYJF 3, WD4CHP 3, K4ZKNZ 3, W4SME 2, W4DWN 2, K4BYBS 1, N4PSV 1.

WEST INDIES: SM, Jose A. Purcell, Jr. KP4IG-ASM; WP4ETG. ASM; NP4WL. SEC; WP4FKJ. STM; KP4JN. PIO; NP4XM. BM; KP4EW. TC; KP4ARY. SGL; WP4CSG. NM-WINC; NP4WR. NM-WINS; KP4DJ. NM-WINE; VP2VJ. During 7-13 to 7-16 the ARES group participated on an emergency drill sponsored by the PR Civil Defense called HUREX. A group of the PRARC member visited the commercial Satellite Relay Station located in Cayey, PR. It was definitely a very interesting tour. Two new ASMs will be appointed for St. Thomas and St. Croix in order to deal with U.S. Virgin Island affairs within the Section. Special thanks to the VHF Radio Club who operated with 7 operators during the League field day from Charlotte Amalie. Traffic-WINS: Sessions 30, QND 180, QTC 8, QNI 11. WINE: Sessions 25, QTC 2, QNI 50.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF-STM; W7EP. NMs: K6LL, K7POF, W7B7CAG. ASM: K7OMR. Ft. Tuthill hamfest another great success with an estimated 3,000 in attendance. One major vendor reported his sales were up over forty per cent from previous events. Stan, K7KNP, was honored with "Ham of the Year" award. Congratulations to ARCA for all their hard work putting on this FB annual event. Mert, K7BNE and Adam, N7WZ, appeared headlined the event. Bernie, W7VQY reports very successful testing at hamfest with over 159 separate test elements given to approx. 100 individuals. New licensees plus upgrades resulted in 30 Techs, 7 Generals, 12 Advanced, 11 Extras and 3 new Novices. Success rate on all code tests was 54 percent, and over-all success rate on written tests was 75 percent. 17 VEs participated. Congratulations, gang, AZ hams should be proud of such a dedicated group. For you Certificate collectors, the Old Pueblo RC offers a "Worked all Tucson" award for anyone outside Tucson stns. Tnx "Solid Copy." Jim Cushing, KD7FW, reports many early registrations for SW Divn Convention in Scottsdale Oct 9-11.

All registrants are going into a computer and computer-generated receipts being mailed out. FB, Understand OSCAR 12-Fuj finally has its test system at hamfest with System up and running. How many of you OSCAR/Packet buffs have tried the Flying Mailbox system? Let's hear from you. Art, NN7A and Bill, W7YS journeyed south of the border and activated XE2VKR using portable power. They worked the QRP CW contest running 4 watts, and worked 76 stations for 81,000 pts. They also worked some DX, including 17 countries. Glad to hear that Bill, KA7SUF, is recuperating nicely after major surgery in Show Low. Even when in the hospital, Bill was communicating with his many friends on the Greens Peak 2 meter repeater. His XYL is Marge, K1YCZ, both members and active workers in the Superstition ARC. Wally, W7UK, and XYL, Jo are expected to be at the Junction after several years of absence in New Jersey. Welcome back Superstition ARC planning their annual outdoor hamfest for Dec. 5-6 weekend. Catalina RC sent nice report on their FD activity. They scored 3,348 pts., including 1,000 bonus pts. which included OSCAR contacts and solar powered contacts. In closing, I would like to extend my greatest thanks and a "tip of the hat" to the members of the Coconino Co. RC who provided assistance in manning the ARRL booth this year at Flagstaff. Great bunch of people to work with! 73 Jim. Traffic: W7EP 167, K6LL 109, W7KMC 108, K7POF 75, KE7Z 64, W7B7CAG 52, N7ETP 43, K7JKM 25, W7KXE 22, W7GAO 16, Jun.) W7G 48.

NET	QNT	QTC	SESS:
SWN	234	177	31
ACN(HF)	611	75	31
ACN(VHF)	281	46	31
ATEN	774	95	31

LOS ANGELES: SM, Bob Poole, AJ6F-- The Hughes ARC and the Santa Barbara ARC consolidated efforts to bring amateur radio to the joint preparedness meeting of Southern California aerospace companies in Fullerton on July 30th; KN8H, KA6KGF and WB6UNH spearheaded the efforts. I understand the officials from the several companies were duly impressed with the services provided by amateurs. W6FNO reports for July: 254 vehicular, 7 fire and 2 medical emergencies handled on the repeater system; thanks KB6LTL for sending this data via packet radio to AJ6F-1 BBS. Speaking of the BBS, it now supports user ports on 145.07 MHz and 22.42 MHz via APRS leaders and BBS access on 145.36 MHz; The BBS joins the K6LYK-14 system and the VERA13 NetRom node in operation in the area on the frequency on the 220 band. Thanks to the Hilltop Amateur Masterie System newsletter for bringing this item to my attention; AD6P, Cleon, now resides in Haven KS and can be heard on 14.240 MHz around 1400-1415Z from time to time; the Kansas section's gain is our loss--good luck in your retirement, Cleon. We're all gearing up here for the Sixth annual ARRL networking conference that will have been hosted by TRW club by the time this is published; thanks to the many who helped pull this off. Field Day aftermath: the San Gabriel Valley ARC managed to close the publicity points in a local newspaper article; did you guys do the same? The club reminds us that the Southwestern Division Convention will be held in Scottsdale AZ beginning Oct 9; they also published an examination schedule produced by our ACC, KB6AXK. The Lockhead club, W6LS, among others, are recruiting for participants in the L.A. County Fair booth to be sponsored by the LAACARC; as you read this, there may still be the opportunity to help out or just visit the display through Oct 4th. A special treat for the United Radio Amateur Club was presented by KA7TXV; Joel, who is a member of the ship's company on the USS Missouri, arranged a tour for the club at the Long Beach Naval Station. Joel is known to have worked packet radio from the vessel. Downey club members K6X, K6HES, WA6OZQ, N6PMZ, N6GGH, KB6ACJ, WB6YKQ, and WB6ZGF participated in the annual July 4th fire watch which reported several incidents to the authorities in the city. Many of the area hams were able to attend the W6YA open house in Leucadia on Aug 9th; Jim stays in touch with the SCDXC gang and many of them attended (tnx NK6A). A special get-well to Harry, WC6M, who became ill; Harry is a stalwart supporter of the GLAARG amateur exerts in the Palos Verdes area. Chip off the block Dept.: KB6DRT, Neal, wrote a very

nice article on a Novice's point of view on Field Day for the Pasadena ARC newsletter; Neal follows in his father's (KC7O) footsteps toward literary achievement. Sorry that this column is shorter than usual. Part out of the gate. Part out of the gate that summer is in full bloom. N6LHE is on vacation, K6UYK returned from vacation, so we are doing ok. With county fairs, it seems our totals are improving. W6TH is now established in Rosamond and is a good outlet for Mojave area etc. Traffic: K6UYK 445, W6INH 301, N6LHE 247, W6TH 156, WB6VPY 122, N7CZF 50, W6NKE 40.

SAN DIEGO: SM, Arthur R. Smith, W6INI--W9FQC, KB6NKM, N6DPP, K6SG contributed to success of American Lung Association bike event. N4KRA rcvd ARRL award for PSHR activity. A6EE rcvd DXCC endorsement for 175 countries on CW. ARES breakfast & meeting on second Sat. each month at Normal High United Meth Ch, 4650 Mansfield, San Diego. Breakfast 8 to 8:45, meeting at 9AM. Come to either or both. All Amateurs are welcome, spouses and harmonics, too. Learn the art of formal msg handling by joining the North County Traffic Net on the 530mhz ARC repeater, N6SPL, 6:00 PM. Other nearby repeater: the Palomar repeater are Packet Voice Net each Tue 10:30 PM, microwave net Mon. at 9PM, and ARES Sun. at 8:30AM. If you're interested in emergency preparedness try the following ARES nets: Sun. 9AM 3905 kHz SSB, 9AM 145.5 MHz AM, 9:30 AM *3725 kHz CW, 10AM *28.375 MHz SSB, 11AM 1945 kHz SSB, 7PM 146.52 MHz FM; Sat. 7 PM *224.91 MHz FM, 8PM 144.25 SSB. (*Novice/Techs welcome.) Escondido ARS runs 2 meter T-hunts on 3rd Sat. Start 9AM at Grape Day Pt. Upgrades: K6SP to Extra, KB6NZE/N6PPW, N6PHR, N6PPN to General, KB6OHZ/N6SPRC to Tech.

SANTA BARBARA: SM, Thomas L. Geiger, W2KVA--Bob Tauxe, W6JTA, replaces former SM, K6FL at Calif Spc'd Trng Inst. New DEC for SLO is Van Lyons, WB6IYJ. Congrats and best wishes to Bob and Van, Bill Long, K6EVC, became a Silent Key in May. He will be sorely missed! Field Day preliminary results are trickling in, and it's clear that some of you have broken new ground. The Paso Flores ARC and the Satellite ARC both eclipsed their previous records, excellent scores also turned in by SBARC and others. High called scores for the QJ Worldwide DX/CW are out with World Multi-Multi honors going to KP2N, operated by two of the section's Super-Ops, W7CB and W6OUL et al. Fifth Multi-Multi in the World was our own Southern Cal Contest Club, at XE2SI, 73 for now. Traffic: W6NOR 140, N6FOU 21, KB6KCW 17, KB6IEC 15. (Jun.) W6NOR 146, N6FOU 24, KB6KCW 10.

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC--ASST SM: K5MXO. SEC: CG6PO. STM: W5VMP. PIO: K5HGL. BM: W5GUL. ACC: W5LNU. OOC: W5SJP. ACC: W5UFR. I have just returned from the West Gulf Division Convention, held this year in conjunction with the Texas VHF FM Society summer meeting in Austin. The featured speaker at the ARRL Forum was none other than Dave Sumner, K1ZZ, our Executive V.P. of the League, and publisher of QST. It was great for everyone to get to meet and chat with Dave, who was with us from start to finish all three days. This was his first trip this far west in our Division; I hope he enjoyed the Austin area and the local hospitality as much as we enjoyed having him come down. Our Director, Jim Haynie, W5BJP, discussed several pending dockets before the FCC that are in our interest, including the 220 MHz battle and special call signs. Marked the 25th anniversary of the West Gulf Division of 1989 will be the blow-out of all time as Ham-Come teams with the ARRL National Convention, celebrating the 75th anniversary of the League, and also the 25th anniversary of the Texas VHF FM Society, all to take place at once, right here in Dallas! Plans are already being made to make this a really special event. Very 73 to Kevin, W5VZ, and his son, Jeff, N5KRX as they QSY to a new QTH in Florida. They were very active in public service work, and will be missed on the nets. Traffic: W5ZSN 407, KD5HC 258, W5NTD 231, W5VZ 212, W5GS 208, N5BT 192, K5MXK 161, KB5ADE 142, W5YOZ 112, W5VMJ 87, W9QYL 71, KA5AZK 62, K5ML 55, KA5QYV 12, N5FR 8. PSHR for July: K5GMXO, W5VMP, W5GSV, W5ZSN, K5ML, KB5ADE, KA5QYV.

OKLAHOMA: SM, Bill Goswick, K5WG--Ham Holiday 1987 State Convention was a huge success. The Central Oklahoma Radio Amateurs are to be congratulated on producing an outstanding event. West Gulf Director Jim Haynie, W5BJP, presided at the ARRL Forum and held many questions from the large audience. Attendance was up significantly from last year's event; you missed a great hamfest if you weren't there. Many thanks to our State Government Liaison, Larry Hazelwood, W5NZS for securing proclamations declaring the first week of August as Amateur Radio Week from Governor Henry Bellmon and Mayor Ron Norrick, Oklahoma City. Congratulations to Howard Baker, W5AS, Section Bulletin Manager, and Harold Gilbertson, W5FB, on receiving certificates of merit from the ARRL commemorating their many years of dedicated service to their fellow amateurs. Mark Hugg, WB4UHJ, Westport, is planning on teaching a Novice Class beginning in January, 1988. Anybody interested should contact Mark at (405) 772-6811. Traffic: W5BSRP 187, W5RB 112, WA5OUJ 96, KF5RD 79, W5AS 64, K5XK 60, K5GBN 57, W5DFBF 38, WA5OGC 33, WA5ZOO 29, N5IKN 29, N5FEM 28, K5WG 28, W5VLW 26, W5VOR 26, N5BW 2, (June) W5AS 285, KA5WGS 118, NQ5Y 5, N5BW 5.

SOUTH TEXAS: SM, Art Ross, W5KR--ASM: N5TC. STM: K5OEWF. SEC: K5GD. PIO: WA5UZE. BM: K5CVD. SGL: K5KJN. ACC: W5BYDD. OOC: WA2VJL. San Antonio ARC bulletin reports N5IPD went to ZL land for eye-ball QSO with ZL1BMV; Central Texas Traffic Net, 6:30 CDT daily, 147.74/14 going great so check in soon. KARS newsletter, Boerne, reports emergency net moved to Tuesday at 7:30PM, 146.04/64; Packet activity increasing. D-CAT, Houston, reports great FDB7 publicity with 15 minutes on AM radio and several repeated reports to CBS. W5KLV reports 6 APRIL bulletins, 25 call bulletins, 4 propagation forecasts, 5 DX bulletins. CRRL bulletin given to 9 nets. Beaumont ARC reports EC W5KR (bicycle mobile) is trying to build up the ARES network; contact Charley for more information. OOC WA2VJL, who wears more hats than anyone I know, wears his San Benito ARC President hat to brag about the club receiving a Certificate of Merit from ARRL; nice going, Fred. Williamson County ARC, Georgetown, holds regular net meetings every Thursday at 8:30PM on 146.04/64; all within range are invited to check in. HOT HOG News, Brady, reports W5SS, KA5FVR, W5DSH and KB5AUM helped with the Heart of Texas Bicycle Classic, The Bull Shout, TX DX Society, Houston, reports N5RH has been invited to give a presentation on a full-size 75 meterloop for FDB7 with fantastic results! Cand NM W5KLV reports 594 messages passed in 31 July sessions; DRN5 represented 100%; STX stations helping were W5SFQU, NX5V, KD5KQ, N5DFQ, W5SEPA, W5BYDD, W5KLV, N5BHQ, KB5ABE. San Benito ARC reports KA5UVY, age 14, attended National Hispanic Institute Conference and shook hands with Texas Governor Clements! Northwest AHS PIA N5FX, Houston, reports ARES group KF5ZL, N5KUL,

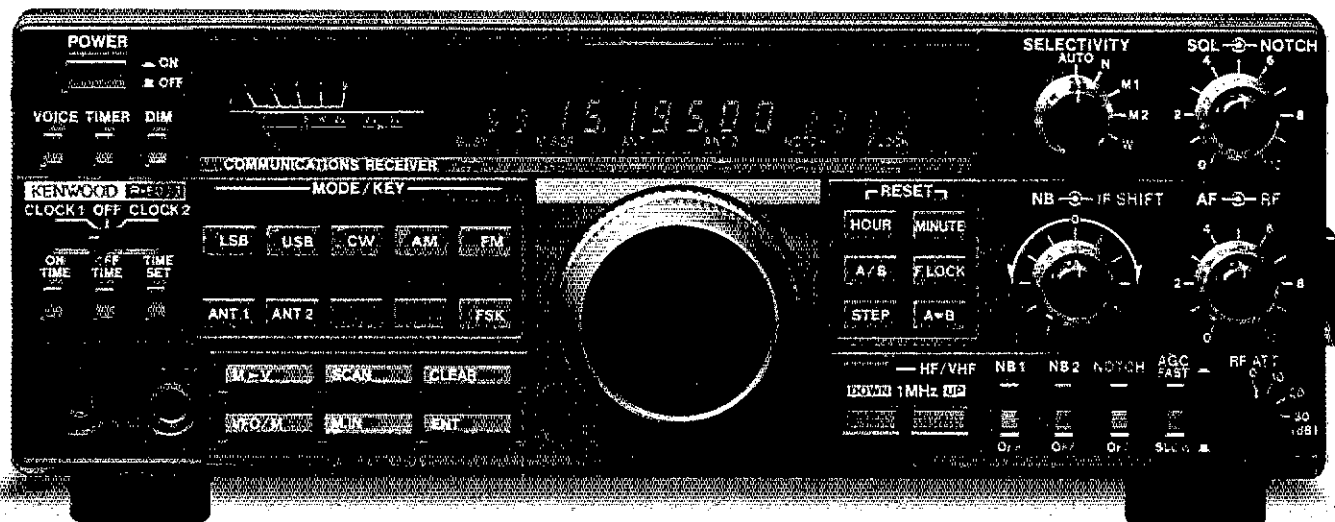
(continued on page 132)

KENWOOD

...pacesetter in Amateur Radio

NEW

Hear it All!



R-5000

High performance receiver

THE high performance receiver is here from the leader in communications technology—the Kenwood R-5000. This all-band, all mode receiver has superior interference reduction circuits, and has been designed with the highest performance standards in mind. Listen to foreign music, news, and commentary. Tune in local police, fire, aircraft, weather, and other public service channels with the VC-20 VHF converter. All this excitement and more is yours with a Kenwood R-5000 receiver!

- Covers 100 kHz-30 MHz in 30 bands, with additional coverage from 108-174 MHz (with VC-20 converter installed).
- Superior dynamic range. Exclusive Kenwood DynaMix™ system ensures an honest 102 dB dynamic range. (14 MHz, 500 Hz bandwidth, 50 kHz spacing.)



- 100 memory channels. Store mode, frequency, antenna selection.
- Voice synthesizer option.
- Computer control option.
- Extremely stable, dual digital VFOs. Accurate to ± 10 ppm over a wide temperature range.
- Kenwood's superb interference reduction. Optional filters further enhance selectivity. Dual noise blankers built-in.
- Direct keyboard frequency entry.

- Versatile programmable scanning, with center-stop tuning.
- Choice of either high or low impedance antenna connections.
- Kenwood non-volatile operating system. Lithium battery backs up memories; all functions remain intact even after lithium cell expires.
- Power supply built-in. Optional DCK-2 allows DC operation.
- Selectable AGC, RF attenuator, record and headphone jacks, dual 24-hour clocks with timer, muting terminals.

Optional Accessories:

- VC-20 VHF converter for 108-174 MHz operation
- YK-88A-1 6 kHz AM filter
- YK-88S 2.4 kHz SSB filter • YK-88SN 1.8 kHz narrow SSB filter • YK-88C 500 Hz CW filter
- YK-88CN 270 Hz narrow filter
- DCK-2 DC power cable • HS-5, HS-6, HS-7 headphones • MB-430 mobile bracket
- SP-430 external speaker • VS-1 voice synthesizer • IF-232C/IC-10 computer interface.

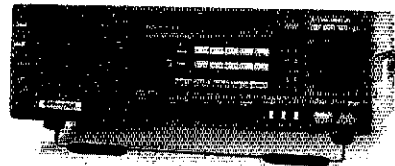
More information on the R-5000 and R-2000 is available from Authorized Kenwood Dealers.

KENWOOD

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

R-2000

- 150 kHz-30 MHz in 30 bands
- All modes • Digital VFOs tune in 50 Hz, 500 Hz, or 5 kHz steps • 10 memory channels
 - Programmable scanning • Dual 24-hour digital clocks, with timer • 3 built-in IF filters (CW filter optional)
 - All mode squelch, noise blanker, RF attenuator, AGC switch, S meter • 100/120/220/240 VAC operation • Record, phone jacks
 - Muting terminals • VC-10 optional VHF converter (118-174 MHz)



Audio Equalization and Speech Processing: The DX'ers Edge

A variety of convention discussions and on-the-air observations indicate that an increasing number of radio amateurs recognize the advantages of clear SSB audio with maximum "talk power." Supporting that noteworthy criterion, ICOM builds superior audio designs into every transceiver and includes an attractive selection of operator-tailoring assets to fit each amateur's needs. The overall results are SSB signals that stand apart from the crowd with the effective cleanliness to create a most favorable on-the-air image of its operator. ICOM is also a winner in this endeavor, because superb performing equipment directly reflects the high integrity of its manufacturer. When you're setting an industry-leading pace, there simply isn't room for compromise!

An SSB signal's audio quality and "punch" are influenced by several interrelated factors. The basic considerations involve transmitter ALC circuits, speech processors, and microphone response characteristics. Additionally, most American voices are low-pitched in nature, and many conventional microphones accentuate the bass range of 300 to 1800Hz. When combined, they concentrate transmitted energy into only the lower half of an SSB signal's passband and leave the upper range open for substantial improvement.

While SSB communications utilize the audio spectrum between 300 and 3000Hz, maximum speech intelligibility and "presence" are conveyed in the upper passband range of 1500 to 2800Hz. Attempting to divert predominantly bassy audio into this prime upper area by increasing mike gain and adding speech compression typically creates additional power robbing bass.

Amplifier stages can also be driven beyond normal ALC compensating ranges. Resultant signals lack "copy ability," as maximum articulation and greatest RF power occur within different areas of the SSB signal's spectrum.

A favorable equalization of transmitter audio response significantly reduces bass losses while centering audio intelligibility in the SSB filter's range of highest output. Speech processor and ALC circuits are then free to increase that peak/average ratio up to 20dB and produce sparkling clear audio with superb fidelity and DX "penetrating power."

A basic, yet quite effective means of equalization, is achieved with a transmit-audio tone control. This feature encourages an operator to tailor his/her unit for optimum bass or treble response as desired. **Naturally, that control is included in ICOM's new generation of HF and VHF transceivers.** ICOM microphones are also center-audio designed so their response can be optimized via tone control.

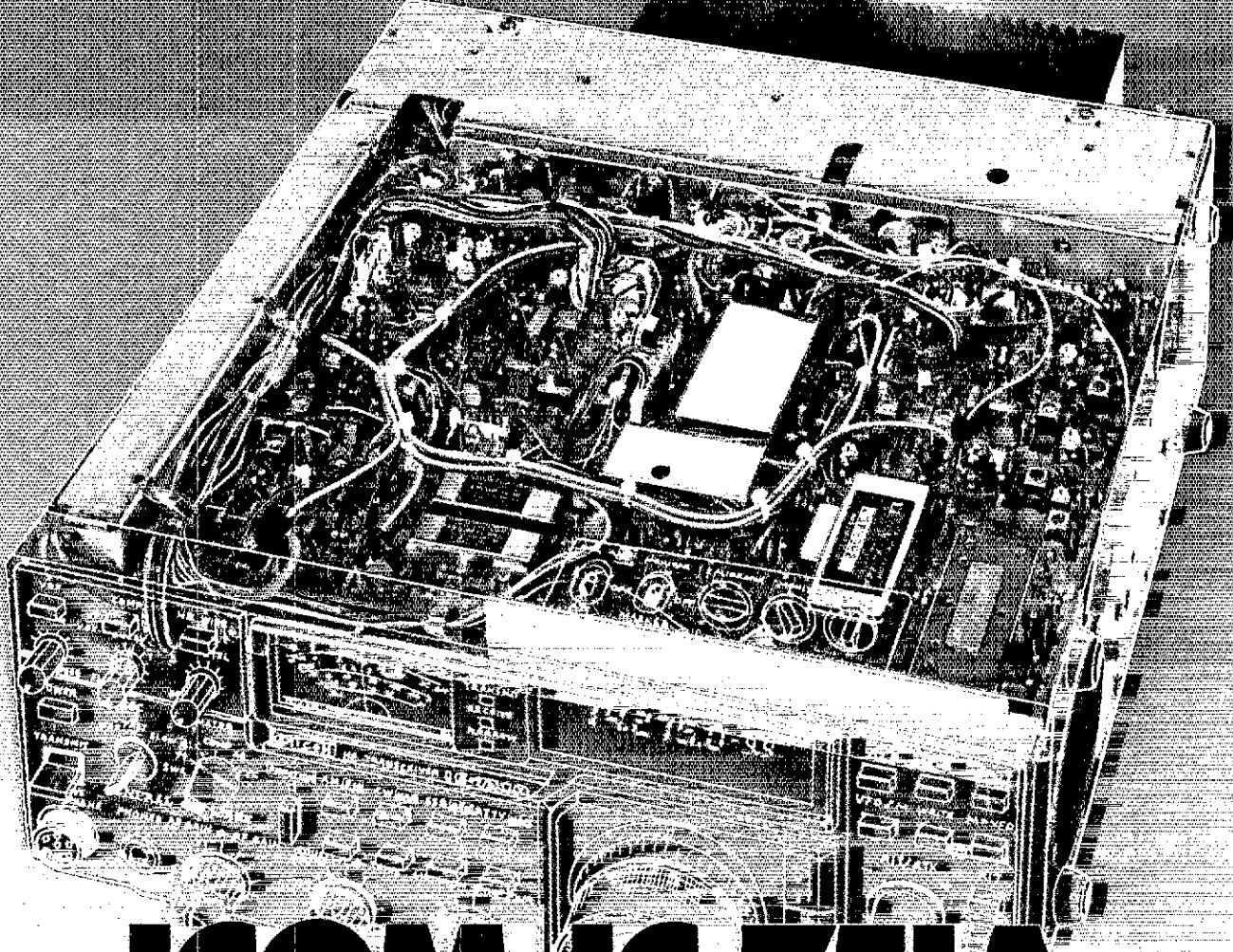
Full graphic equalization or separate level controls for low, bass, medium, and high audio frequencies is the most effective means of shaping SSB audio before transceiver processing. An operator can independently optimize each tonal band according to equipment and voice characteristics, then speech processing can efficiently amplitude-compress that signal for outstanding audio. **Four band graphic equalization is featured in ICOM's unique SM-10 desk mike with speech compressor,** and it's plug-compatible with ICOM's HF and VHF transceivers.

Speech compressor design variations also play a creditable role in SSB

transceiver performance. RF/IF level speech compression is comparable to "transmit AGC" or negative feedback in amplifier stages. It yields the highest peak-to-average SSB ratio, and it functions relatively independent of applied audio frequencies. AF compression operates with transceiver microphone or audio amplifier stages. Although it exhibits a lower peak-to-average ratio, it includes the benefit of upper audio range emphasis or an "intelligibility boost." Properly adjusted RF compressors typically increase a distant S meter level, whereas AF compressors usually increase a signal's readability and "presence." Combining the concepts of audio equalization with RF compression exemplifies how a "barefoot" transceiver can perform comparable to a kilowatt rig. One uses its power efficiently while the other excessively amplifies power usurping bass.

ICOM owners are ideally situated to enjoy the previously described benefits by tone or graphic tailoring transmitted audio, then adding fully effective speech compression. A high power amplifier isn't mandatory: it's simply icing on the cake!

Graphic equalization concepts are also applicable to communications receivers. ICOM's new SP-20 speaker, for example, includes four panel selectable low/high pass filters that shape receive response to fit band conditions and individual hearing variations. High pass filters emphasize "presence" while low pass filters minimize band noises. The SP-20 is a perfect "finishing touch" for a top notch ICOM setup. Ready to experience band commanding performance at its best? **Move ahead with ICOM. It's the modern amateur's winning edge!**



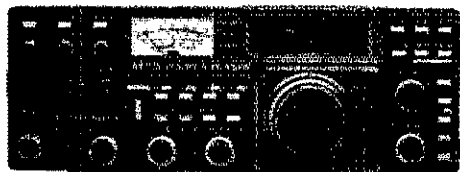
ICOM IC-751A

"IT'S WHAT'S INSIDE THAT COUNTS!"

- All HF Band Transceiver / General Coverage Receiver
- Advanced Circuit Designs
- All Modes Built-in USB, LSB, FM, AM, CW, RTTY
- Superb Frequency Stability
- Continuous Duty Operation
- Crystal Clear Signal Quality

Midsize Masterpiece! The deluxe IC-751A includes more high performance features and professional circuitry per cubic inch than any other HF transceiver. Its smooth-as-silk operation and long-term reliability produce the ideal contesting, DX'ing, mobiling and portable rig. Owning an IC-751A truly means "Going First Class!"

Unsurpassed Quality and Reliability. Quality and Reliability is important to you and it's important to ICOM. ICOM now covers you and your investment with its exclusive



one year warranty. There's more! The IC-751A's receiver boasts 105dB dynamic range for superb listening. The 100% duty cycle transmitter defies abuse and delivers 100 watts of exceptionally stable and clean RF output. Reliability. Quality. One year warranty. That's ICOM.

All Bands, All Modes Included. Operates 160 through 10 meters, it's easily modified for MARS operation, plus it includes general coverage reception from 100kHz to 30MHz. No compromise, no comparison!

32 Tunable Memories. Store both frequency and mode information. Use them to quick-access your favorite spots or as 32 preferred frequency-remembering VFOs.

A Modern Amateur's Delight! Special attractions include an electronic keyer, semi or full break-in rated to 40 WPM, panel selectable 500Hz/FL-32A CW filter, and volume control-tracking sidetone. SSB transmissions are enhanced with an RF speech processor and tone control to produce sparkling clear audio. PLUS there's a new rubberized tuning knob for velvet-smooth tuning and a full line of accessories and filters.

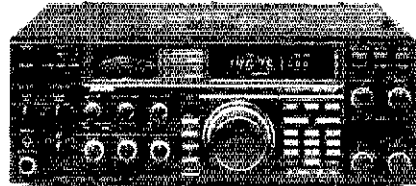
RF Power Control. Varies output independent of mic gain, ALC and speech processor action. Enjoy maximum "talk power" at any drive level!

To see the IC-751A, contact your local ICOM dealer.



ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 Customer Service Hotline (206) 454-7619
 3150 Premier Drive, Suite 126, Irving, TX 75063 / 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
 ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 751A187.



HF Equipment Regular SALE
IC-761 HF xcvr/SW rcvr/ps/AT 2499.00 2149
 SP-20 Ext. speaker w/audio filter 149.00 134⁹⁵
 FL-101 250 Hz CW filter 69.95
 FL-102 6 kHz AM filter 56.00
 CI-V Computer interface adapter TBA
 EX-310 Voice synthesizer 46.00



IC-751A 9-band xcvr/1-30 MHz rcvr 1649.00 1399
 PS-35 Internal power supply 199.00 179⁹⁵
 FL-32 500 Hz CW filter (1st IF) 66.50
 FL-63 250 Hz CW filter (1st IF) 54.50
 FL-52A 500 Hz CW filter (2nd IF) 108.00 99⁹⁵
 FL-53A 250 Hz CW filter (2nd IF) 108.00 99⁹⁵
 FL-33 AM filter 35.25
 FL-70 2.8 kHz wide SSB filter 52.00
 RC-10 External frequency controller 39.25

IC-745 9-band xcvr w/1-30 MHz rcvr 1049.00 899⁹⁵
 PS-35 Internal power supply 199.00 179⁹⁵
 EX-241 Marker unit 22.50
 EX-242 FM unit 44.00
 EX-243 Electronic keyer unit 56.00
 FL-45 500 Hz CW filter (1st IF) 66.50
 FL-54 270 Hz CW filter (1st IF) 53.00
 FL-52A 500 Hz CW filter (2nd IF) 108.00 99⁹⁵
 FL-53A 250 Hz CW filter (2nd IF) 108.00 99⁹⁵
 FL-44A SSB filter (2nd IF) 178.00 159⁹⁵



IC-735 HF transceiver/SW rcvr/mic 999.00 799⁹⁵
 PS-55 External power supply 199.00 179⁹⁵
 AT-150 Automatic antenna tuner 445.00 349⁹⁵
 FL-32 500 Hz CW filter 66.50
 EX-243 Electronic keyer unit 56.00
 UT-30 Tone encoder 17.50

Other Accessories Regular SALE
IC-2KL 160-15m solid state amp w/ps 1999.00 1699
 PS-15 20A external power supply 169.00 154⁹⁵
 PS-30 Systems p/s w/cord, 6-pin plug 299.00 269⁹⁵
 MB Mobile mount, 735/745/751A 24.50
 SP-3 External speaker 61.00
 SP-7 Small external speaker 49.00
 CR-64 High stab. ref. xtal (745/751) 63.00
 PP-1 Speaker/patch 159.25 149⁹⁵
 SM-6 Desk microphone 44.95
 SM-8 Desk mic - two cables, Scan 78.50
 SM-10 Compressor/graph EQ, 8 pin mic 136.25 124⁹⁵
 AT-100 100W 8-band auto. antenna tuner 445.00 389⁹⁵
 AT-500 500W 9-band auto. antenna tuner 559.00 489⁹⁵
 AH-2 8-band tuner w/mount & whip 625.00 549⁹⁵
 AH-2A Antenna tuner system, only 495.00 429⁹⁵



Other Accessories - continued: Regular SALE
 GC-5 World clock 91.95 89⁹⁵
VHF/UHF base multi-modes Regular SALE
 IC-271A* 25W 2 meters ... CLOSEOUT 859.00 699⁹⁵
 AG-20* Internal preamplifier 64.00
 IC-275A 25W 2m FM/SSB/CW w/ps 1199.00 1049
 IC-275H 100W 2m FM/SSB/CW 1389.00 1229
 IC-475A 25W 440 FM/SSB/CW w/ps 1399.00 1249



IC-471A* 25W 430-450... CLOSEOUT 979.00 769⁹⁵
 AG-1* Mast mounted preamplifier 99.50
IC-471H* 75W 430-450 ... CLOSEOUT 1399.00 999⁹⁵
 AG-35* Mast mounted preamplifier 95.00

***Preamp \$99⁹⁵ with 271A/471A/471H Purchase**

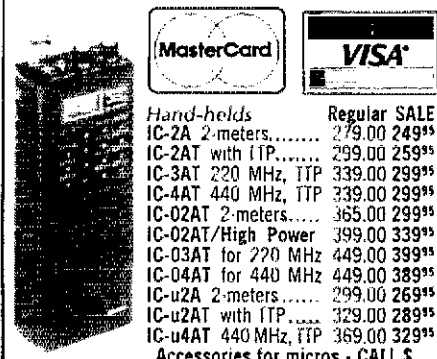
Accessories common to 271A/H and 471A/H
 PS-25 Internal power supply for (A) 115.00 104⁹⁵
 PS-35 Internal power supply for (H) 199.00 179⁹⁵
 SM-6 Desk microphone 44.95
 EX-310 Voice synthesizer 46.00
 TS-32 Commspec encode/decoder 59.95
 UT-15 Encoder/decoder interface 14.00
 UT-15S UT-15S w/TS-32 installed 92.00

VHF/UHF mobile multi-modes Regular SALE
 IC-290H 25W 2m SSB/FM CLOSEOUT 639.00 569⁹⁵
 IC-490A 10W 430-440... CLOSEOUT 699.00 499⁹⁵

VHF/UHF 1.2 GHz FM Regular SALE
 IC-27A Compact 25W 2m FM w/TTP mic 429.00 369⁹⁵
 IC-27H Compact 45W 2m FM w/TTP mic 459.00 399⁹⁵
 IC-37A Compact 25W 220 FM, TTP mic 499.00 439⁹⁵
 IC-47A Compact 25W 440 FM, TTP mic 549.00 479⁹⁵
 PS-45 Compact 8A power supply 139.00 129⁹⁵
 UT-16/EX-388 Voice synthesizer 34.99
 SP-10 Slim-line external speaker 35.99
 IC-28A 25W 2m FM, TTP mic 459.00 399⁹⁵
 IC-28H 45W 2m FM, TTP mic 489.00 429⁹⁵
 IC-38A 25W 220 FM, TTP mic 489.00 429⁹⁵
 IC-48A 25W 440-450 FM, TTP mic 489.00 429⁹⁵
 HM-14 TTP microphone 55.50
 UT-28 Digital code squelch 37.50
 UT-29 Tone squelch decoder 43.00
 HM-16 Speaker/microphone 34.00

IC-900 Transceiver controller 589.00 529⁹⁵
 UX-29A 2m 25W unit 295.00 269⁹⁵
IC-3200A 25W 2m/440 FM w/TTP... 599.00 529⁹⁵
 UT-23 Voice synthesizer 34.99
 AH-32 2m/440 Dual Band antenna 37.00
 AHB-32 Trunk-lip mount 34.00
 Larsen PO-K Roof mount 20.00
 Larsen PO-TLM Trunk-lip mount 20.18
 Larsen PO-MM Magnetic mount 19.63

RP-3010 440 MHz, 10W FM, xtal cont. 1229.00 1089
 IC-1200A 10W 1.2 GHz FM Mobile 699.00 629⁹⁵
 IC-1271A 10W 1.2 GHz SSB/CW Base 1229.00 1069
 AG-1200 Mast mounted preamplifier 105.00
 PS-25 Internal power supply 115.00 104⁹⁵
 EX-310 Voice synthesizer 46.00
 TV-1200 ATV interface unit 129.00 119⁹⁵
 UT-15S CTCSS encoder/decoder 92.00
 RP-1210 1.2 GHz, 10W FM, 99 ch. synth 1479.00 1289



Hand-holds Regular SALE
 IC-2A 2-meters 279.00 249⁹⁵
 IC-2AT with ITP 299.00 259⁹⁵
 IC-3AT 220 MHz, TTP 339.00 299⁹⁵
 IC-4AT 440 MHz, TTP 339.00 299⁹⁵
 IC-02AT 2-meters 365.00 299⁹⁵
 IC-02AT/High Power 399.00 339⁹⁵
 IC-03AT for 270 MHz 449.00 399⁹⁵
 IC-04AT for 440 MHz 449.00 389⁹⁵
 IC-u2A 2-meters 299.00 269⁹⁵
 IC-u2AT with ITP 329.00 289⁹⁵
 IC-u4AT 440 MHz, TTP 369.00 329⁹⁵

Accessories for micros - CALL \$
 IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP 459.00 399⁹⁵
 A-2 5W PEP synth. aircraft HI 499.00 449⁹⁵
 A-20 Synth. aircraft HT w/VOR 599.00 529⁹⁵

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

Accessories for IC and IC-O series Regular
 BP-2 425mah/1.2V Nicad Pak - use BC35 47.00
 BP-3 Extra Std. 250 mah/8.4V Nicad Pak 37.50
 BP-4 Alkaline battery case 15.25
 BP-5 425mah/10.8V Nicad Pak - use BC35 58.50
 CA-5 5/8-wave telescoping 2m antenna 18.95
 FA-2 Extra 2m flexible antenna 11.50
 CP-1 Cig. lighter plug/cord for BP3 or Dlx 13.00
 CP-10 Battery separation cable w/clip 22.50
 DC-1 DC operation pak for standard models 23.25
 MB-16D Mobile mtg. bkt for all HTs 24.50
 LC-2AT Leather case for standard models 54.50
 RB-1 Vinyl waterproof radio bag 34.95
 HH-SS Handheld shoulder strap 16.95
 HM-9 Sneaker microphone 47.00
 HS-10 Boom microphone/headset 23.25
 HS-10SA Vox unit for HS-10 & Deluxe only 23.25
 HS-10SB PTT unit for HS-10 23.25
 ML-1 2m 2.3w in/10w out amplifier SALE 99.95
 SS-32M Commspec 32-tone encoder 29.95

Receivers Regular SALE
 R-71A 100 kHz-30 MHz, 117V AC 949.00 799⁹⁵
 RC-11 Infrared remote controller 67.25
 FL-32 500 Hz CW filter 66.50
 FL-63 250 Hz CW filter (1st IF) 54.50
 FL-44A SSB filter (2nd IF) 178.00 159⁹⁵
 EX-257 FM unit 42.50
 EX-310 Voice synthesizer 46.00
 CR-64 High stability oscillator xtal 63.00
 SP-3 External speaker 61.00
 CK-70 (EX-299) 12V DC option 12.25
 MB-12 Mobile mount 24.50
 R-7000 25 MHz-2 GHz rcvr... SPECIAL 1099.00 899⁹⁵
 RC-12 Infrared remote controller 67.25
 EX-310 Voice synthesizer 46.00
 TV-R7000 ATV unit 131.95 119⁹⁵
 AH-7000 Radiating antenna 89.95 (4)

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

Milwaukee WATS line: 1-800-558-0411 answered evenings until 8:00 pm Monday thru Thursday.
WATS lines are for Quotes & Ordering only, use Regular line for other Info & Service dept.

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

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

AMATEUR ELECTRONIC SUPPLY[®] Inc.

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

AES[®] BRANCH STORES

Associate Store

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

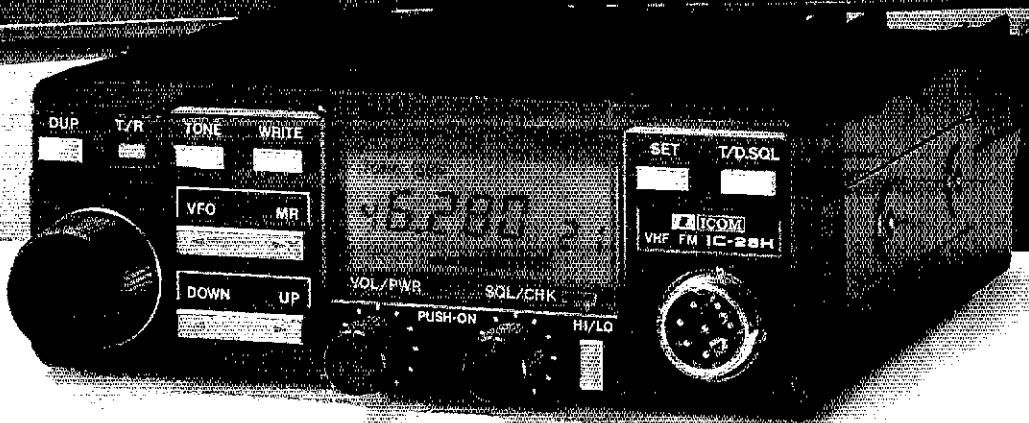
ORLANDO, Fla. 32803
 621 Commonwealth Ave.
 Phone (305) 894-3238
 Fla. WATS 1-800-432-9424
 Outside Florida 1-800-327-1917

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

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

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

**20MHz IC-38A
440MHz IC-48A
Now Available!**



ICOM IC-28A/H

THE ONE FOR THE ROAD

- Compact Size
- Simple to Operate
- Large LCD Readout
- 25 Watt IC-28A
- 45 Watt IC-28H
- Packet Compatible
- 21 Memory Channels

The IC-28H has all the features you need for carefree 2-meter mobile operation. The only thing it doesn't have is a big price.

45 Watts. The IC-28H provides a full 45 watts of powerful output. The IC-28A 25-watt version is also available. Both units have a selectable low power.

Large LCD readout. A wide-view LCD readout can be easily read even in bright sunlight. An automatic dimmer circuit reduces the brightness for evening operation.

Wideband Coverage. The IC-28H performs from 138-174MHz (specifications guaranteed from 144.00-148MHz) and includes weather channels. Ideal for MARS and CAP operation.

Compact Size. The IC-28H measures only 2 inches high by 5½ inches wide by 7¼ inches deep (IC-28A is 5¼

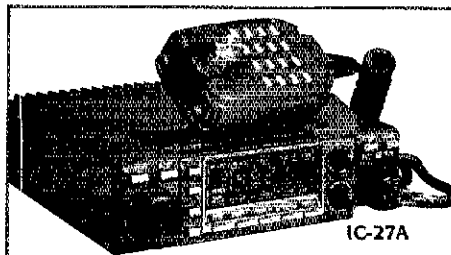
inches deep). Great for mobile installations where space is limited.

21 Memory Channels. Store 21 frequencies into memory, or lock out certain memory channels. All memories are backed up with a lithium battery.

Scanning. Scan the entire band or the memory channels from the provided HM-12 mic.

Easy to Operate. With only 11 front panel controls, the IC-28H is simple to operate.

Available Options. IC-HM14 DTMF mic, PS-45 13.8V 8A power supply, UT-29 tone squelch unit, SP-10 external speaker, IC-HM16 speaker mic and HS-15/HS-15SB flexible boom mic and PTT switchbox.



The IC-27H 45 watt and IC-27A 25 watt ultra compact 2-meter mobiles continue to be available.

ICOM
First in Communications

W1FB's Antenna Notebook

This is one of the most readable books about antennas ever published. It's not really a novel about antennas, but *W1FB's Antenna Notebook* is far from being a dry lecture on the properties of wire and vertical antennas. Instead, we can imagine ourselves being invited over to Doug DeMaw's hamshack to chew the rag about antennas. Have a seat in the easy chair in front of the fireplace while Doug grabs his *Antenna Notebook* off the shelf. Listen intently as we discuss what this new ARRL publication is about.

While the adage, "the bigger and higher the better" might be true for those with unlimited pocketbooks, lots of real estate, and plenty of technical and mechanical knowledge, most of us are constrained in some way, from putting up vast arrays of heavy metal! Wire antennas are inexpensive, can be unobtrusive, and give good performance if designed properly. Verticals don't have to be "equally weak in all directions," and we learn how to overcome this so-called "curse." That bargain coax that you picked up at the local flea market may look good, but is it? The first chapter describes a simple test to find out for sure, as well as telling us about the hidden traps of traps, what conditions cause baluns to do some very nasty things, and a brief discussion on SWR (or VSWR if you prefer.)

The second chapter is devoted to the dipole and its variations: the inverted-V, G5RV, trap dipoles, folded dipoles, multi-band dipoles, and dipole look-alikes. Chapter three covers the care and feeding of end-fed wires. Doug tells how to treat them properly so they won't bite! He will also make your day by telling you how to terminate true longwires—painlessly (so that most of the radiation will be in just one direction.)

During the time that W1FB was *QST* Technical Editor, he lived on a typical suburban lot in Newington, Connecticut. He had a tri-bander for 10, 15 and 20 meters on a 55-foot tower. Since Doug lacked the space to "go out" he decided to "go up" by optimizing his tower and beam for use on the lower amateur bands—especially 160-meters. You'll learn from his experience in one of the most

informative chapters on vertical antennas ever written.

Since Doug used to live only 2 blocks from League HQ, he had to cope with over 1 volt of RF at the receiver antenna terminals when W1AW was on the air. With code practice and bulletins being sent on 7 bands, the result was the generation of all sorts of mixing products in many receivers. (This was before the time "bullet-proof"

solid-state devices had been developed for receiver front ends.) All of this noise made reception difficult at best! The chapter on Special Receiving Antennas is the result of the author's experience using receiving loops and other types of antennas to overcome this problem. Of course, the antennas described offer a solution to other forms of man-made noise as well.

Wire antennas come in two models: the basic street model, like the dipole, and high performance "off road" configurations. The latter actually provide gain over a dipole in certain directions and are described at length: loops (in almost all geometric configurations,) collinear arrays, and cloud-warmers (for effective short-range communication.)

We know of a local amateur who worked 200 countries from his apartment using a 33-foot end-fed invisible antenna running from the window to a nearby tree. He used a black

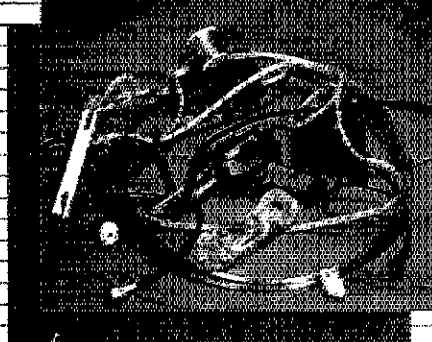
plastic comb as an insulator on the far end. Chapter 6 is devoted to limited-space and invisible antennas including flag poles, TV antennas (the guy lines are the antenna) and the half sloper.

Need a match? The chapter on matching techniques has circuits ranging from simple L-networks to complete Transmatches.

The final chapter is devoted to measurements. It tells how to build and use such useful devices as field strength meters, SWR bridges, noise bridges, dip meters and a current sampling meter for verticals.

That is *W1FB's Antenna Notebook* in a nutshell. This 122 page publication is available for \$8.00 at your dealer or directly from ARRL. Please add \$2.50 (\$3.50 for UPS) for shipping and handling.

W1FB'S ANTENNA NOTEBOOK



By Doug DeMaw, W1FB

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

ICOM HAND HELDS

SURROUND YOURSELF WITH THE BEST!

Reliable. ICOM's extensive line of reliable, field-proven handhelds and interchangeable accessories give you the most options for handheld communications. 2-meter, 220MHz, 440MHz or 1.2GHz...ICOM has your frequency covered.

2-Meters. For 2-meter coverage, ICOM offers the IC-02AT and IC-2AT handhelds. The versatile IC-02AT covers 140,000-151,995MHz, the IC-2AT 141,500-149,995MHz...both include frequencies for MARS and CAP operation. The IC-02AT features an LCD readout, 32 PL tones standard, DTMF, direct keyboard entry, three watts output, (optional 5 watts output with IC-BP7 battery pack), 10 memories and three scanning functions. The IC-2AT, the most rugged handheld on the market, has a DTMF pad, 1.5 watts output and thumbwheel frequency selection. The IC-2A is also available and has the same features as the IC-2AT except DTMF.

220MHz. To get away from the crowd, ICOM has the IC-3AT 220,000-224,990MHz handheld with 1.5 watts output, thumbwheel selection and a DTMF pad.

440MHz. For 440MHz operation, ICOM has two handhelds available, the versatile IC-04AT and the IC-4AT. The IC-04AT and IC-4AT offer full coverage from 440,000-449,995MHz. The IC-04AT includes an LCD readout, 32 PL tones standard, DTMF direct keyboard entry, three watts output, (optional 5 watts output with IC-BP7 battery pack), 10 memories and three scanning systems. The IC-4AT has a DTMF pad, thumbwheel selection and 1.5 watts output.

1.2GHz. ICOM announces the IC-12AT 1260,000-1299,990MHz handheld, the first 1.2GHz handheld available. The IC-12AT features 10 memories, an LCD readout, DTMF direct keyboard entry, two scanning systems and one watt output.

Accessories. A variety of interchangeable accessories are available, including the IC-BP8 800mAh long-life battery pack, HS-10 boom headset, CPI cigarette lighter plug and cord, HM9 speaker mic (for IC-02AT, IC-04AT and IC-12AT), leather cases, and an assortment of battery pack chargers.

NEW FROM ICOM
IC-02AT 2-Meter Micro Handheld
IC-03AT 220MHz Handheld



ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 **Customer Service Hotline (206) 454-7619**
3150 Premier Drive, Suite 128, Irving, TX 75063

ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4, Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. HH-986

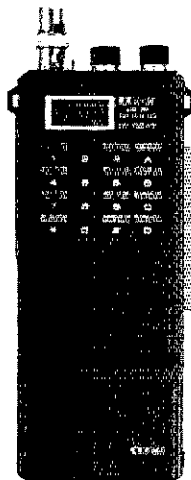
ICOM DAY!

Presented by:

Missouri Radio Center

102 N.W. Business Park Lane
Kansas City, Missouri 64150
(816) 741-8118 or (800) 821-7323

SATURDAY
OCTOBER 17, 1987
9:00am till 4:00pm



WIN!!

★ Prize drawings each hour!
Come and register to win!

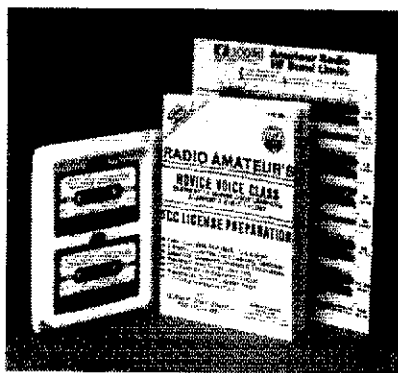
Grand Prize

IC-02AT 2-Meter Digital Readout Handheld

(No purchase necessary to win.)

- ★ Special pricing
- ★ ICOM personnel to demonstrate new equipment
- ★ See the new line of ICOM equipment

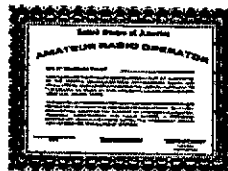
Gordon West's 21 DAY NOVICE



\$19.95

Plus \$2.50
Postage and
Handling

INSTRUCTOR
DISCOUNT
AVAILABLE



**CODE TAPES • 112 PAGE BOOK • BANDS CHART • ALL FCC FORMS
SAMPLE TESTS • HOTLINE • PLUS MORE!**

STEREO THEORY TAPES COULD BE SUBSTITUTED FOR THE BOOK FOR THE VISUALLY IMPAIRED. PLEASE ASK US.

- \$70 in equipment certificates from ICOM, KENWOOD, & YAESU.
- Ham radio equipment "Wish Books". • Laminated world map.
- ARRL membership forms. • Free CQ Magazine coupon.
- Hotline for student questions. • Dealer distributor list.
- School pen. • Course completion certificate. • License holder.

GORDON WEST RADIO SCHOOL

2414 College Drive • Costa Mesa, CA 92626 • (714) 549-5000

Spider Antenna

U.S. Patents 4349875, 4460896



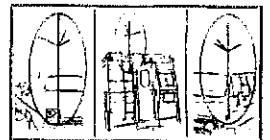
These trademarks are your assurance of
quality and performance.

*Wherever you may roam, on Land or Sea ...
or even at Home*

The Spider™ Antenna will help you keep in touch with
your ham friends around the world. Four bands —
10, 15, 20 and 40 (or 75) meters. Needs no antenna
tuner. Custom made with highest quality
workmanship and materials.

On Land . . .

Suitable for use
on any motor
vehicle from a
compact
automobile to a
motor home.
Work four
bands without stopping to change coils.



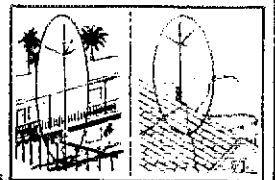
Or Sea . . . The

Spider™
Maritimer™ is
for use on or
near the ocean.
Highly polished
brass.

non-magnetic stainless steel and nickel-chrome plated
brass.

At Home . . .

If you live in
an apartment,
condominium
or restricted
area, the
Spider™ may
well be the
answer to your
antenna problems.



MULTI-BAND ANTENNAS
7131 OWENSMOUTH AVENUE, SUITE 363C
CANAJO PARK, CALIF., 91303
TELEPHONE: (818) 341-5460

NEW!



ICOM IC-761

A NEW ERA DAWNS

- Built-in AC Power Supply
- Built-in Automatic Antenna Tuner
- SSB, CW, FM, AM, RTTY
- Direct Keyboard Entry
- 160-10m/General Coverage Receiver
- Passband Tuning plus IF Shift
- QSK up to 60 WPM

The IC-761 ushers in an exciting new era of amateur radio communications; an era filled with all the DX'ing, contesting, and multi-mode operating pleasures of a fresh new sunspot cycle. The innovative IC-761 includes all of today's most desired features in a single full-size cabinet. This is ham radio at its absolute best!

Work the World. The IC-761 gives you the competitive edge with standard features including a built-in AC power supply, automatic antenna tuner, 32 fully tunable memories, self-referencing SWR bridge, continuously variable RF output power to 100 watts in most modes, plus much, much more!

Superb Design, Uncompromised Quality. A 105dB dynamic range receiver features high RF sensitivity and steep skirted IF selectivity that cuts QRM like a knife. A 100% duty cycle transmitter includes a large heatsink and internal blower. The IC-761 transceiver is backed with a full one-year warranty and ICOM's dedicated customer service with four regional factory service centers. Your operating enjoyment is guaranteed!

All Bands, All Modes Included. Operates all HF bands, plus it includes general coverage reception from 100kHz to 30MHz. A top SSB, CW, FM, AM, and RTTY performer!

Passband Tuning and IF Shift plus tunable IF notch provide maximum operating flexibility on SSB, CW, and RTTY modes. Additional features include multiple front panel filter selection, RF speech processor, dual width and adjustable-level noise blanker, panel selectable low-noise RF preamp, programmable scanning, and all-mode squelch. The IC-761 is today's most advanced and elaborate transceiver!

Direct Frequency Entry Via Front Keyboard or enjoy the velvet-smooth tuning knob with its professional feel and rubberized grip.

Special CW Attractions include a built-in electronic keyer, semi or full break-in operation rated up to 60 WPM, CW narrow filters and adjustable sidetone.

Automatic Antenna Tuner covers 160-10 meters, matches 16-150 ohms and uses high speed circuits to follow rapid band shifts.

Complementing Accessories include the CI-V computer interface adapter, SM-10 graphic equalized mic, and an EX-310 voice synthesizer.

You're The Winner with the new era IC-761. See the biggest and best HF at your local ICOM dealer.

 **ICOM**
First in Communications

N5FIX, KB5AKK, KA5QAP held joint emergency exercise with a local major hospital; hospital staff quite impressed. DPNS NM WB5YDD reports 540 messages passed in 82 July sessions; STX represented 98% by W5CTZ, N5DFO, W5KLV, K5WOB, KD5KQ, K5QEW, WB5FQU, WB5HZQ, K5GDX, WB5EPA, KE5ZV, WA5ZJY, WB5YDD. PIA NZ5J reports Guadalupe Valley Radio & Repeater Assn donated APRIL publications and tapes to Seguin-Guadalupe County Public Library; Amateur Radio provided communication for Freedom Festival Parade with KA5BOA, WD5DLN, W5FFG, WD5QRF, N5KDO, N5KEI, K5KXW, KF5MK, W5MTO, W5PTI, WR5X, WA5UFL and NZ5J doing a great job. KD5VU has been appointed HF and VHF awards manager for Austin ARC. Sam Houston ARK, Cleveland, PIA N5IKW, reports KB5NX received a first contact award on 6 meters after 32 years of Amateur Radio. STM K5QEW reports 7290 Traffic Net, an Independent net, passed 464 messages in 51 sessions, with KA5AZK as NM. Traffic: WB5J 518, W5KLV 374, WB5YDD 351, W5GTX 281, WD5GKH 190, AC5Z 112, WB5EPA 88, WB5FQU 68, WA2JL 25, W5BGE 23, NV5L 14, NZ5J 13, KA5UVY 7. WEST TEXAS: SM, Milly Wise, W5OVH—ASMs: WF5E, N5DO, KD5D, SEC: W5MVJ, PIO: KE5ZW ACC:K5SIS. OOC: KD5FL, BM: K5VRF, TC: K5CU, STM: AE5I. If there is any job or office you wish to fill contact the appointee covering the job. There are 89 counties, 16 APRIL affiliated clubs, approximately 925 APRIL members in the West Texas Section. Would like to know of any clubs who are not affiliated. DEC Herb, N5FHR, of El Paso, is organizing and appointing ECs in District 5. In July his Emergency Training Net (ETN) on Wed. 2000 hrs local on 146.28/88 had 43 checkins and Big Bend Emergency Net on Sun at 1403 Z had 164 checkins. Members of the Prairie Dog ARC of Childress have each logged 110 hours on Storm Watch. Big Bend ARC presented a special plaque to Karl Smith, WB5ZAB for his work for BBARC. The BBARC has graduated three new Novices, all high school students. Snyder ARC is holding Code Classes alternate Tues & Thurs. PIO Paul, KE5ZW of Snyder is looking for PIAs from each club in West Texas. Had a nice visit with Lubbock ARC which recently became affiliated with APRIL. EPARC El Paso will have code and theory classes every Sat starting Sept 12. Station Activities: AE5I 89. Reports have been slow.

**SWITCH
TO SAFETY!**



WORLD FAMOUS

**GURTI'S
KEYERS**



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

COLUMBIA 9913 EQUIVALENT

LOW LOSS COAX, 100 FT. & UP
SAME SPECS AS BELDEN

29¢ FT



DIGITAL INDOOR
OUTDOOR THERM.
W/CLOCK & ALARM
REG. 44.95
NOW **\$29.95**

INDICATES UTC 24 HR. TIME
SHOWS INDOOR OR OUTDOOR TEMPERATURE IN CELSIUS OR FAHRENHEIT ALARM FOR SCHED REMINDER.
GIFT BOXED 12 ft. 6 in. Remote Sensor

AMERITRON AL-1200 \$1399
AL1500 \$1999

KENWOOD TR-2600A \$279
TM-2550A \$349

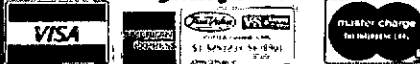
MJ #484 Grand Master
Memory Keyer \$126

SALE

Beacat BC-145XL '87
3510 CLOVERDALE RD. FLORENCE, AL. 35630
Phone TED K14M at 205-767-5845

POUNDERS

True Value



TIMBERLINE ELECTRONICS

Expert Repair on all types of ham equipment, from tubes to the most modern. FCC licensed.

ALL MAIL TO: ALL UPS TO:
P.O. Box 2064 25440 Wrightwood Dr.
Idyllwild, CA 92349 • 714-659-4018

QRO?

This is the first "QRO?" column, a collection of notes and anecdotes concerning ALPHA amplifiers, ETO, and RF power in general. We plan to print QRO? irregularly—whenever we think we have something of interest.

QRO? as you probably know, means, "Shall I increase power?" Some of our staff prefer the name "Power Lines" for this new column. If you'll help us settle the issue by dropping me a note before November 1 with your vote and the name of the magazine where you read this, we'll send you an ETO keychain as a token of our appreciation. (It may take a month or two, so please be patient.) Meanwhile, keep an eye out for QRO? (or "Power Lines") opposite ETO's regular ad.

Where have we been?

You may have wondered why ETO's monthly ad disappeared abruptly from the ham magazines in mid 1983. Well, at Dayton that year, representatives of one of the world's largest electronics companies saw our ALPHA 85 micro-processor-controlled RF linear amplifier (since superseded by the forthcoming ALPHA 88) and recognized the applicability of its basic technology to an imminent requirement of theirs.

The upshot is that ETO is now the principal supplier world-wide of the RF power amplifiers used in high field magnetic resonance imaging (MRI) systems. These sophisticated linear amplifiers typically deliver 15+ kW and cover 10-87 MHz automatically under remote computer control.

The incredibly complex medical diagnostic MRI systems in which our amplifiers are used can peer into the living human body and display images of the brain, spinal column—even the beating heart—with clarity and detail that rivals the illustrations in med school anatomy texts. Suffice to say for now, the opportunity to become involved in MRI was something ETO couldn't pass up, and we spent three years totally immersed in that challenge.

Today's ETO is a different company.

We're five times bigger than we were in 1983. A new building tripling our floor space was added in 1985. In the ETO tradition of investing heavily in new technology, our engineering group (mostly

hams) has grown five-fold. We may even have a ham station on the air by the time you read this!



Meet our Technical Director.

Last year, Don Fowler (W1GRV, ex-W4YET/K6YXC) joined ETO as director of all technical activities including engineering, quality, and manufacturing. Those with long memories will remember Don as the young chief engineer of Signal/One, responsible for the original CX7 transceiver back in 1968-69. That design nearly two decades ago introduced a bevy of new techniques and features that since have become *de rigueur* in virtually all up-scale amateur transceivers.

Don spent the intervening years in increasingly responsible engineering management jobs with GenRad, Narco Scientific, and Sensormatic. There is absolutely no one I would rather have in charge of technological progress at ETO, and our new products will demonstrate why.

For now, please take a close look at the ALPHA 86 and all the truly new features and capabilities it incorporates. The '86 is FCC type accepted and shipments should be going out the door by the time you read this. Why not give us a call so we can send you a detailed brochure? Better yet, order now for earliest delivery of your new ALPHA 86!

73.



Dick Ehrhorn

Dick Ehrhorn
W4ETO

Alpha 86 offers these very special reasons to buy one now:

- 1500 watts RF output power — no time limit in any mode.
- Silent, lightning-fast QSK — new PIN diode T/R system.
- Pre-tuned input on all bands — easy drive and high efficiency.
- Five-function instant metering—four separate LED bargraphs.
- Quick, easy tune-up.

THE NEW ALPHA 86

PROVING AGAIN THAT THE
ONLY GOOD REASON TO
GIVE UP YOUR OLD ALPHA
IS A NEW ALPHA

by
ETO

Plus the traditional virtues of all Alpha amplifiers:

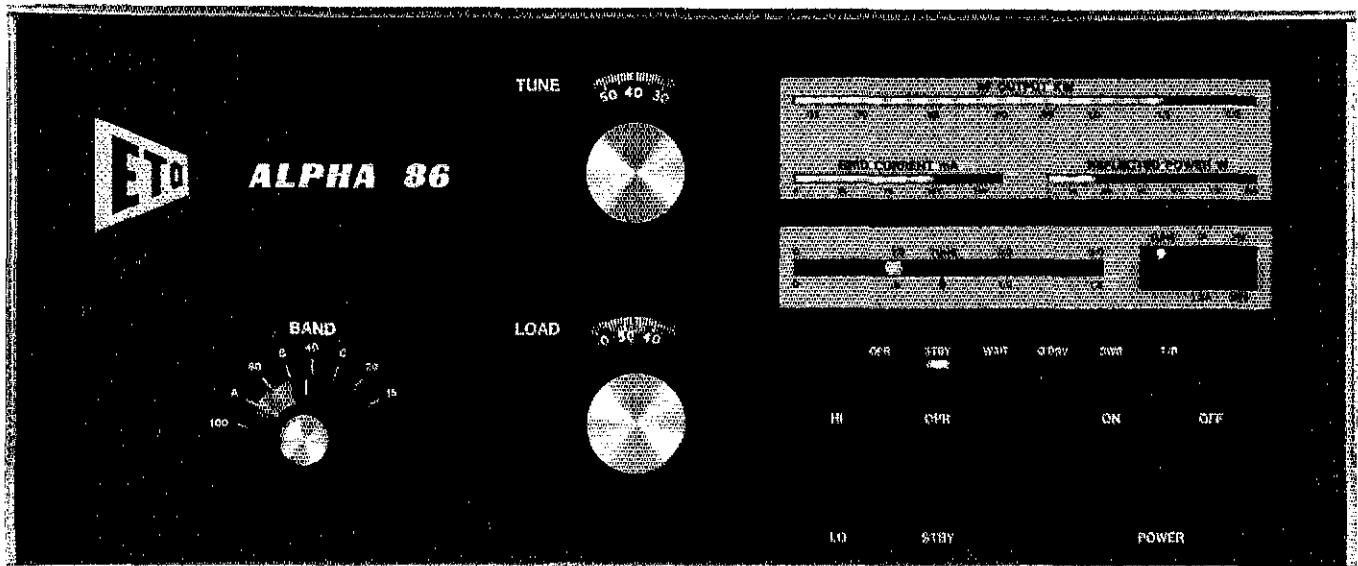
- Ruggedness and quality — synonymous with Alpha.
- Compact and lightweight — exceptional power/weight ratio.
- 3 year limited warranty — exclusive with ETO.
- ETO factory service — renowned for helpfulness.
- Satisfaction of ownership — goes with every Alpha.

Contact ETO direct for detailed literature and delivery information.

EHRHORN TECHNOLOGICAL OPERATIONS, INC.

PO. Box 888
Canon City, CO 81212
Telephone (303) 275-1613

Alpha 86: \$2995 delivered in North America



TUNE IN THE WORLD WITH HAM RADIO

YOUR ROAD TO HAM RADIO EXCITEMENT

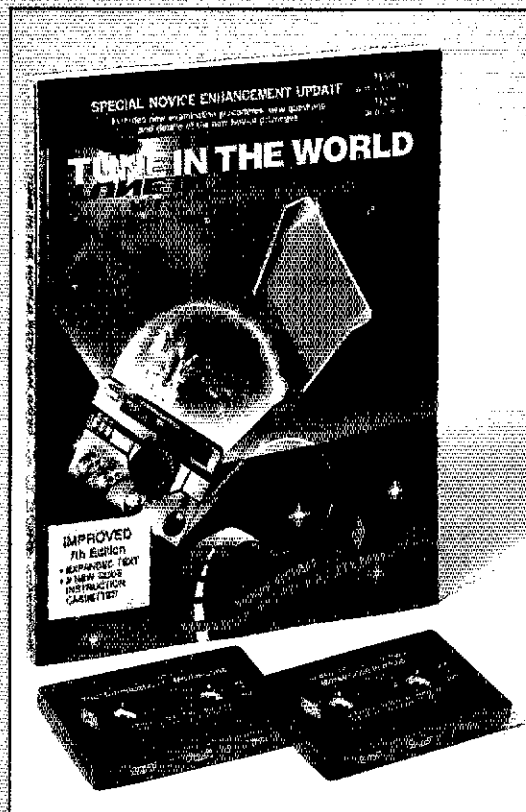
Tune in the World with Ham Radio has put the fun back into learning what Amateur Radio is all about. Enhanced Novice class privileges have brought the fun back into operating. Now beginners with their Novice licenses no longer have to spend all of their time on the air using only Morse code. Novices can now use voice communications on 10-meters and use VHF and UHF repeaters. The new privileges include the use of digital communications so that home computers can be linked through packet radio networks.

Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the globe. Perhaps you would like to become a friend over the airwaves with someone on a remote island in the South Pacific or on an ice-flow in the Arctic. There are hams everywhere!

The FCC requires that Novices know

something about their new privileges and that's where the expanded *Tune in the World with Ham Radio* text comes in. You'll find what you need to know explained in clear, concise bite-sized chunks of information.

You'll find all 300 possible questions on the Novice exam with their distractors and answer key. Besides improving the text, we've added almost three times the code practice material to the package in the form of two C-90 tape cassettes. One tape teaches the code, the other provides practice. They are recorded in stereo so you can switch off the voice portion for even more practice. These new tapes make learning the code a snap!

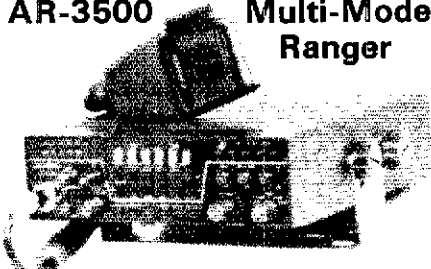


The *Tune in the World with Ham Radio* package including the text and both tapes is available for \$15. The text alone is \$12 and the set of tapes is \$10. Add \$3.50 for shipping and handling.



10 METERS!

AR-3500 Multi-Mode Ranger



- Convenient, easy-to-use front panel controls
- All Mode operation
- Switchable noise blanker - highly effective on ignition noises
- Programmable scanning range
- Scanning in 100 Hz, 1000 Hz, 10,000 Hz, and 100,000 Hz increments
- Five selectable memory channels
- Split frequency operation
- Easy-to-read LED frequency display
- Available in power outputs of 30 and 100 watts
- Microphone and power cord supplied

RECEIVER

Frequency Range: 28.0000-29.9999 MHz
 Circuit Type:
 Superheterodyne, dual conversion
 Clarifier Range: ± 500 Hz
 Sensitivity: SSB & CW better than 0.3 μ V for 10 dB S+N/N, FM better than 0.5 μ V for 12dB SINAD
 Selectivity: -6dB -60dB
 SSB, CW 2.6 KHz 4.7 KHz
 AM, FM 6.0 KHz 18 KHz

TRANSMITTER

Frequency Range: 28.0000-29.9999 MHz
 Tuning Steps:
 100 Hz, 1 KHz, 10 KHz, 100 KHz, 1 MHz
 Emission Types:
 LSB, USB, CW, AM, FM
 Power Output: 30 watt Model
 SSB—25 watts, AM:FM—8 watts,
 CW—30 watts
 Input 12.5 VDC 6A Max
 Power Output: 100 watt Model
 SSB—100 watts+, AM:FM—30 watts,
 CW—150 watts
 Input 12.5 VDC 25A Max

WARRANTY

Limited one year warranty by Clear Channel Corporation of Issaquah, WA.

30 Watt Model - List \$379
Special \$319
 100 Watt Model - List \$489
Special \$409

PENETRATOR II Wideband Antenna

- Frequency Coverage 25-30 MHz
- VSWR under 1.5 for 2 MHz bandpass.
- Rated 1400 watts RMS, 2800 watts P.E.P.
- Two Lengths
 Standard Length 73 inches
 Short Length 64 inches
- Stainless steel construction
- Standard 3/8" x 24 "stud type" mtg.

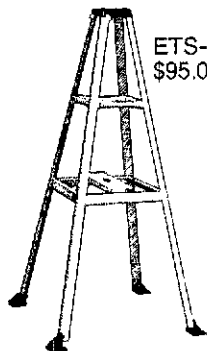
WE SHIP SAME DAY UPS— COD/VISA/MC
(619) 744-0728

RF PARTS COMPANY
 1320 Grand San Marcos
 California 92069



ELECTRONIC EQUIPMENT BANK

516 Mill Street NE
 Vienna, VA 22180 USA



ETS-180
 \$95.00



THRUST BEARING
 MODEL AA2-7A

\$44.00



PK-232

CALL FOR PRICES!

UPS SHIPPABLE

ALINCO "Quad Pod" the perfect match for todays antenna installations, i.e. OSCAR systems, light HF beams, VHF-UHF beams 4 legs—strong—rotor plate—accepts optional thrust bearing, lightweight, durable aluminum construction—easy installation.

MODEL	ETS-180
Base For Bearing (top)	6"
Max Opening Width (leg)	27"
Actual Height	57"
Angle	80°
Legs	Adjustable Step
Weight	23 lb.

BOHN			
20G	10' sect.	43.50	
20AG	top sect.	49.00	
25G	10' sect.	54.50	
25AG	2.3 top sect.	64.95	
45G	10' sect.	121.00	
45AG	2.3 top sect.	133.95	
AS25G	access shelf	18.75	
AS45G	access shelf	49.75	
TB-3	thrust bear	53.95	
M200	10' mast	22.25	
S825G	short base	26.25	
S845G	short base	48.75	
EF2545G	gin pole	270.00	
	AND MORE!		

CUSHCRAFT			
A4	4 el triband	300.00	
A3	3 el triband	224.00	
AV5	5 band trap vert	105.00	
32-19	19 el. 2mt. boomer	97.95	
215WB	15 el. wide band 2mt. boomer	83.95	
424B	24 el. 70cm boomer	83.95	
416TB	16 el. OSCAR 435 MHz	60.00	
A144-10T	10 el. OSCAR 145.9 MHz	53.00	
AOP-1	OSCAR pack 2mt. & 70cm	150.00	
AR-2	2mt. vert. ringo	24.50	
ARX-2	2mt. vert. ringo ranger	31.00	
ARX-2B	2mt. vert. ringo ranger II	37.00	
BUTTERNUT			
HF8V	80-10 vertical	125.00	
HF2V	80-40 vertical	119.00	
2NCV5	2MT vertical	53.95	
RMKII	roof mtg. kit	45.00	
TBR160S	160m add on mtg. post sleeve	47.00	
MPS		5.50	
	AND MORE!		

HY-GAIN			
TH7DXS	7 el. triband		
TH5MK2S	5 el. triband		
EX-14	4 el. triband		
TH3JRS	3 el. 750W pep		
18AV1/WBS	5 band trap vert		
14AV0/WBS	4 band trap vert		
V2S	2mt. omni-direct		
V4	70cm omni-direct		
HB144MAG	2mt mag mt.		
	AND MORE!		

HY-GAIN ROTORS			
T2X	20 sq ft		
HAM IV	15 sq. ft.		
CD45II	8.5 sq. ft.		
KENPRO ROTOR			
KR5400A	azimuth/elevation		
DAIWA 750E ROTOR			
Compare These Specs & Pricing:			
MR750E	1 Motor	2 Motor	4 Motor
Wind Load			
Sq Ft	16.1	21.5	30
Tum.			
Pwr Lbs.	610	1200	2400
Break Pwr Lbs.			

KLM			
KT34A	triband 4 el		
KT34XA	triband 5 el		
2M-14C	2mt. satellite		
2M-22C	2mt. satellite		
435-18C	70cm satellite		
435-40CX	70cm satellite		
432-30L BX	70cm satellite		
2M-13L BA	2 meter		
2M-16L BX	2 meter		
	AND MORE!		

DIAMOND DISCONE RECEIVING ANTENNA			
Ideal for ICOM R-7000 or YAesu FRG-96000			
Continuous coverage from 25 MHz-1300 MHz			
50 ft coax included			
CALL FOR PRICE!			

RTTY-AMTOR Packet

RTTY-AMTOR-PACKET

EEB is one of the few Amateur dealers that actually demonstrates the latest high tech equipment. We test every new item and only sell what we feel confident with. If you are considering Packet, call us and we'll sell you the best. (Ask for Scott, WR4S or Ted, AA4GM at 703-938-3350). If you are in the DC area, stop in and marvel at our dedicated RTTY room.

"NEW"!!!

PC-PakRat Terminal Program for IBM compatible and PK-232. Split Screen, Xmit & Recv. Buffer All commands are Simple function keys. Complete help menus for all PK-232 commands & functions. Makes use of the PK-232 Host mode. List Price \$29.95. Amt. Price \$25.00.

NEW! PK-232 with weather fax!

- AMTOR, RTTY, PACKET, CW, WEATHER FAX.
 - All decoding, signal processing & protocol software, for all modes, is on ROM in the PK-232.
 - Only a terminal program is required for computer interface
 - VHF/HF/CW modem with eight pole bandpass filter
 - Type ahead buffer (750 characters)
 - Receiver buffer (2700 characters)
 - 240 page users Manual with "Quick Start" section included.
- \$ SALE CALL + \$5.00 UPS**
FREE AC ADAPTOR \$30.00 VALUE



EEB is Bird's No. 1 East Coast Dealer. Large inventory. Package Deal. \$ CALL \$ Bird 43—elements—loads

CABLE & CONNECTORS

Belden 9913	Low Loss	49c/ft.
Columbia RG 213	50 Ω (OHM)	32c/ft.
RG8/U	Foam	29c/ft.
RG 8X	Mini	15c/ft.
RG59/U	72 OHM	14c/ft.
PL259/Silver		1.10/1.49
21.95 N Male for 8/U		4.00
BN(CM)-UHFF)		4.80
	AND MORE!	
Columbia Low Loss		39

MISC.

DXA 160, 80, 40 m		49.95
Larsen KD4-150-HO	150-160MHz	16.95
Larsen Dual Banders	Coil & Whip	38.45
Ant. Spec. AP151.3G	On Glass	34.50
X-Panda Five	Adapter	14.95
Alpha Delta DX80	Short 80-10	69.95
Hustler UGM	wave mag	19.95
Untenna Dual Band	Mag mt.	51.00
Butternut HF4B	Mini Beam	199.95

ANTENNA

CR2A

CR2AM



CR2AM	PERM MT	41.00
CR2A	2M Mag MT	41.00
CR3A	220 MHz Mag MT	37.00
CR4A	440 MHz Mag MT	34.00
CR2RD	Radome Cover	12.00

CABLE IS NOT INCLUDED



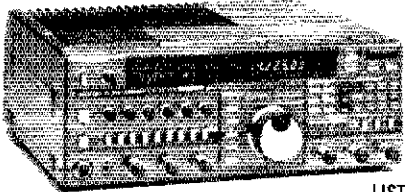
ELECTRONIC EQUIPMENT BANK

516 Mill Street NE
 Vienna, VA 22180 USA

Prices & specs subject to change
 Shipping charges not included
 2 weeks for delivery
 Returns subject to 20% restock charge
ORDER TOLL FREE 800-368-3270
 Tech Info—VA orders 703-938-3350
NO C.O.D.'s

YAESU ★ Large Stock ★ Low Prices ★ Top Trades at AES®

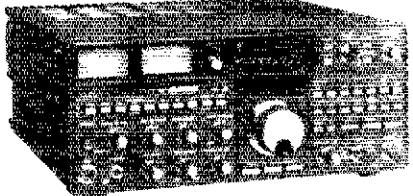
Call TOLL FREE for DISCOUNT Prices or TRADE-IN quote on your clean, late model equipment



LIST
FT-767GX* 160-10m xcvr./1-29.99 MHz Rcvr \$1895.00
2M/767* 2m module 179.95

***Call for Special Deal!**

6M/767 6m module 179.95
430/767 430-440 module 219.95
440/767 440-450 module 219.95
FT-ONE Xcvr/Rcvr/4 filters/RAM/FM 2859.00
KY-ONE Keyer unit 50.00
DC-ONE DC cable 15.00



FT-980 9-band CAT Xcvr/SW Rcvr \$1795.00
SP-980 Speaker with audio filter 99.95
SP-980P Speaker/patch 99.95
FC-757AT Automatic ant. tuner w/memory 359.00
FAS-1-4R Remote antenna selector 79.95
E-980 Interface cable; FT-980/757AT ... 46.50
XF-8.9HC 600 Hz CW filter (1st IF) 50.00
XF455.8MCN 300 Hz CW filter (2nd IF) ... 59.95
KY-ONE Keyer unit 50.00
FIF-65 Computer interface; Apple IIe 69.95
FIF-80 Interface; NEC PC-8001 119.95
FIF-232C for VIC-20/TI/most RS-232 79.95
FRB-1 External relay box 20.00
GC-980 General coverage kit 14.95

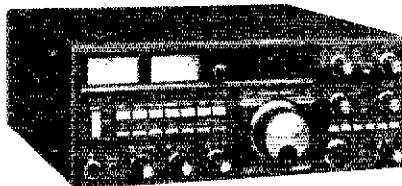


FT-757GX 9-band Xcvr/SW Rcvr/mic \$995.00
FT-757GX MkII 9-band Xcvr/SW Rcvr/mic 1079.95
FP-757HD Heavy duty supply with fan 249.00
FP-757GX Compact power supply 235.00
FP-700 Power supply 209.95
FRB-757 External relay box 10.00
FC-757AT Automatic ant. tuner w/memory 359.00
FAS-1-4R Remote antenna selector 79.95
MMB-20 Mobile mount 25.95
FIF-65A Interface; Apple IIe 59.95
FIF-232C for VIC-20/TI/most RS-232 79.95
GX Turbo/FOI Software; Apple II 59.95
GX Turbo/COI Software; C64/128 89.95

GX Turbo/VOI Software; VIC-20 89.95
FTV-700 Transverter w/no module 175.00
2M/FTV 2m module only 189.00
6M/FTV 6m module only 139.00
70 cm/FTV 430 module only 255.00
Misc. accessories LIST
SP-102 Speaker with audio filter \$ 99.95
SP-102P Speaker/patch 99.95
MD-1B8 Desk microphone 99.95
MH-1B8 Mobile microphone 24.95
YS-60 1.8-60 MHz 2kw PEP wattmeter \$ 84.95
YS-500 140-520 MHz 200w wattmeter 69.95
YH-55 Lo-Z headphones 21.95
YH-77 Lightweight headphones 21.95
FF-501DX Low pass filter 34.95

Call TOLL FREE for DISCOUNT PRICES

All items are shown with the Manufacturer's Suggested LIST Prices. On Major items and some accessories, we can offer a Substantial Savings.

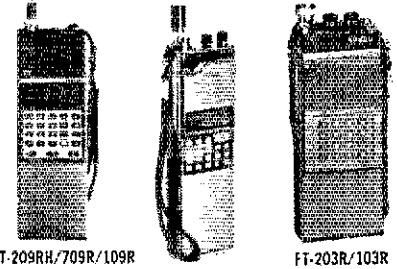


VHF/UHF equipment LIST
FT-726R VHF/UHF Xcvr w/2m, TTP mic ... \$1095.00
HF/726 10-12-15m unit 289.95
6M/726 6m unit 269.95
430/726 430-440 MHz unit (OSCAR) 329.95
440/726 440-450 MHz unit (FM band) 329.95
SU-726 Satellite duplex module 129.95
XF-455MC 600 Hz CW filter 69.95
DC-726 DC cable for FT-726R 10.05
FTE-36 Tone board for FT-726R 58.00
AD-2 50w 2m/440 duplexer 34.95
FT-290R MKII 25w 2m FM/SSB xcvr 579.95
FT-690R MKII 10w 6m FM/SSB xcvr 569.95
FBA-8 Holder for C-cell Nicads 26.95
NC-26B Wall Charger for FBA-8 16.95
CSC-19 Soft case 10.00
MH-10F Speaker/Microphone 27.95
MH-10E Hand Microphone 21.95
FTS-7 Encoder/decoder 49.95
FT-270RH 45w 2m FM Xcvr w/TTP mic 439.95
FT-2700RH 25w 2m/440 FM w/TTP mic 599.95
FTS-8 Encoder/decoder 49.95
FVS-1 Voice synthesizer 31.95
AD-2 50w 2m/440 duplexer 34.95
FT-770RH 25w 440 FM xcvr w/TTP mic 479.95

FTS-8 Encoder/decoder • FREE with the purchase of a FT-270RH or FT-770RH

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

Milwaukee WATS line: 1-800-558-0411 answered evenings until 8:00 pm Monday thru Thursday.
WATS lines are for Quotes & Ordering only.
use Regular line for info & service department.

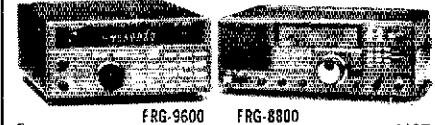


FT-209RH/709R/109R
FT-727R
FT-203R/103R

Handhelds LIST
FT-209RH 5w 2m FM HT/TTP/batt/cgr \$359.95
FT-109RH 220 FM HT/TTP/batt/cgr 379.95
FT-709R 4w 440 FM HT/TTP/batt/cgr 359.95
FT-727R 5w 2m/440 HT/TTP New CPU! 499.95
FT-23R 2.5w 2m compact HT 269.95
FT-23R/TTP 2.5w 2m compact HT w/TTP 299.95
FT-73R 2w 440 compact HT 279.95
FT-73R/TTP 2w 440 compact HT w/TTP 314.95

2.5W FM Handheld Closeout
FT-203R/TTP 2m w/batt/cgr/TTP ... \$199⁹⁵

Acc. for 09-series, 03-series FT-727R LIST
FBA-5 Alkaline battery holder 14.95
FNB-3 425ma 10.8v batt (comes w/03 series) 49.95
FNB-4 500ma 12v batt (comes w/09-series) 59.95
FTS-6 Encoder/decoder; 09-series 49.95
FTS-7 Encoder/decoder; 03-series *29.95
*When purchased with 203R, otherwise - \$49⁹⁵
LCC-6 Leather case w/top cover; 09-series 39.95
MH-12A2B Speaker/microphone 39.95
NC-9B Wall charger for FNB-3 9.95
NC-15 Desk quick charger/AC ps 89.95
NC-18B Wall charger for FNB-4 9.95
MMB-21 Mobile bracket 14.95
PA-3 Mobile adapter and charger 39.95
TA-2 2m 19" telescoping whip ant. 11.95
YH-2 VOX headset 26.95



Receivers LIST
FRG-8800 150 KHz-29.999 MHz Shortwave \$699.95
FRA-7700 Indoor active receive antenna 59.95
FRT-7700 Antenna tuner 64.95
FRV-8800 118-174 MHz VHF converter 129.95
FIF-232C Interface; VIC-20/TI/RS-232 79.95
FF-5 500 KHz low-pass filter for VLF 20.00
DC-8800 DC kit 3.50
FM-W/8800 FM-wide kit 20.00
FRG-9600 60 to 905 MHz receiver 679.95
VU-9600 NTSC video unit 25.00
Catpack software (specify computer) 79.95



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. 34625 1898 Drew Street Phone (813) 461-4267 No In-State WATS No Nationwide WATS	LAS VEGAS, Nev. 89106 1072 N. Rancho Drive Phone (702) 647-3114 No In-State WATS Outside Nevada 1-800-634-6227	Associate Store CHICAGO, Illinois 60630 ERICKSON COMMUNICATIONS 5456 N. Milwaukee Avenue Phone (312) 631-5181 15 min. from O'Hare!
--	---	---	---	---

QST — CALLING ALL AMATEURS!

HAMEXPO '87

SUNDAY,

NOVEMBER 8, 1987

FROM 9:00 AM to 4:00 PM

ADMISSION: \$3.00 (UNDER 13 FREE!)

GIANT INDOOR HAMFEST

ADVANCED REGISTRATION REQUIRED
TABLE SPACE
\$15.00

LICENSE EXAM TEST SESSIONS

SEMINARS

DX PROPAGATION
PACKET, SATELLITE,
ANTS-NOAS

For further information and Hamfest Registration, contact John May, K9ZDQ, 4501 94th + 9000 Eves., (516) 888-6336 or Andrew Feldman, WB7FXN, evenings only, (618) 928-3888 or write directly to HAMEXPO '87, c/o John May, K9ZDQ, 5 Indian Valley Road, East Bethel, N.Y. 11733.

UNLIMITED FREE PARKING
ALL-INDOOR EVENT
CAFETERIA SERVICE

**HAMEXPO '87
SELDEN,
LONG ISLAND**

SPONSORED ANNUALLY BY
RADIO CENTRAL AMATEUR RADIO CLUB
Official ARRL Event



LONG ISLAND EXPRESSWAY (495) EXIT 62 (MILLS ROAD)
NORTH 1 MILE TO SELDEN COMMUNITY COLLEGE ENTER
AT RED/WHITE TRAFFIC LIGHT

RCARC REPEATER, WAZUEC: 144.55 145.75 MHz

**MAJOR AMATEUR RADIO
MANUFACTURERS AND DEALERS
WILL BE PRESENT**

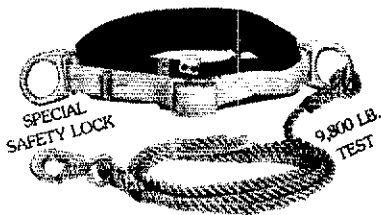
**NEW
ONV SAFETY BELT
WITH SEAT HARNESS**



\$89.95

ADJUSTABLE TO 46" WAIST
Extra \$10.00 Large to 56"

WITHOUT SEAT HARNESS

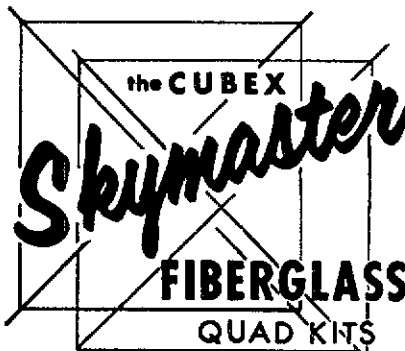


ADJUSTABLE TO 46" WAIST
Extra \$10.00 Large to 56"

ONV Tool Pouch 15.95
Add 3.00 for handling
VISA M/C CHECK **\$74.95**

UPI Comm. Systems Inc.
Box 886 • Saddle Brook, N.J. 07662
201-368-3655 • Telex: 844-106 • (UPICOM)
1-800-345-5634

"CHOICE OF THE DX KINGS"



ONLY
\$249.95
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 \$299.95

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) 798-8106 or 449-5925

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

WRIGHTAPES: (Since 1976) Unconditionally guaranteed Morse Code Practice on 60 min. cassette tapes. Beginners 2-tape set 5 WPM \$7.90. Also 3, 4, 5, 6-8, 10, 9-11, 12-14, 14, 16-20, 22, 24-28 WPM. Specify Plain Language or Code Groups. Also plain lang. only 30-35, 35-40, 45-60. FCC type tests: 5-6, 11-12, 11-17, 13-14, 20-24. Call signs: 12-15, 20-24. Nos.: 5-22, 13-18, 18-24. Check, M/C, Visa \$3.95 ea. PPD 1st class USA. Can. Printed texts add \$.50 per tape. Call anytime.

Instant Service
PH: 517-484-9794 WRIGHTAPES
235 E. Jackson S-1 • Lansing, MI 48906

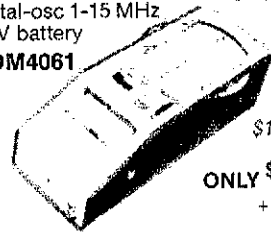
THE WIREMAN

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

NEW FROM EEB

**NOW buy that test equipment
you've wanted and save!**

DIPMETER 1.5 To 250 MHz
AM Modulation 6 Plug-In Coils
Xtal-osc 1-15 MHz
9V battery
DM4061

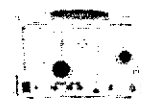


\$109.95 Value

ONLY **\$79.95**
+ \$4 UPS

- Measure resonance of antennas and tank circuits.
- Check for Harmonic radiation.
- Use as OSC for Rec. alignment.
- More uses detailed in the RSGB Handbook, pages 18.15 to 18.21.

**RF SIGNAL GENERATOR
SG4160**



- 100 KHz - 150 MHz to 450 MHz on harmonics.
- RF Output 100 mVs.
- Modulation: Int. - 1 KHz Ext. - 50 Hz to 20 KHz.
- Crystal OSC 1 - 15 MHz.

\$219.95 Value ONLY **\$149.95** + \$4 UPS

**RF POWER METER/LOAD
PM330**

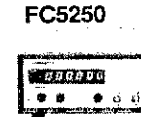


- 1.8 to 500 MHz.
- 50 OHM-N-J Connector.
- 5W, 20W, 120 Watts.
- Accurate to +/- 10%.

\$109.95 Value ONLY **\$79.95** + \$4 UPS

FREQUENCY COUNTER

FC5250

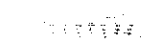


- 10 Hz to 150 MHz.
- 7 Digit readout.
- Gate 1s & 6 sec.
- Accurate to +/- 1 count.

SENSITIVITY: 25 - 100 mV to 30 MHz;
100 - 300 mV to 150 MHz

\$169.95 Value ONLY **\$129.95** + \$4 UPS
AC Adapter is included with unit.

**RF ATTENUATOR DC—500 MHz
RFA8000**



- 0 - 81 dB in 1 dB steps.
- Accurate to +/- .3 dB
- Steps 1, 2, 3, 5, 10 and 20 dB
- 50 Ohm - 1/2 Watt Insertion Loss .5 dB.

\$299.00 Value ONLY **\$149.95** + \$4 UPS

**SWR/RF ANTENNA METER
SWR3P**



- Read SWR, RF power and field strength.
- 1.7 to 150 MHz.
- 10 or 100 watt range.
- SWR +/- 5%;
POWER +/- 10% accuracy.

\$29.95 Value ONLY **\$19.95** + \$4 UPS

Prices and Specs Subject to Change



Electronic Equipment Bank
516 Mill Street, N.E.
Vienna, Virginia 22180
Virginia orders, technical questions
703-938-3350

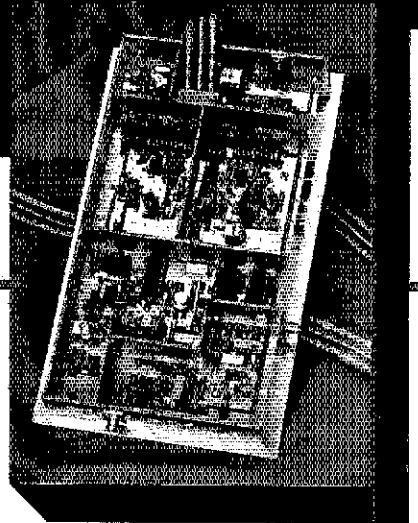
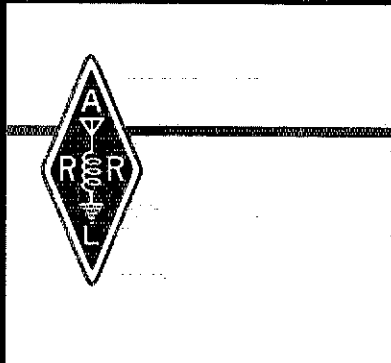
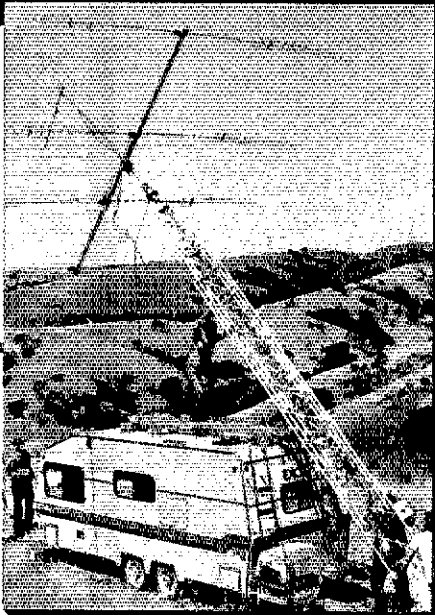
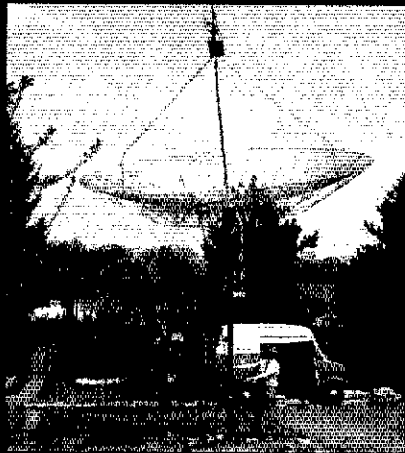
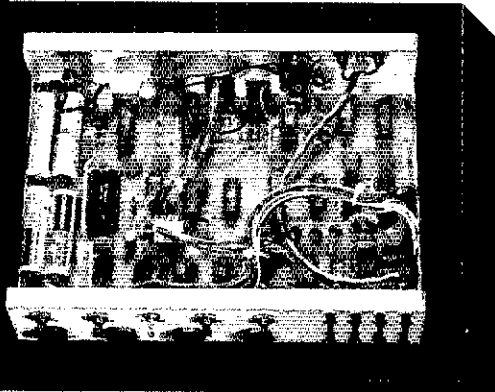
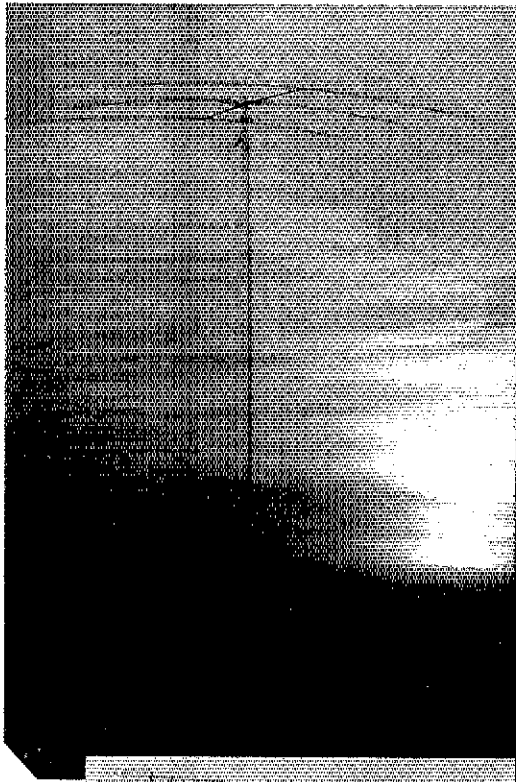
VISA, MASTERCARD, CHOICE, and DISCOVER

800-368-3270

\$21⁰⁰

THE 1988 ARRL HANDBOOK

FOR THE RADIO AMATEUR



PUBLISHED BY:
THE AMERICAN RADIO RELAY LEAGUE

By 73
20, w/BDI
24 Dec 76

Late '25 + early 1926. Letter
reply devised by FEH as a
stop gap for the 6 to 9 mo.
before the first Handbook
was in print... as a Tech Info Svc
"advise" to those asking ideas on
building a rig!

Hartford, Conn.

Dear Friend:

We were mighty glad to get your letter asking for information on breaking into the amateur game. A great deal could be said on the subject. There is nothing very difficult about it all, however, and I am going to give you all the information I can right in this letter or tell you where you can find it. Please feel that we are right with you from start to finish. This sheet is mimeographed only because there is so much to say and so many who want to hear the story that it is necessary to get the information in your hands in this way.

Because of a general need, a "Hand Book" is in preparation written to help amateurs who are starting in the game and covering both amateur station construction and operation. Useful information about learning the code, amateur abbreviations, and constructional information of interest to you are included. I am sure you will want a copy when it is out as "being an amateur" and the organization of the American Radio Relay League and its Headquarters departments are discussed in detail. We hope that this "Hand Book" will be in print soon.

FROM 12 PAGES TO OVER 1200!

Sixty-five editions and 5.8 million copies later, we wonder if Ed Handy had any idea what began as twelve mimeographed information sheets would lead to one of the most highly respected publications in the RF design field! But more importantly, the 1988 ARRL Handbook for the Radio Amateur is a *basic resource* for all radio amateurs as well as technicians and engineers.

What is new in this edition? As usual, "hot topics" that are changing on a day-to-day basis were given top priority on the revision list. Next, we took a close look at those subject areas of interest to the "enhanced Novice" and updated these as necessary. New construction projects range in complexity from a passive CW audio filter to a synthesized computer-controlled receiving converter for 100 kHz to 20 MHz. Other fun projects added to the new edition include a new deluxe memory keyer, balanced QRP transmatch, DTMF (Touchtone®) decoder and QSK 3-watt 160-meter transverter.

The sixty-fifth edition not only will stand on its own as to content but physically as well. Older editions felt and acted like floppy city telephone directories. Now, all 1988 Handbooks will use the popular and economical hard cover design of the type used to bind *Yagi Antenna Design*.

Unless we become victims of Murphy's Law, we expect the 1988 Handbook to be available at your U.S. or Canadian dealer by mid-to-late October or order directly from ARRL. The price is \$21.00 in the U.S. or \$23.00 in Canada and Elsewhere.

Here is a description of what is covered in the Handbook:

The first 5 chapters serve as an introduction and cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, and solid state fundamentals. Vacuum tube principles as they pertain primarily to high power amplifier design are also presented in these introductory chapters. There are 12 chapters devoted primarily to these radio principles: power supplies, audio and video, digital basics, modulation and demodulation RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another 4 chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in 2 chapters. The construction and maintenance section has 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll find up-to-date component data that the Handbook is famous for. The final 5 chapters cover how to obtain your license, station design and operation, interference, monitoring and direction finding. An abbreviations list, huge index and etching patterns make up the balance of the book.

The American Radio Relay League, Inc., 225 Main St., Newington, CT 06111 USA

CREATE HIGH PERFORMANCE LOG PERIODIC ANTENNA
ONE ANTENNA COVERS 50-1300MHZ!!

• LIGHTWEIGHT
• EASY ASSEMBLY
• SMALL SIZE

WIDE BANDWIDTH
LOW VSWR
HIGH GAIN

- CLP5130-1 50-1300 MHz 25 el. 500W 6' Boom \$199 UPS
CLP5130-2 105-1300 MHz 20 el. 500W 4' 6" Boom \$119 UPS

Operate on 6m, 2m, 1 1/4 m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are pre-cut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.

ROTATORS

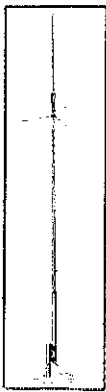
Unique mast centering guide
Rugged mast clamps
Cable connector
Worm gear (RC5A-3 cut out)
No brake!
Manual control
Speed control
Preset function
Second overlay
Manual control
RC5A-3

RC5-1	10 sq. ft.	\$229
RC5-3	10 sq. ft. preset	\$299
RC5A-2	25 sq. ft.	\$373
RC5A-3	25 sq. ft. preset	\$436
RC5B-3	35 sq. ft. preset	\$736

(All rotators are UPS shippable)
See Lew McCoy's Review In August 1987 Issue Of CQ.

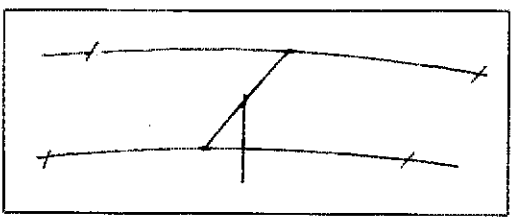


Creative Design Co., LTD.®



CV-48 is a ruggedly built 40 and 75 meter vertical. Overall length of 40'8" means full size performance on 40m. Antenna comes with radial system. An optional adaptor for 80m is available. Handles 2KW PEP.

CV-48 \$251 UPS AD-385 (adaptor) \$63



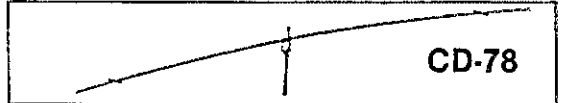
Unique 2 element phased arrays offer excellent gain and front to back ratio compared to standard parasitic antennas.

- AFA75-1 75 meters 29'6" boom \$1842
AFA40 40 meters 16'8" boom \$ 344

730V-1

10 thru 40m (4 Bands)
No Radials
Easy assembly
Horizontal Polarization
Great Performance

The 730V-1 is a V-dipole consisting of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. \$148 UPS



Rotatable dipole for 3.5 MHz and 3.8 MHz is 58 feet long. Tuning unit allows operation on 3.5 MHz. \$418 UPS

ALSO AVAILABLE: ROOF TOWERS • MONOBANDERS • TRIBANDERS • TOWERS • DUALBANDERS • COMMERCIAL

All Create Antennas Are Manufactured With High Quality, Heavy Duty, Precision Aluminum Tubing For Easy Assembly And Long Life.

TO ORDER CALL M-F 9:00 - 6:00 PM Sat 9:00 - 2:00 PM
1-800-255-7020, or in CA 213-663-2541
(Specifications and prices subject to change without notice or obligation)

ORION HI-TECH
P.O. Box 8771
Calabasas, CA 91302

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—W7GAQ/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, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510

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, Forads, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Durlag (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FOG EXAMS. Novice-Extra. Sunnyvale VEC ARC. 408-255-9000, 24/hr. Gordon, W6NLG, Pres. Flea Market, Los Altos, CA March-September.

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., 20933 Brant Avenue, Long Beach, CA 90810.

RV OPERATORS are invited to check in Sun 2 PMC, 14.240 + 5 Txs, Thurs 8 PMC 3,880 + 5 - Good Sam RV net - info SASE KJ4RO.

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610

SCARA INDOOR Ham Radio and Computer Flea Market. Sunday, November 15, 1987 at the North Haven Park and Recreation Center, 7 Linsley Street, North Haven, CT. Sellers admitted at 7 AM. Buyers from 9 AM to 3 PM. Tables are \$10 in advance, \$15 at the door. General admission \$2 per person. Talk-in on 146.01.61. Reservations for tables must be received with check by November 4, 1987, and NO reservations by phone. For information or reservations, SASE to: SCARA Flea Market, P.O. Box 81, North Haven, CT 06473 or call between 7 PM and 10 PM Brad, WA1TAS at 203-265-6478.

BELL SYSTEM hams, active and retired. Join in on annual CQ-WE contest Nov. 14-15. Write P.O. Box 108, Pluckemin, NJ 07978 for info.

IN CABLES, OUR LOSS IS YOUR GAIN!

International's New Low Loss RG 8/U Coax Transmission Line

• 50 ohm Impedance

Black PVC Jacket

95% T/C Braid

100% Foil Shield

NOMINAL ATTENUATION
MHZ db/100

• Semi-Solid Polyethelene Dielectric

• .405 Nominal O.D.

9 1/2 awg Solid Copper Center Conductor

50	0.9
100	1.4
200	1.8
400	2.6

95% T/C Braid Coverage at Less Cost!

International's #9086 high-performance co-ax cable gives you less loss at less cost! Perfectly engineered with 95% T/C braid coverage, low attenuation and excellent weathering for top performance. Yet priced to save you money.

For the name of your nearest distributor

CALL 1-800-323-0210

**312-299-0021
WITHIN ILLINOIS**



INTERNATIONAL ELECTRONIC WIRE & CABLE CO.
520 Business Center Drive, Mt. Prospect, IL 60056 • 800-323-0210

FT-757GX, FT-757GX/11, FT-767GX & IC-735

QSYers

If you enjoy hamming — whether contesting, mobiling, or Dx hunting — you'll love the convenience and speed of a QSYer frequency entry terminal. \$89.50 plus \$2.50 S&H. Visa and M/C accepted.

Stone Mountain Engineering Co. 404-879-0241
P.O. Box 1573 Stone Mtn., GA 30086

CANADA: Atlantic Ham Radio Ltd. 416-636-3636



THIS MONTH'S GOODIE FROM
THE CANDY STORE
KENWOOD TM-221A UNDER \$336.00



KENWOOD TH-205A \$219.90 ALL L.T.O.
OVER 8700 HAM RELATED ITEMS IN STOCK. ALL PRICES
FOB PRESTON. Send SASE for HF & 2 METER PRICE LIST.
More specials in classifieds.

ROSS DISTRIBUTING COMPANY (P.O. BOX 234)
78 South State Street, Preston, Idaho 83263
Telephone (208) 852-0830. We close at 2:00 on Mon. & Sat.

• SANTEC • TOKYO HY-POWER • WELZ • KENPRO • SANTEC •



The One
You Swear By ...
Not Swear At ...
SUPER ST-20T

- Memory channels
- Automatic standard or "Oddball" offset and sub-audible tone programmable per channel.
- Battery saver on squelch receive
- 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

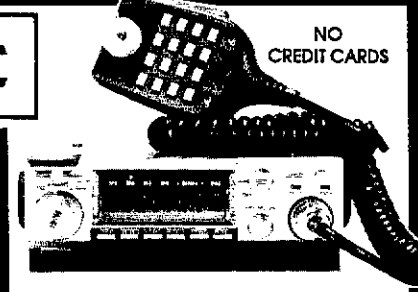
BATTERY PAKS ST-400/83 nicad pak (9.6vdc @ 600 mahl) Fits Santelec Models HT-1200 ST-7 ST-144 ST-220 ST-440 ST-142 ST-222 ST-442 We pay UPS shipping

\$32.00



The Largest Mail-Order Santelec Dealer IN THE NATION!
SANTEC • TOKYO HY-POWER • WELZ • KENPRO

WILLIAMS RADIO SALES



NO
CREDIT CARDS

Once You see What
the FM-240 Will Do. . .
You'll want one!

The FM-740 Operates 440 Mhz.

- FREE UPS BROWN SHIPPING

THE SANTEC TOLL-FREE HOTLINE

1-800-523-0347

NC Call (919) 993-5881

NOON to 10:00 PM EST

600 LAKEDALE ROAD, DEPT. S
COLFAX, N.C. 27235



You're face to face

Meet America's Newest, the Ten-Tec Paragon, Model 585

PARAGON HF TRANSCEIVER.
Model 585 . . . \$1995

The Paragon Model 585 is a full featured, synthesized transceiver. General coverage all mode receiver tunes from 100 kHz to 29,999.99 MHz. Transmit at 100 watts output on all authorized frequencies from 1.8 to 29,999.99 MHz SSB, CW, FSK and optional FM. Noise blanker and speech processor are standard equipment. Dual VFOs, RX offset, TX offset, QSK with a changeover time of less than 30 ms, five f-f filters (standard 6 kHz AM and 2.4 kHz SSB, optional 1.8 kHz, 500 Hz and 250 Hz) that are front panel selectable independent of mode, selectable tuning rates with automatic speed-up at rapid tuning knob rotation, passband tuning, audio bandpass filtering, tone control, squelch, notch filtering and more!

Sixty-two programmable memories that include frequency, mode, filter selected, channel number and a 7 character alpha-numeric tag for entering a net name, call sign or I.D. of your choice. As the memory channels are scanned, all of the information is displayed (what a light show!) and the receiver automatically sets up mode, filters, tag and frequency as stored in each channel. Channels scanned are totally controllable with global lock-out, global reset and individual lock-out and reset.

The construction is impressive too. All circuit boards are glass epoxy (G-10) and all of them can be removed without desoldering. The front panel is hinged to provide access to all sections of the chassis. All aluminum construction keeps the weight of the rig reasonable too. And of course, the front panel is a spacious arrangement which makes the critical controls easy to use.

Frequency selection can be made using the main tuning knob, keypad direct entry or up/down buttons that can shift one MHz or to the next ham band. Frequency readout is selectable to display to 100 Hz or 10 Hz. Front panel clock is in 24 hour format. Rear panel input and output provisions keep the all-mode operator in mind too. Fixed level audio out and FSK keying (170 Hz shift), auxiliary dc jack, amplifier control circuits plus all the other connections that you could possibly need, including RS-232 computer interface option.

The Paragon is the end result of a three year engineering effort. Much of that effort was invested in improving the receiver performance and controlling the phase noise inherent in a PLL oscillator. We are proud of the performance of the Paragon and we think it has set new standards of excellence in synthesized rigs. All we ask is that you take the time to check it out. We think that you will share our pride in the Paragon.

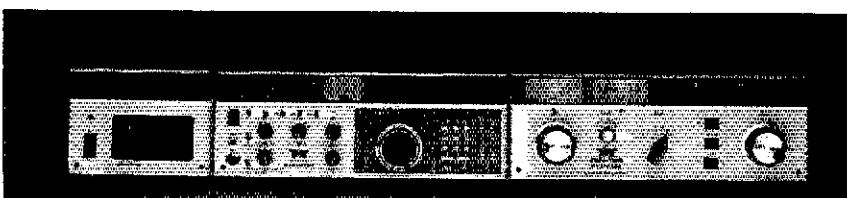
GENERAL SPECIFICATIONS

Frequency Range: Receive: 100 kHz to 29,999.99 MHz. Transmit: 1.8 to 29,999.99 MHz.
Frequency Control and Readout: Microprocessor controlled digital PLL synthesizer. 10 Hz resolution.
Frequency Stability: Worst case, 1 PPM per degree C. at 29,999 MHz.
Frequency Accuracy: ± 100 Hz @ 25 degrees C.
Tuning Rate:

	Normal	Normal Shifted
CW/USB/LSB/FSK	10 Hz 4.8 kHz per turn	20 Hz 9.6 kHz per turn
AM/FM	50 Hz 24 kHz per turn	100 Hz 48 kHz per turn
	Fast	Fast Shifted
CW/USB/LSB/FSK	20 Hz 9.6 kHz per turn	50 Hz 24 kHz per turn
AM/FM	100 Hz 48 kHz per turn	500 Hz 240 kHz per turn

Antenna Impedance: 50 ohm unbalanced.
PC Boards: 14 double-sided, 9 single-sided .062" glass-epoxy.
Power Required: Receive = 1.5A. Transmit = 20A. 12 - 14 VDC.
Dimensions: HWD 5 1/4" x 14 3/4" x 14 3/4". 13 x 37 x 36 cm.
Net Weight: 16 lbs. 7.25 kg.

Paragon Station with Model 960 Matching Power Supply (\$229), and the Mighty Titan Amplifier (\$2685).





Shown actual size.

with the Paragon.

TRANSMITTER

Modes: USB & LSB (J3E), CW (A1A), FSK (F1A); FM (F3E) optional (Model 256).
DC Power Input: Typical 200 watts.
RF Power Output: ALC stabilized, adjustable, 10 to 100 watts (into 50 ohms) with front panel RF OUT control.
Microphone Input: Low Impedance, bias voltage for electret provided.
CW Sidetone: Internally generated, adjustable tone and volume independent of AF GAIN control.
SSB Generation: 9 MHz, 8-pole crystal ladder filter. Balanced modulator.
Carrier Suppression: Greater than 60 dB.
Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.
Harmonic Emissions: Greater than 45 dB below peak power output.
Spurious Output: Greater than 50 dB below peak power output.
Third Order Intermod Products: -30 dB from two-tone at 100 watts PEP.
Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.
CW Offset: 750 Hz automatic.
FSK Shift: 170 Hz.
Transmit Offset Tuning Range: ± 99.9 kHz.

RECEIVER

Modes: USB, LSB, CW, FSK, AM, (FM optional).
Sensitivity:

	1.1 - 1.5 MHz	1.6 - 29.999 MHz	
SSB/CW/RTTY	5 μ V	15 μ V	10 db S/N @ 2.4 kHz
AM	3.5 μ V	1.0 μ V	10 db S/N @ 6.0 kHz
FM	1.0 μ V	3 μ V	12 db SINAD @ 15 kHz

Selectivity:

	-6 dB BW	-8 dB BW	Shape Factor
Standard AM	6.0 kHz	11.25 kHz	1.875:1
Standard SSB	2.4 kHz	3.36 kHz	1.87:1
Opt. 1.8 kHz SSB (Model 288)	1.8 kHz	2.9 kHz	1.60:1
Opt. 500 Hz CW (Model 285)	500 Hz	1.4 kHz	2.60:1
Opt. 250 Hz CW (Model 282)	250 Hz	.85 kHz	3.40:1
Standard FM	15 kHz	30 kHz	2.00:1

Attenuator: -20 dB for 1.6 to 29.999 MHz, -10 dB for .1 to 1.6 MHz.

I-F Frequencies: 1st = 75 MHz, 2nd = 9.0 MHz, 3rd = 6.3 MHz (FM 3rd = 455 kHz).

Image Rejection: Greater than 80 dB.

I-F Rejection: Greater than 70 dB.

Noise Blanker: Switchable on/off with adjustable width.
Dynamic Range: 100 dB.

Blocking Dynamic Range: +16 dBm for 1 dB compression of an S9 signal, frequency offset = 50 kHz. -2 dBm for 1 dB compression of an S3 signal, frequency offset = 50 kHz.

Third Order Intercept: +18 dBm.

Noise Floor: -132 dBm @ 2.4 kHz BW.

Squelch Sensitivity: Less than .6 μ V.

Receiver Recovery Time: Less than 27 ms.

Receiver Offset Tuning Range: ± 99.9 kHz.

Pass Band Tuning I-F Shift: ± 1.2 kHz.

Audio Output: 1.5 watts @ 8 ohms, 5% distortion max.
Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.

Audio Bandpass Filter: 4 pole, variable center frequency 220 to 1.7 kHz, 35% bandwidth @ -6 dB.

Tone Control: Variable 15 dB rolloff @ 5 kHz.

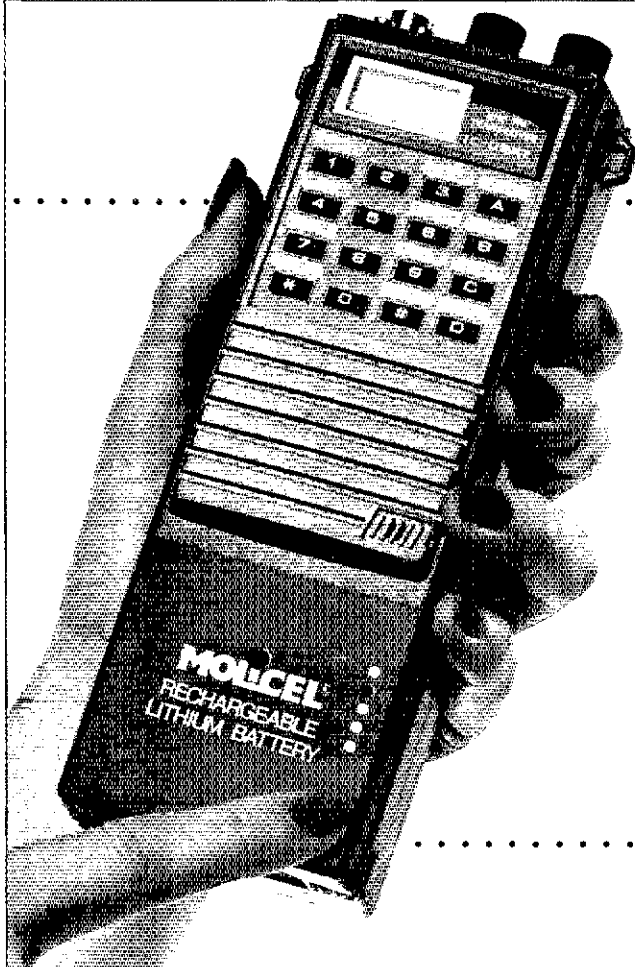
...America's Best Kept Secret!

TEN-TEC

Highway 411 East
 Sevierville, Tennessee 37862
 615/453-7172

Write for our new 10-page
 full-line catalog.

**MADE IN
 U.S.A.**



You've put your finger on it!

The biggest problem with existing batteries is never knowing how much operating time you've got left.

MOLICEL® rechargeable lithium batteries eliminate that problem.

By simply pressing a button, you'll know exactly where you stand. No more surprises.

And that's not all. In addition to state-of-charge indication, MOLICEL® batteries offer:

- Charge retention of years instead of weeks.
- Long life because there's no memory effect to reduce capacity.
- More operating time between charges.

MOLICEL® replacement battery packs compatible with several popular handheld transceivers are available from MoliKit. Order yours now!

MOLICEL® replacement battery packs (in kit form) are available with plastic cases for ICOM transceivers only. Please enquire about compatibility with other makes. The MoliKit includes a 6 cell pack, PC board, electronic components, charger and instruction book. Price: \$99. U.S. (includes shipping). Order by credit card on our toll free line. Call MoliKit 1-800-663-6658. PO Box 82460, N Burnaby, BC, Canada V5C 5Z1 [See "The Magic of Moli," QST, June 1987, pp. 22-25]

MOLICEL®



**1988 EDITION
NOW AVAILABLE**
(Formerly Radio Database International)

ARRL 225 MAIN ST., NEWINGTON, CT 06111

DISCOVER!

Here's your chance to discover (or rediscover) what is going on between our ham bands in the way of international broadcasting. Many modern Amateur Radio transceivers can receive these frequencies. Now it is easier than ever to hear world events as they happen — *providing* you know where and when to look for a particular station. **Passport to World-band Radio** lists shortwave broadcast stations by country and frequency. It also gives the language, power and antenna directivity at specific times. For example, when might you expect to hear an English language broadcast from Malta? The country listing shows such a transmission on 9515 kHz. For more detail you turn to the frequency listings and see that the broadcast takes place at 2030z with a power of 250 kW beaming Europe. The frequency listing makes identifying particular stations a snap! International radio is a great way of increasing your knowledge of the world. Something is happening *right now!* You can be a part of it by listening in on the medium and shortwave broadcast bands. 352 pages, 1988 edition \$15.00 plus \$2.50 (\$3.50 UPS) for postage and handling.

QSL CARDS / RUBBER STAMPS / ENGRAVING

CANADIANS QSL samples \$1 (refundable) M. Smith, VE7FI, Box 1376, Delta, BC V4M 3T3.

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 1160, Pflugerville, TX 78660.

FREE samples—stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & RUBBER STAMPS. Top quality. QSL samples and stamp information 50 cents. 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 KØAAB 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. 39 cents self addressed business size envelope required. Mary Mahre, WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs SAMPLES 40 cents (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Haver, 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.

FREE, 100 QSLs with first order. Samples 50¢. Gazebo Press, Rt. 4 Box 4148, LaPlata, MD 20646.

ENGRAVING: CALLSIGN/name badges by WØLQV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples \$1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

PICTURE QSL CARDS of your shack, etc. from your photo or black ink art work. 500 \$24; 1000 \$36.50. Also non-picture cards. Customized cards, send specifications for estimate. Send two stamps for illustrated literature. Generous sample kit \$2; half pound of samples \$3. Raum's, R.D. 2, Orchard Road, Coopersburg, PA 18036. Phone 1-215-679-7238

QSLs QUALITY and Fast Service for 28 years. Include Call for Decal. Samples 50¢. Ray K7HLR, Box 331, Clearfield, UT 84015

BROWNIE QSLs since 1939. Catalog & Samples \$1 (refundable) with order) 3035 Lehigh Street, Allentown, PA 18103.

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, Dept. B, 310 Commercial, Emporia, KS 66801.

QSL CARDS, Fast Service. Low Cost. High quality. Free Samples. Shell Printing, KD9KW, P.O. Box 50, Rockton, IL 61072

QSL SAMPLES send \$1 (refundable with order) Box 1262, Point Roberts, WA 98261.

MAGNETIC CALLSIGN . . . 2" x 8" . . . Instant transfer car to car! Your call in lettering Black, Blue, Green or Red (white background). Each sign only \$8.50 ppd. Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566

QSL samples - 25 cents Samcards - 48 Monte Carlo Drive, Pittsburgh, PA 15239.

QUALITY QSLs, Samples 50 cents. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

COMPUTERIZED LOGS? Ask about our special design to accommodate your computer label. Standard styles also. Write for free samples. QSLs By W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

GAIL'S QSL's. Stamp for sample, first 100 \$10, \$5 thereafter. Fast service, postpaid. KAØYZT, 1150 Muenz, Wright City, MO 63390.

FULL COLOR Custom QSLs made from your slide-photo. \$84.75 thousand. B/W 250-\$23. Samples. Picture Cards, 3806 NE 24th, Amarillo, TX 79107, 808-383-8347.

COLORFUL QSLs by WA7LNW - Improve your QSL returns! Revolutionary printing process combines brilliant rainbow colors with sparkling metallic inks. The ultimate QSLs! Samples \$1 (refundable) COLORFUL QSLs, PO Box 5358, Glendale, AZ 85312-5358.

ANTIQUÉ-VINTAGE-CLASSIC

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 G802, Council Bluffs, IA 51502-0802

HALLCRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Arico Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

MICROPHONES AND related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

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, RI, 02895-0001.

hy-gain® 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

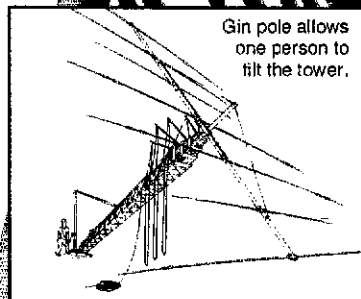
- Mast • Thrust Bearing • Coax Arms • Rotators • Tower Gin Pole

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®

TELEX COMMUNICATIONS, INC.

9600 Aldrich Avenue South
Minneapolis, Minnesota 55420

The New 688-page ARRL Operating Manual is **HOT...**



On July 8, 1986, a railroad tanker carrying toxic phosphorous derailed and caught fire near Miamisburg, Ohio. The success of the Monsanto Amateur Radio Association's emergency plan in helping local authorities deal with this potential disaster is documented in November 1986 *QST*. The photograph above which was taken over the scene by Mike Carter, WD8BSI, shows what could happen in your backyard! Would you be ready for such a situation? The Emergency Communications chapter by Richard Regent, K9GDF, in the new *ARRL Operating Manual* tells how to prepare for such an eventuality. Emergency Communications and efficient message handling go hand-in-hand. Maria Evans, KTSY, tells all about this subject and how you can become a part of the National Traffic System in the expanded Traffic Handling chapter.

Over forty percent of the radio amateurs licensed today were at one time or still are shortwave listeners. With modern transceivers, it's possible to hear what is going on outside our ham-bands. David Newkirk, AK7M, adds his enthusiasm for this closely related hobby in the SWL chapter. On a related subject, Paul Rinaldo, W4RI, tells us about the characteristics of the Amateur Radio Spectrum and how our hands are assigned.

Most hams are interested in just getting on the air and talking to someone. Even so, ham radio is a lot more than talking into a microphone or pound-

ing a telegraph key. Carol Smith, AJ2I, and Bill Jennings, KIWJ, have prepared a chapter on Basic Operating. It is just what the newcomer needs in order to get started, and it's good review for some of us who have been away from ham radio for a while. Almost everyone can qualify for the Rag Chewer's Club Certificate, but do you realize that there are hundreds of Amateur Radio awards from throughout the world? Well you can see dozens of these awards in *full color* along with their requirements in the Awards chapter by Bob Halprin, K1XA.

Clarke Greene, K1JX, tells all about competitive operating. Clarke has won almost every major contest, HF, VHF/UHF, from home and away, using full power and QRP. Now he tells how it's done!

Almost everyone seems to be interested in digital communications these days. Stan Horzepa, WA1LOU, covers Packet Radio in detail; while Larry Wolfgang, WA3VIL, covers RTTY and other digital modes in a separate chapter. If you find SSTV or ATV of interest, Bruce Brown, WA9GVK, has put together a fantastic chapter on Image Communications.

If you still need to work the countries represented by the QSLs below, you're not alone; but you can pick up some good tips on working DX from well-known DXer and author Bob Locher, W9KNI. DX-peditioner Carl Henson, WB4ZNH, gives advice on how to operate from the "rare ones"

without catching malaria or worse! You can find out when to work DX at anytime during the sunspot cycle by referring to the propagation tables which were newly incorporated in this edition. You'll also find sunrise-sunset tables for working DXCC countries around the world, and there is a great chapter on Antenna Orientation by *ARRL Antenna Book* editor Jerry Hall, K1TD.

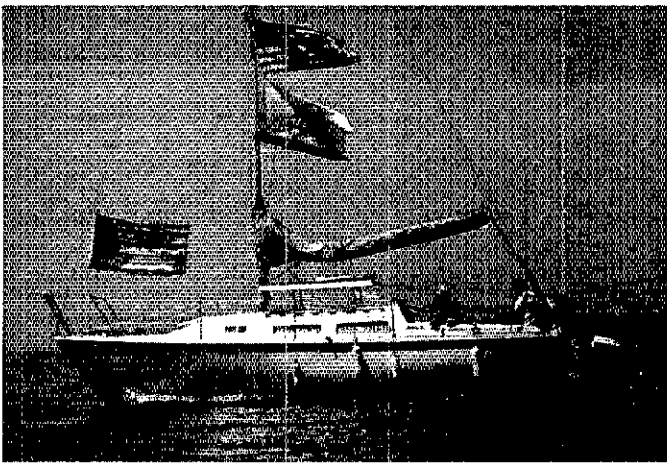
Besides "packet," WA1LOU tells what is new in the area of FM and Repeater operation. This chapter is "must" reading for Novices who want to use repeaters for the first time or for those who want to upgrade their existing repeater operations. There is a lot doing these days on weak signal VHF/UHF work and Mike Owen, W9IP, shows how it's done from moonbounce to meteor scatter. Will you be ready for the OSCAR launch that may take place later this year? Dick Jansson, WD4FAB, captures us with his satellite operating techniques.

You'll also find numerous handy tables and charts in the third edition of *The ARRL Operating Manual*. It is edited by Robert J. Halprin, K1XA, Deputy Manager of Membership Communications at ARRL HQ. The new edition is available at your dealer or from ARRL for \$15. (Please add \$2.50, \$3.50 for UPS for shipping and handling.)

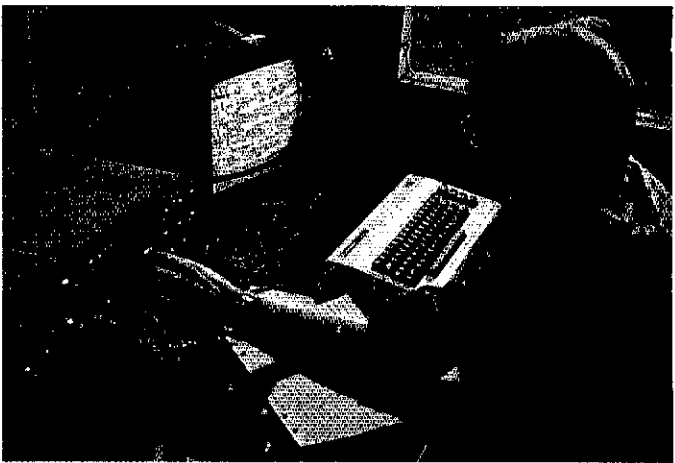


but it's also

FUN!



Can you think of a better spot for some relaxing operating than this? KB6AIB and N6ESB ride the waves after catching some waves on HF. Fun like this is covered in the Basic Operating chapter of the new ARRL Operating Manual.



WB7RPJ shows visitors to a county fair what RTTY is all about. We've doubled the amount of material on digital communications in the new edition so you can learn how to join in. (KC7YN photo)

A brief look at the new ARRL Operating Manual

N1CXV is shown here checking out the W1AW 2-meter repeater. The new *Operating Manual* does an excellent job in describing just about all you need to know about this popular means of communication.

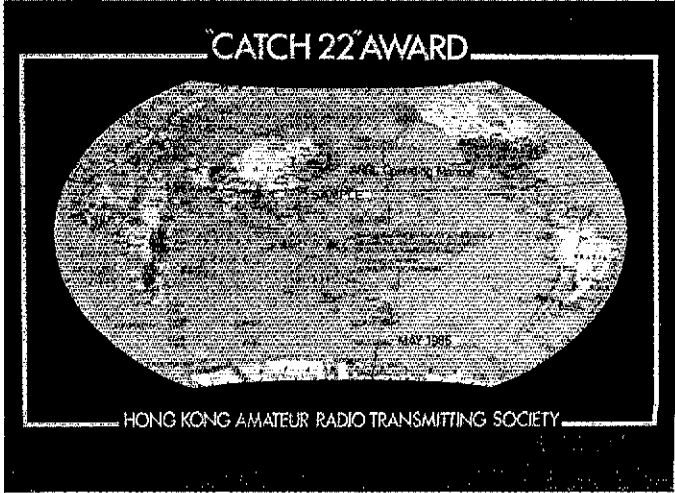
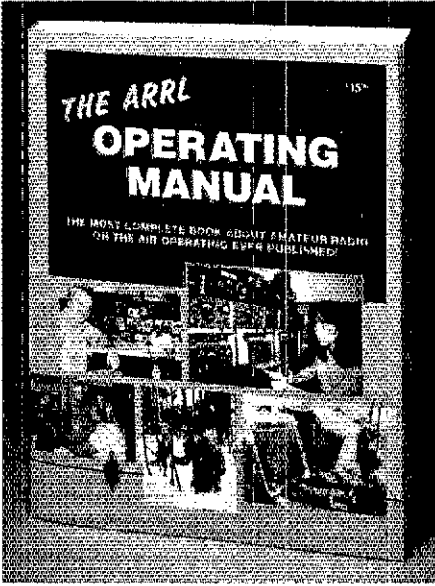
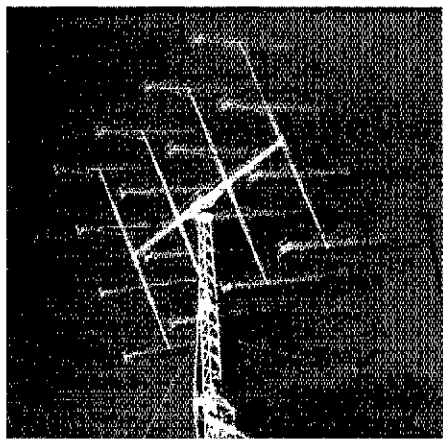
There is no better book on operating for the new Novice. Now that Novices are allowed operation on FM and other modes on the VHF/UHF bands, the new *ARRL Operating Manual* is the source for information on the proper procedures to use. Many beginners are nervous because they haven't tried a particular band or mode before. Now, newcomers can find out what is going on and explore new frontiers of operating with confidence. Even the beginner can use the propagation tables to determine when there will be openings to particular parts of the world on the HF bands.

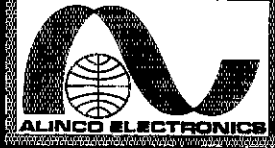


Weak signal work on VHF/UHF is always fascinating. The array at right is used by I2OD1 for moonbounce. There is also meteor and tropospheric scatter, and if that isn't enough there are Sporadic E and auroral openings. ARRL's VUCC awards for working grid squares make VHF/UHF operating all the more fun! The VHF/UHF chapter tells what you need to know.

Practically all of the popular operating awards are described in the Awards chapter. Like the "Catch 22" Award, most are reproduced in full color!

N8HLE is shown here operating Field Day. "FD" is an emergency exercise, an operating event, and a learning experience. Those terms also capture the essence of the new *ARRL Operating Manual*. The new edition belongs in every Amateur Radio operator's library. (See the preceding page for more details.)





ALINCO ELECTRONICS INC.

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

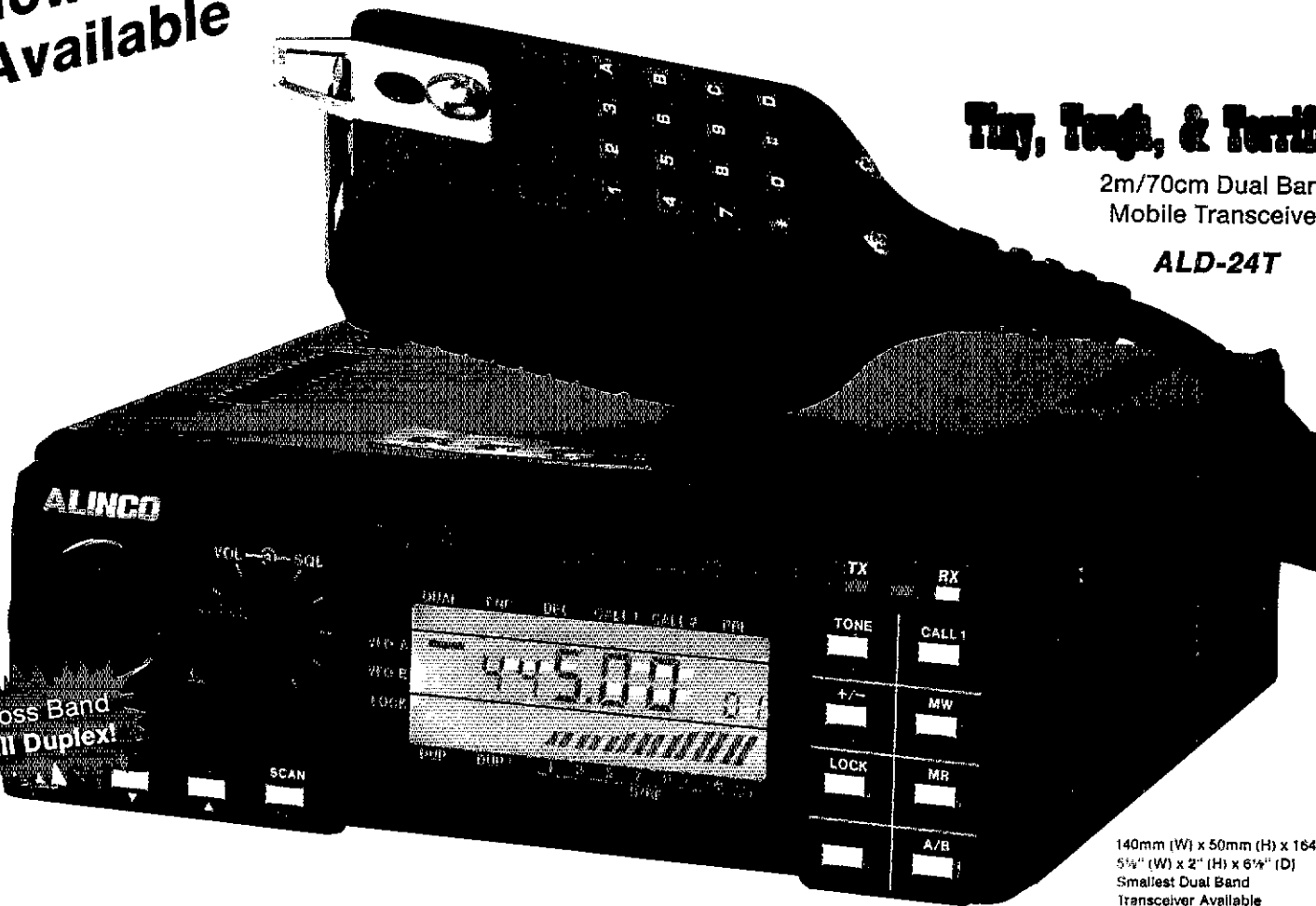
Dual Bander

Now Available

Tiny, Tough, & Terrific

2m/70cm Dual Band
Mobile Transceiver

ALD-24T



Cross Band Full Duplex!

140mm (W) x 50mm (H) x 164mm (D)
5 1/2" (W) x 2" (H) x 6 1/2" (D)
Smallest Dual Band Transceiver Available

With ALINCO's advanced engineering and technology, the ALD-24T 2m/70cm Dual Band Mobile Transceiver is designed to be the ultimate in compact size with an impressive array of features, allowing maximum flexibility in installation and ease of operation.

- 140-147.999 Mhz/440-450 Mhz
- CAP and MARS compatible
- 25 Watt High - 5 Watt Lower Power both bands
- 21 Memory Channels
- Dual VFOs
- Large LCD
- CTCSS Encoder/Decoder: Standard
- 16-Key Autopatch Microphone with Up/Down Buttons
- Programmable Band Scan
- Memory Scan and Memory Lockout
- Ultra Compact & Light Weight
- Simple to Operate
- Programmable Standard and Non-Standard Repeater Offset

*Many features, see your Dealer!

Also now available:
25WATT 2m, 45 WATT 2m
and 25 WATT 450 MHZ.

***ALL ALINCO Products now carry a 2-year Factory Warranty.
See your favorite dealer, listed below, for full details.****

Alinco's products are carried by these fine dealers

Amateur & Advance Comm. - Wilmington, DE
 Amateur Comm. ETC. - San Antonio, TX
 AES - Milwaukee, WI
 AES - Wickliffe, OH
 AES - Orlando, FL
 AES - Clearwater, FL
 AES - Las Vegas, NV
 Austin Amateur Radio Supply - Austin, TX
 Barry Electronics - New York, NY
 Burghard of Amateur Center - Watertown, SD
 Delaware Amateur Supply - Delaware, DE
 Doc's Communications - Rossville, GA
 Earth Star Communications - Minneapolis, MN
 ELOriginal Electronics - Brownsville, TX
 EBB - Vienna, VA
 EGE, INC. - Woodbridge, VA

EGE, INC. - Salem, NH
 Erickson Communications - Chicago, IL
 Floyd Electronics - Collinsville, IL
 The Ham Station - Evansville, IN
 The Ham Hut - Amarillo, TX
 Halry Radio - Hartford, CT
 Henry Radio - Los Angeles, CA
 HR Electronics - Muskegon, MI
 HRO - Anaheim, CA
 HRO - Atlanta, GA
 HRO - Burlingame, CA
 HRO - Oakland, CA
 HRO - Phoenix, AZ
 HRO - San Diego, CA
 HRO - Van Nuys, CA
 HSC - Sunnyvale, CA

International Radio Systems - Miami, FL
 Jun's Electronics - Culver City, CA
 Kennedy Associates - San Antonio, TX
 KJI Electronics - Cedar Grove, NJ
 Madison Electronics - Houston, TX
 Maryland Radio Center - Laurel, MD
 Memphis Amateur Electronics - Memphis, TN
 Michigan Radio - ML Clemens, MI
 Mission Consulting - Houston, TX
 Missouri Radio Center - Kansas City, MO
 N & G Electronics - Miami, FL
 Omni Electronics - Laredo, TX
 Ouement Electronics - San Jose, CA
 Reno Radio - Reno, NV
 Ruvendell Associates - Derry, NH
 Rogus Electronics - Southington, CT

Rosen's Electronics - Williamson, WV
 Rose Distributing Co. - Prenton, ID
 TNT Radio Sales Inc. - 4124 Robbinsdale, MN
 Tel-Com Electronic Comm. - Littleton, MA
 Texas Comm. Center - Houston, TX
 Texas Towers - Plano, TX
 VHF Communications - Jamestown, NY
CANADA:
 Atlantic Ham Radio Ltd. - Downsview, Ontario
 C.M. Peterson Co. Ltd. - N. London, Ontario
 Com-West Radio Systems - Vancouver, B.C.
 Hobby Tronique Inc. - Ville St. Laurent, Quebec
 R&S Electronics Ltd. - Dartmouth, Nova Scotia
 Texpro Sales Inc. - Burlington, Canada

TELEGRAPH BUGS, paddles, old keys wanted. Collector seeks all models and variations to date. Keys by Martin-United Electric-Vibroplex wanted working or not. Donations of parts, partial or damaged keys appreciated. Write: John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

WE MAY HAVE the tubes you need. (Thousands in stock). Send S.A.S.E for our list. Fata Electronics, P.O. Box 1376-1, Milwaukee, WI 53201.

ANTIQUA RADIO CLASSIFIED. If you buy, sell or collect old radios, subscribe to Antiqua Radio's largest circulation monthly magazine. Old radios, TVs, Ham Equip., 40's & 50's Radios, Telegraph, Books & more. Ads and Articles. Free 20-word ad monthly. Sample free. Six-month trial: \$10. Yearly rates: \$18 (\$24 by 1st class). Write for foreign rates. ARC, P.O. Box 2-B2, Carlisle, MA 01741

WANTED, BOOKS: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHF, 6270 Clinton St., Elma, NY 14059 716-681-3186

BUY, sell, collect and restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antiqua Wireless Association which sponsors old-time "meets," flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only \$10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

NATIONAL RADIO equipment manuals or NCL 2000 factory parts lists. SASE Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

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, 414-645-5237.

R-390A RECEIVER: \$115, electronically complete, repairable (Government-removed meters, operation unaffected). R-390 Parts: Info SASE. Mint military-spec pull-out 12AT7, 6AG5, 6BA6: \$15/dozen. CPTC-26 six meter FM transceiver with crystal, handset: \$22.50, \$42.50/pair. Add \$4.50/item shipping except R-390A, shipped collect. Baytronics, Box 591, Sandusky, OH 44870.

WANTED: KT-88, KT-77, KT-66 tubes by Genelex or Mullard, 6550 tubes by Tung-Sol. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385.

CODE/CIPHER MACHINES Wanted! Historian buys code/cipher devices, manuals, books, etc. All periods! Melton, Box 5755, Bossier City, LA 71171, 318-798-7319.

WANTED: NATIONAL HRO-500 unmodified mechanically, good condition with manuals; wiring diagram of AC Power Supply Type 20218 for Navy TC8 radios. Tajima, JA1DNQ, c/o Toshiba, 111 Business Park Drive, Armonk, NY 10804, 914-273-1750.

WANTED: HAMMARLUND HX-50A transmitter. Phil, KG6KB, 120 Cedar Lane, Santa Barbara, CA 93108. 805-962-8957.

QST's 1943 to present, complete. Make offer, cash or trade. W6NJV, 818-767-3499.

WANTED QST pre-1930, NV2C, Richard Titus, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

AM TRANSMITTER Wanted. 250W up. Bob Mattson, 10 Janewood, Highland, NY 12528, 914-691-6247.

COLLECTORS: GONSETT GSB-100 Exciter super clean \$130, Eidico 100F \$150, C.E. 100V \$170, new 813s \$20 each miniature tubes, \$1 octals, Iocals \$2, M.C. Jones Power Meter with coupler \$25, New Heath Cantenna Dummy Load \$20, Swan 240 with A.C. Supply \$100, Brown Simpson Mk 75 Memory Keyer \$125, Levy, W5QJT, 2833 Junction Hwy. #15, Kerrville, TX 78028, tel. 512-367-4741.

WANTED - MANUALS and cables for RBM-3 rcvr June 1942 and CGT - 20086 Power Unit. D. Palmer, 638 Benvenue Avenue, Los Altos, CA 94022.

MODULATION Transformer wanted. 500W up. Bob Mattson, 10 Janewood, Highland, NY 12528, 914-691-6247.

WANTED: MANUAL or copy for BC-939B Antenna Tuner. May be a tuner for BC-610 transmitter. Manual for H-P 608 Signal Generator, UHF model C7 or E7 K4RN, Box 312, Versailles, KY 40383.

RCA ACR135 amateur receiver \$125, CE20A - CE458 VFO \$125, HRO50T matching spkr., 5 coils sets \$150, Globe 612 meter transmitter \$45, Gonset 6 meter II \$45, III \$60, Heath 2 meter transceiver \$35, Knight all band VFO \$35, Military grid dipper AN/PRM-10 \$50, K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37130, 615-893-5344.

SPARK TRANSFORMER, 1/2 KW Thordarson for sale, write to, Edward Payne, P.O. Box 822, Clifton, NJ 07015.

SELLING - Heathkit SB-313 shortwave receiver kit, partially built, some parts missing, \$75, negotiable, call evenings, Lovie, WA2CBZ, 718-748-9612, Brooklyn, NY 11209.

QST: 1943 - 1986 missing a few issues. Have 1926, 1936, 1938. Best offer. Dave Lichtenhal, WA2GRY, 42A Charlesbank Way, Waltham, MA 02154, 617-893-3751.

WANTED - Buy, Borrow, Rent a Wire Recorder to transcribe old family collection of wire recordings. W1NW/4, 703-978-4740.

WANTED: Grebe CR18 receiver 1915-1916 QST's. Deforest radios. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37130, 615-893-5344.

WANTED: January 1945 CQ Magazine. WA2FQS, 301-498-9954.

FOR SALE: Used xmtr tubes #851 and #861. Thos. Waters, 3703 Bonview Avenue, Baltimore, MD 21213.

GENERAL

DO-IT YOURSELF DXpedition. Stay at ZP8SB. 2BR cottage, beach, Quad. Fish or dive if band folds. Write airmail: ZF8SB, Little Cayman, CAYMAN ISLANDS.









SEND FOR **FREE** 1987 CATALOG... 48 PAGES!

***QUALITY PARTS *DISCOUNT PRICES *FAST SHIPPING!**

ALL ELECTRONICS CORP.


ALL ELECTRONICS CORP.

WE'VE MOVED OUR NEW ADDRESS IS P.O. BOX 567 VAN NUYS, CA 91408 800-826-5432

<p>BLACK LIGHT ASSEMBLY</p>  <p>Complete, functioning assembly includes ballast, on-off switch, power cord, sockets and P4T5-BL black-light. Mounted on a 7 1/8" X 3 1/8" metal plate. Use for special effects lighting or erasing EPROMS. CAT# BLTA \$10.00 EACH</p>	<p>FLASHER LED</p> <p>5 volt operation</p> <p>jumbo T 1 3/4 size</p> <p>RRD FLASHER</p> <p>CAT# LED-4 \$1.00 each</p> <p>GREEN FLASHER</p> <p>CAT# LED-4G \$1.00 each</p>	<p>1 mA METER</p> <p>Module: 0-1 mA signal strength meter with K1M logo. 1/4" X 1 3/4" X 7/8" deep.</p> <p>CAT# MET-2 \$2.00 each</p>	<p>SWITCHING POWER SUPPLY</p>  <p>Compact, well regulated switching power supply designed to power Texas Instruments computer equipment. INPUT: 14-25 vac @ 1 amp OUTPUT: +12 vdc @ 350 ma. +5 vdc @ 1.2 amp -5 vdc @ 200 ma. SIZE: 4 3/4" square. CAT# PS-30 \$3.50 each</p>
<p>RECHARGEABLE NI-CAD BATTERIES</p> <p>AAA SIZE 1.25V \$2.25 AA SIZE 1.25V \$2.00 AA WITH SOLDER TABS \$2.20 C SIZE 1.2V 1200MAH \$4.25 SUB-C SIZE SOLDER TABS \$4.25 D SIZE 1.2V 1200MAH \$4.25</p>	<p>VIC 20 MOTHERBOARD</p>  <p>26 IC's including 6502A and 6560. Not guaranteed but great for replacement parts or experimentation.</p> <p>CAT # VIC-20 \$15.00 each</p>	<p>WALL TRANSFORMER</p>  <p>11.5 Vdc @ 1.95 amp. Input: 120 Vac SIZE: 3 3/4" X 2 7/8" X 2 5/8" CAT# DCTX-11519 \$6.50 each</p>	<p>10 AMP 200V FULL WAVE BRIDGE</p>  <p>5/8" square CAT# FWB-1020 \$1.00 each 10 for \$9.00</p>
<p>NI-CAD CHARGER/TESTER</p>  <p>Will charge most every size Ni-cad battery available. CAT# UNCC-N \$15.00 each</p>	<p>TOLL FREE ORDERS 800-826-5432</p> <p>INFO • (818) 904-0524 FAX • (818) 781-2653</p> <p> </p> <p><small>QUANTITIES LIMITED MINIMUM ORDERS \$100 CALL ADD SALES TAX USA \$100 SHIPPING NO C.O.D. FOREIGN ORDERS INCLUDES POSTAGE SHIPPING</small></p>		


T.V.I. problems?

low pass T.V.I. filters from Barker & Williamson




Model	Power (Watts)	Cut Off Frequency	Frequency of Maximum Attenuation	Minimum Attenuation	Frequency Range	Price
FL10/1500	1000	34 MHz	52 MHz	70 db	1.8 - 30 MHz	\$32.00*
FL10/100	100	44 MHz	57 MHz	60 db	1.8 - 30 MHz	\$23.50*
FL6/1500	1000	55 MHz	63 MHz	70 db	6 meter	\$36.00*
FL6/100	100	55 MHz	63 MHz	50 db	6 meter	\$27.00*


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) 768-5581



*Add \$2 shipping and handling
All above to match 50 ohm transmitters and antennas.

Iron Powder and Ferrite TOROIDAL CORES

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

Small Orders Welcome
Free 'Tech-Data' Flyer

AMIDON
Associates

Since 1963



12033 Otsego Street, North Hollywood, Calif. 91607

RSGB BOOKS

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.

NEW!

THE BUYER'S GUIDE TO AMATEUR RADIO by Angus McKenzie, G3OSS. Have you ever seen a used equipment ad and wondered what the specifications were for the piece of gear advertised? Is the rig that your friend is selling all he claims it to be? *The Buyer's Guide to Amateur Radio* may have the answers! This book contains over 100 full reviews of equipment and close to that number of product descriptions. Modern gear is covered as well as some venerable "boat anchors." Some of the descriptions apply only to the British versions of equipment designed for operation under European band plans. The opinions expressed in this book are those of the author and not necessarily those of ARRL. Copyright 1986, 480 pages, \$12.00 softbound.



THE AMERICAN RADIO RELAY LEAGUE, INC.

225 MAIN STREET
NEWINGTON, CT 06111

SAVE on these AES/KENWOOD Specials!



TM-2530A • TM-2550A • TM-2570A
25, 45 and 70W 2-meter FM Transceivers
Call for Special Prices

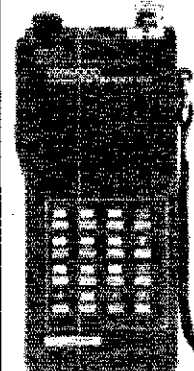


TM-411A Compact 25W 440 MHz FM Mobile
Closeout - \$299⁹⁵



TW-4000A 25W, 2m/440 FM Dual Bander
Closeout - \$499⁹⁵
Special! - TU-4C Programmable Encoder
\$100 with TW-4000A Purchase

NOTE:
TH-21AT pictured,
TH-41AT is same.

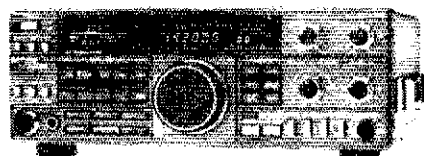


SAVE \$30
on TH-41AT
440 MHz Handheld
List - \$229⁹⁵
Closeout \$199⁹⁵
includes a **FREE** extra
PB-21 Battery Pack.

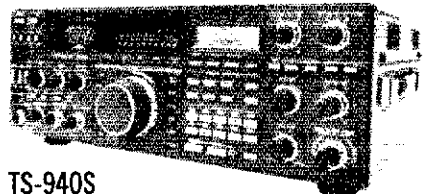
also
SAVE \$26
on TU-6
Programmable encoder
List - \$30⁹⁵
Special \$4⁹⁵
(purchased with TH-41AT)

TR-3600A 440 MHz FM Handheld
Closeout - \$319⁹⁵
Extra PB-26 Battery **FREE** with Purchase

Due to changing prices and limited quantities, all listings on this page are subject to change without notice. Please check with salesperson when ordering.



TS-440S Compact HF Transceiver • **Call**
In stock, with or without built-in antenna tuner



TS-940S
Competition - Class HF Transceiver • **Call**
In stock, with or without built-in antenna tuner

NOVICE ENHANCEMENT

TM-3530A 25W 220MHz FM transceiver
Similar to TM-2570A pictured in upper left.
Call for Sale Prices

TH-31BT 1W 220MHz Handheld xcvr
Similar to TH-21AT left, w/built-in tone encoder

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

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

Associate Store

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

Please use WATS line for Ordering and Price Checks. For other Info and Service Dept., please use our Regular lines.

Clip out this handy Coupon and Mail Today!

TO: AMATEUR ELECTRONIC SUPPLY[®]
4828 W. Fond du Lac Avenue
Milwaukee, WI 53216

I am interested in the following new KENWOOD Equipment:

I have the following to TRADE (What's your DEAL?)

Rush me your quote - I understand that I am under no obligation.

Name _____

Address _____

City/State _____ Zip _____

Contact AES[®] for all of your KENWOOD needs!

- ★ Low Prices ★ Large Stocks ★ Fast Service
- ★ Top Trades ★ Toll Free Ordering line
- ★ AES[®] Ships Coast to Coast

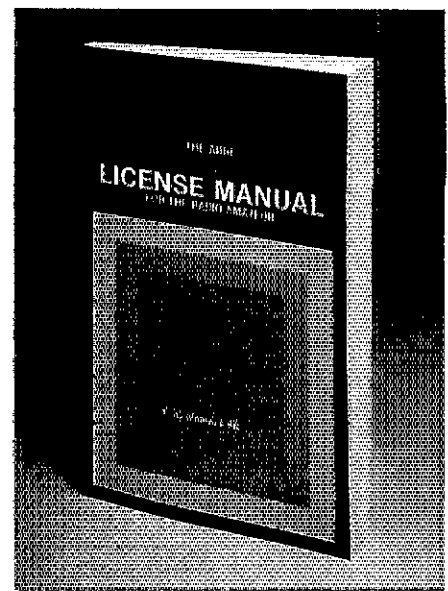
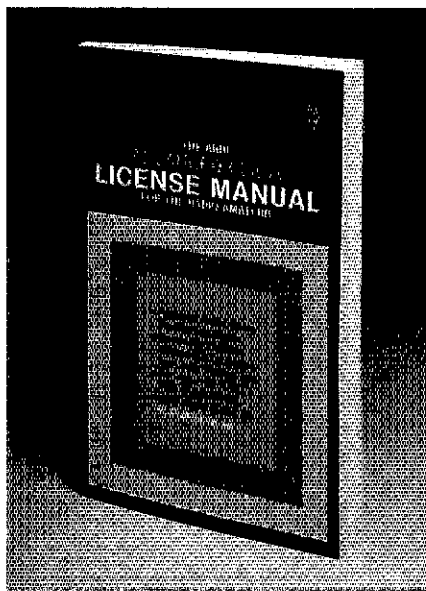
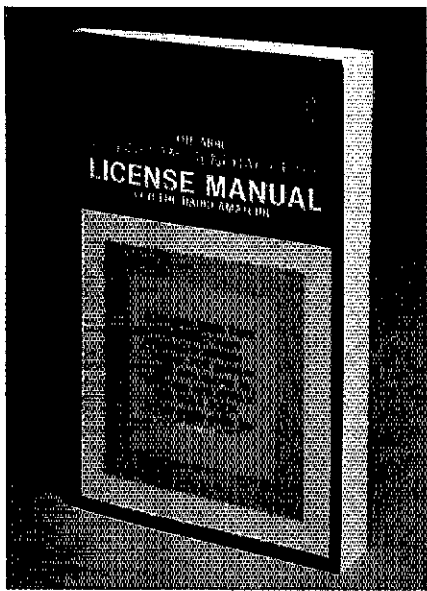
HOURS: Mon. thru Fri. 9-5:30; Sat 9-3



**USE
YOUR
CREDIT
CARD**



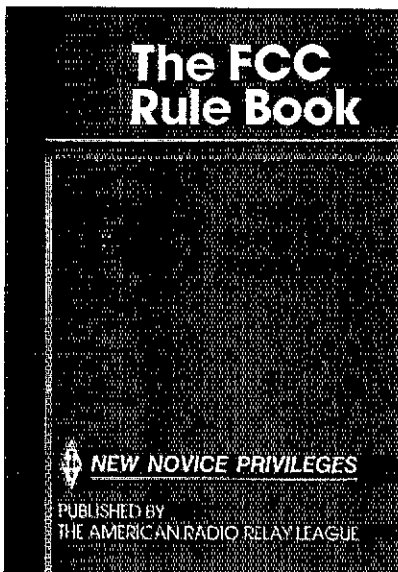
Note: Our TOLL FREE Ordering line 1-800-558-0411 is answered until 8 pm CST Monday thru Thursday.



The popular **ARRL License Manual Series**. The current editions are based on examination questions pools that will be in use at least until January 30, 1988. The new 3rd Edition of *The ARRL Technician/General Class License Manual* separates the study material for the Element 3A (Technician) and Element 3B (General) exams for easy study. The current 2nd Editions of the *Advanced and Extra Class License Manuals* are just the "ticket" for upgrading.

PASSING POWER!

The new 7th Edition of *The FCC Rule Book* is just off the press and has been updated to cover all of the changes in the regulations brought about by Novice Enhancement. It continues in the popular "Washington Mailbox" style of rule interpretations by the FCC besides containing Amateur Radio regulations. We have upgraded *Tune in the World with Ham Radio* to cover material on the new 30-question Novice exam and have almost tripled the amount of code instruction and practice on two 90-minute cassettes. We've had to go back on press to print additional copies of *Morse Code, The Essential Language*. This book provides a history of code operation and shows how useful it is.



Tune in the World with Ham Radio
 With book and cassettes #0380 \$15
 Book only #0399 \$12
 Set of 2 C-90 Cassettes #0398 \$10

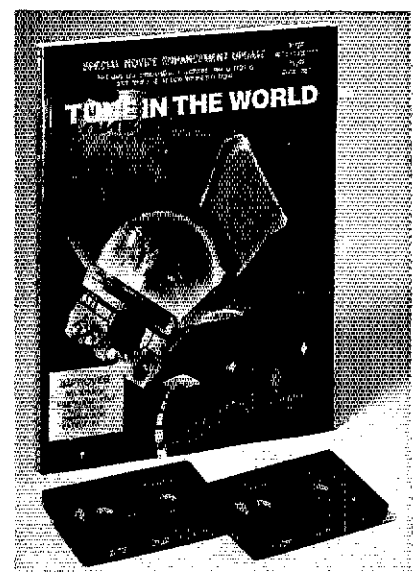
License Manual Series
 Technician/General Class #0143 \$ 5
 Advanced Class #016X \$ 5
 Extra Class #0178 \$ 5
 FCC Rule Book #0216 \$ 5

Code Proficiency
 Morse Code the Essential Language #0356 \$ 5
 Code Kit #5501 \$ 8
 Morse University TM Tune-in book and cartridge for C-64 computer #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

Orders must include \$2.50 shipping for book rate or \$3.50 for UPS.

The American Radio Relay League, Inc.
 225 Main Street
 Newington, CT 06111



WANTED: DRAKE R7A, MS7. All letters answered. Tony Ficarra, 144 Gladstone Avenue, Wollongong, NSW, AUSTRALIA, 2500.

TELETYPEWRITER parts, supplies, gears. Toroids, S.A.S.E. list. Typetronics, Box 8873, Ft. Lauderdale, FL 33310. Buy unused parts, cash or trade.

HAM TRADER YELLOW SHEETS. In our 26th year. Buy. Swap. Sell ham radio gear. Published twice a month. Ads quickly circulate—no long wait for results. Send #10 SASE for sample copy. \$12 for one year (24 issues). P.O.B. 2057, Glen Ellyn, IL 60138-2057.

TEFLON, s.a.s.e. W9TFY, Alpha II 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 fast for the best deal." New Amp Supply 2500 Watt Linear/Tubes/Hypersil transformer regular \$1149, cash \$986; new display Azden PCS-5000 \$239; New ICOM 2AT regular \$299 cash \$239; new popular ICOM 02AT Handy Talkie regular \$399 cash \$289; new display ICOM 735 Transceiver cash \$769; new WmNye 3KW MBS-A Tuner regular \$625 cash \$499; new Display Kenwood 440-S with tuner cash \$995; new display ICOM 28-H cash \$399. VISA/MASTERCARD 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.

KEYERS. CONTEST, MEMORIES, Iambic. Outstanding performance. Guaranteed. \$15 up. MSC, 1304 Toney Drive, Huntsville, AL 35802.

TUBES WANTED. I pay cash or trade for all types of transmitting or special purpose tubes - Mike Forman, 1472 McArthur Blvd., Oakland, CA 94602 415-530-8840.

CHASSIS & CABINET Kits. 5120 Harmony Grove Rd., Dover, PA 17315 SASE K31WK.

INTERNATIONAL AMATEUR Radio Network emergency/public service: 14.275 MHz. Glenn Baxter, K1MAN, Manager.

TOWER CLIMBING Safety Belts and Accessories. Free Info. Avatar Mag (W9JVF) 1147 N. Emerson Indianapolis, IN 46219-2929

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 instructions for II/II +/e. Send now for free brochure. W1EO 39 Longridge Road, Carlisle, MA 01741.

SAVE \$1.50 SHIPPING on any ARRL book. Send book price plus \$1 to Marshall Hill Enterprises, Bradford NH 03221.

'N-TENNA QUAD KITS. \$64.50. Box 5332, Hickory, NC 28603.

PACKET RADIO MAGAZINE is published monthly by the Florida Amateur Digital Communications Association (FADCA). Enjoy the latest technical and operating news, equipment reviews, construction articles, software reviews, program listings and digital protocol discussions. Write for subscription information. Group Rates for Amateur clubs. Enclose \$1 for a sample issue. FADCA, Inc., 812 Childers Loop, Brandon, FL 33511. 813-689-3355.

MICROLOG AIR-1 with AMTOR, Close-Out Sale. List price \$279. VIC-20 AIR-1's \$125. Add \$5 for shipping in US, \$10 elsewhere. Md. res add 5% sales tax. G and G Electronics, 8524 Dakota Drive, Gaithersburg, MD 20877. 301-258-7373.

MADISON-BELDEN: 9913 low loss solid center conductor foil & braid shield - excellent product 45 cents/ft.; 8214 RG8 foam 43 cents/ft.; 8237 RG8 40 cents/ft.; 8267 RG213 52 cents/ft.; 8262 RG58C/U milspec 16 cents/ft.; 8000 14ga. stranded copper ant. wire 13 cents/ft.; 8448 8-conductor rotor cable 31 cents/ft.; 9405 HD rotor cable 2-16ga., 6-18ga. 52 cents/ft.; 8403 mic cable, 3 conductor & shield 80 cents/ft.; 100 ft. 8214 wends installed \$45; 9258 RG8X 19 cents/ft.; Mastercard/VISA/COD. Madison Electronics Supply Inc., 3621 Fannin Street, Houston, TX 77004, Phone 713-520-7300 or 800-231-3057.

PROTECT YOUR GEAR - Register it with the Electronic Equipment Registry. SASE for details Box 304, Wallingford, CT 06492, 203-265-7388.

TRYLON FREE - STANDING Towers, up to 36 feet, for info write BJX Supply, Box 398, Cortu, NY 14036

23 CM "READY-TO-GO" 100+ watt linears and 2C39 amplifier cavities. Hi-Spec, Box 387, Jupiter, FL 33468

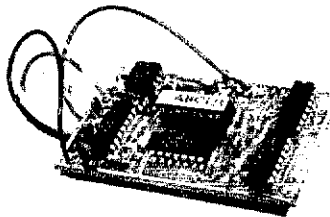
MORSE CODE Practice program for IBM-PC and Compatibles. Send \$10.00 check to SP MicroComputing Co., 1008 Swallow Drive, Cherry Hill, NJ 08003. Developed by NU2H.

RTTY JOURNAL, published 10 times per year for those interested in digital communications. Read about RTTY, AMTOR, MSO, Packet Radio, RTTY DX and Contests, and Technical Articles concerning the digital modes. \$10 per year (foreign higher). RTTY Journal, 9085 La Casita Avenue, Fountain Valley, CA 92708.

THE DX BULLETIN provides you with comprehensive, up-to-date DX information and much more. SASE or call for samples. Box 4233, Santa Rosa, CA 95402, 707-523-1001.

YAESU OWNERS - Hundreds of modifications and improvements to rig. Select the best from fourteen years of genuine top-rated Fox Tango Newsletters by using our new 32-page Cumulative Index. Only \$5 postpaid (cash or check) with \$4 Rebate Certificate creditable toward Newsletter purchases. Includes famous Fox Tango filter and Accessories List. Milt Lowens, N4ML (Editor), Box 15944-A, W. Palm Beach, FL 33416, Telephone 305-683-9587.

**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

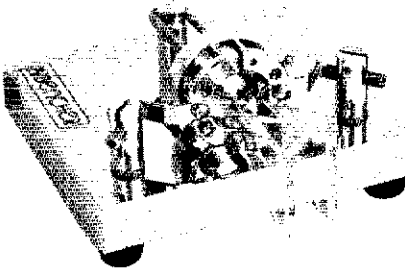
Returnable for full refund within ten day trial period. One year for repair or replacement.

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

**We Make CW
Fun Again**



- Gold Plated Solid Silver Contact Points
- Non-Skid Feet
- Stainless Steel Adjustable Spring for Different Fists
- Nylon & Stainless Self Adjusting Needle Bearings
- Stainless Fasteners
- Large Clear Plastic Handles
- Unmatched Responsiveness

BENCHER, INC.
333 W. Lake St., Chicago, IL 60606
312/263-1808

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
Dipoles			
D-30	30/75	130'	\$31.95
D-40	40/15	65'	28.95
D-20	20	31'	27.95
D-15	15	22'	26.95
D-10	10	18'	25.95
Shortened dipoles			
SD-60	60/75	90'	35.95
SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66'	37.95
PD-8040	80,40/15	130'	39.95
PD-4020	40,20/15	66'	33.95
Dipole shorteners — only, same as included in SD models			
S-80	80/75	131.95/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 Type antenna insulators 1.00/pr.
SO-239 coax connectors 55
No. 14 7/22 Stranded hard drawn copper antenna wire .08/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

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

YOUR NAME AND CALL LETTERS

Embroidered on our 100% ACRYLIC, no-itch, V-NECK SWEATER. MADE IN AMERICA in RED, BLUE, or GRAY. Sizes: S, M, L, or XL. Only \$34.95 each (plus postage and handling. \$3.95 each).

Call Anytime: 1-800-888-SOFT. VISA
M/C **COMPUTER HACKER SOFWAR**
2286A Miner, Costa Mesa, CA 92627
(ALLOW 4-6 WEEKS FOR DELIVERY)
CUSTOM ORDERS INVITED • (714) 645-7345

New

New

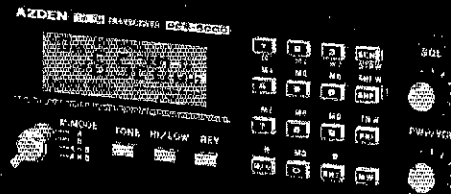
THE STANDARD OF EXCELLENCE

Definitely Superior!

AZDEN PCS-5000

COMMERCIAL — GRADE

AVAILABLE NOW!
PCS-5800H
45 WATTS
10 METER FM



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 1/4 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, BACKLIT 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 microvolt 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

46 Greensboro Highway, Watkinsville, GA 30677 Telephone (404) 769-8706 TELEX: 4930709 ITT

MANUFACTURER:

JAPAN PIEZO CO., LTD.

1-12-17 Kamirenjaku, Mitaka, Tokyo, 181 Japan



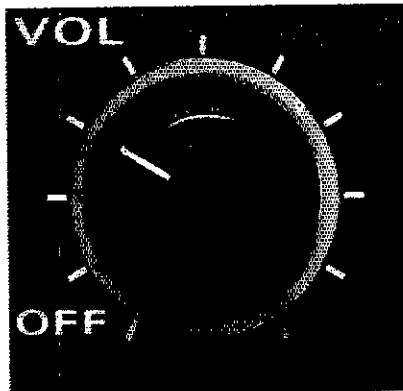
One of the most complex operating controls of our high-performance mobiles.

Now 220 MHz and 12 GHz Models Available

You don't have to sacrifice performance to gain simplicity in your mobile operation.

Yaesu's FT-211RH Series gives you top-of-the-line performance on the 144, 220, 440, or 1260 MHz bands in sophisticated, microprocessor-controlled mobile packages.

With controls that couldn't be more straightforward and easy to learn. Which means greater



they're all based on the same microprocessor programming.

The model lineup includes:

FT-211RH (2 meters, 45 watts), FT-311RM (220 MHz, 25 watts),

FT-711RH (440 MHz, 35 watts), and the FT-2311R (1260 MHz, 10 watts). All

include an *Autodialer* DTMF microphone with ten lithium-backed memories. Each memory can

store telephone numbers up to 22 digits long.

You get a bright-green LCD readout. 10 memories that store frequency, offset, and PL tone (7 memories can store odd splits).

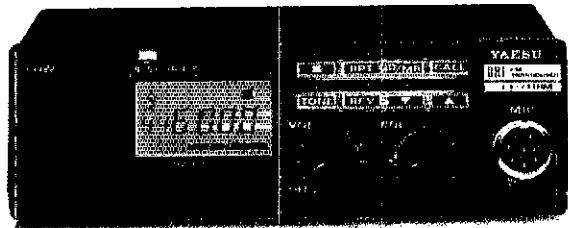
Band or memory scanning. Priority channel.

Independent PL encode/decode memory on each channel (CTCSS Unit optional). High/low power switch. Memory channel lockout for scanning.

And the FT-2311R is fully compatible with either 12 MHz or 20 MHz repeater shifts, and it features a 5-watt low-power position for Novice operation.

What's more, each radio is perfect for overhead mounting. Just remove a few screws and flip the control panel 180°

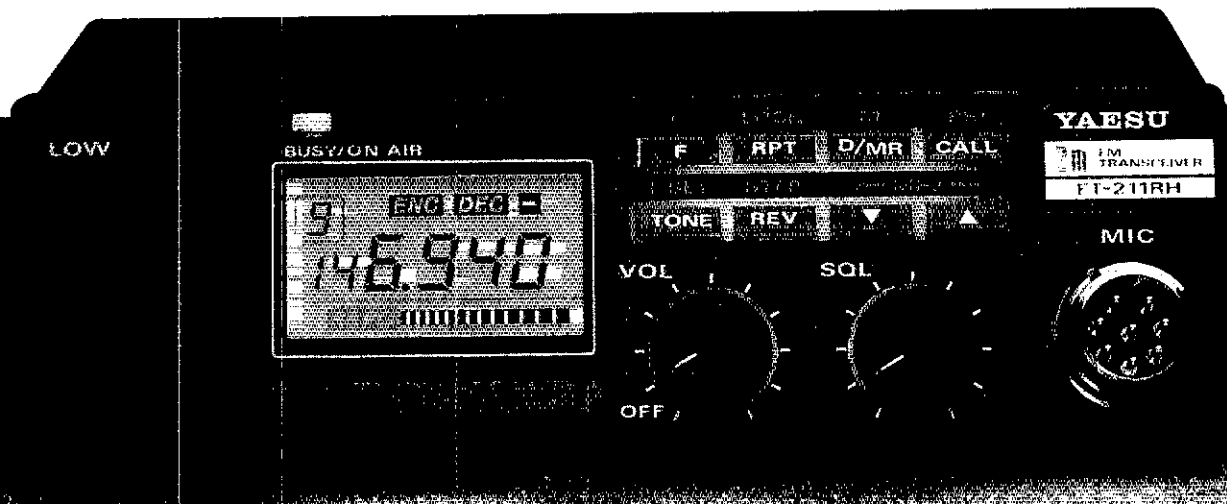
Discover the FT-211RH Series at your nearest Yaesu dealer today. If you can turn a knob and push a button, you'll have high-performance mobile operation mastered.



driving safety without performance compromises.

In fact, if you own one of our FT-23R Series hand-helds, you've already learned to use a 211-Series mobile. Because

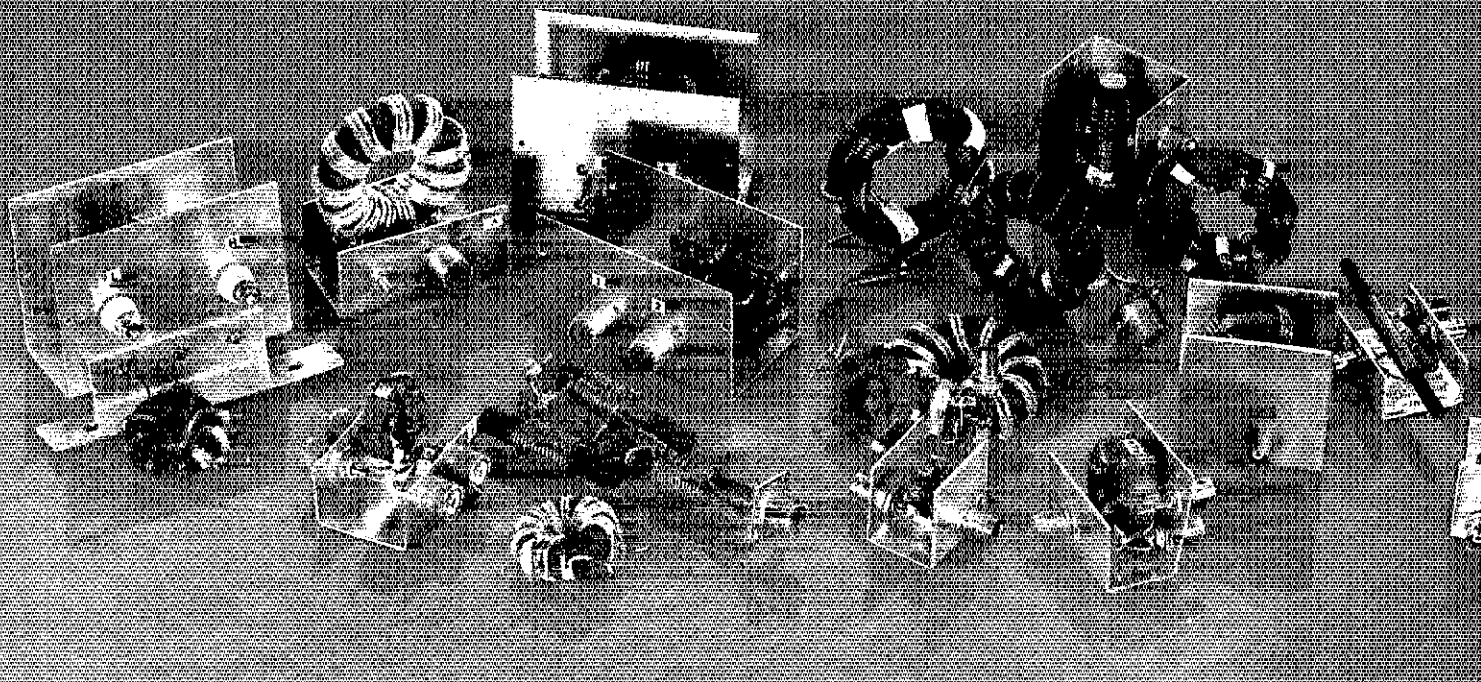
YAESU



Yaesu USA, 210 Edwards Road, Cerritos, CA 90701 (213) 404-3700; Repair Service: (213) 404-4884; Parts: (213) 404-4847; Yaesu Cincinnati Service Center, 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100

Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc.

TRANSMISSION LINE TRANSFORMERS



A new ARRL Publication by Dr. Jerry Sevick, W2FMI

Despite the popularity of transmission line transformers in both commercial and amateur applications, little practical design information has been published concerning these devices. The lack of data was made abundantly clear to Jerry Sevick, W2FMI when he began designing matching transformers for the short vertical antennas that are the subject of his classic series of articles that appeared in *QST*. In order to fill in the gaps of available knowledge, Jerry decided to study the subject of transmission line transformers in depth and the results of his findings are contained in this new ARRL publication!

Transmission Line Transformers covers types of windings, core materials, fractional-ratio windings, efficiencies, multiwinding and series transformers, baluns, and limitations at high impedance levels. There is also a chapter on practical test equipment. This book is must reading for everyone interested in antenna and transmission line theory. Copyright 1987, 128 pages \$10 hardcover only.

CONTENTS

Chapter 1 Analyses

The Basic Building Block
Analyses of 4:1 Impedance Transformer
A Simple Analysis
The Ruthroff Analysis.

Chapter 2 Low Frequency Characterization

Low Frequency Analysis of the 4:1 Unbalanced-to-Unbalanced Transformer
The Rod Versus the Toroid
Rod Parameters

Chapter 3 High Frequency Characterization

Experiment Versus Theory
To Twist or Not to Twist
The Autotransformer Versus the Transmission Line Transformer

Chapter 4 Transformer Parameters for Low Impedance Applications

Stripline Transformers
Low Impedance Coaxial Cable Transformers
The Third Winding

Chapter 5 Transformer Parameters for High Impedance Applications

High Impedance Limitations
Long Transmission Lines
Variable Characteristic Impedance Lines
Series Transformers

Chapter 6 Transformer Designs with Impedance Ratios Less than 4:1

Tapped Bifilar Transformers
Trifilar Transformers
Tapped Trifilar Transformers
Multiwinding Transformers

Chapter 7 Transformer Designs with Impedance Ratios Greater than 4:1

Series-Parallel Transformers
Trifilar Transformers
Trifilar, Coaxial Cable Transformers
Quadrifilar Transformers

Chapter 8 Baluns

The 1:1 Balun
The 4:1 Balun
Baluns With Ratios Greater Than 4:1

Chapter 9 Materials and Power Ratings

History of Ferrites
Experimental Results
Power Ratings

Chapter 10 Simple Test Equipment

The Wheatstone Bridge
A High Frequency Resistive Bridge
Signal Generators
Efficiency Measurements—The Soak Test

Chapter 11 Summary Statements

Chapter 12 References



The American Radio Relay League, Inc
225 Main St., Newington, CT 06111

RADIO SHACK Color Computers: Hardware and Software for ham use. Dynamic Electronics, Box 896, Hartselle, AL 35640, 205-773-2758.

SPY RADIOS WANTED! Buying all types of espionage radios and code machines! Especially wanted are military-type radios in civilian suitcases! Museum, Box 8146, Bossier City, LA 71113, 318-799-7319.

CRYPTOGRAPHY ITEMS wanted. Books, manuals, equipment. Anything related to secret codes or ciphers. WB2EZX, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

CX7 REPAIRS. Mandelkern, 505-528-0917.

PROTECT YOUR EQUIPMENT! Strong, durable, fitted vinyl covers for Alpha, Collins, Drake, Kenwood, ICOM, Ten Tec and Yaesu. Finest quality Cover Craft products. \$9.95 post-paid. Custom sizes available. VISA/MC accepted. The Cover Shop, 1970 Alhambra Drive, Ann Arbor, MI 48103, 313-761-2820.

SELL 726R with 6M module mint. WB2DHC, 201-316-9444.

WANTED: LAFAYETTE PrivaCom 3C, 525, 625, or GE5813B. Radio, 2053 Mohave Drive, Dayton, OH 45431, K9SQG.

"HAMLOG" COMPUTER programs. 17 modules auto-logs, sorts 7-band WAS/DXCC. Full features. Apple \$19.95, IBM or CP/M \$24.95. KA1AWH, PB 2015, Peabody, MA 01960. **APARTMENT DWELLERS/Portable Antenna System:** Simple. Inexpensive. SASE for information. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 312-482-9310.

THE ORIGINAL HAM SACK. Deluxe soft padded case for all popular handhelds. Three zippered compartments for radio, antenna and accessories including some battery packs. Belt loops and detachable shoulder strap. Tough DuPont Cordura (TM) nylon. We are hams and we know you will like this case. Full refund guarantee. \$12.50 includes shipping. Frank & Linda Reed, KC1DM & N1EUR, 15D Daniel Webster Drive, Hudson, NH 03051.

C84 DISK with 26 VEC Code Tests plus random groups plus 1200 words, 1-35 WPM, \$5.95. Wm. Fisher, 2 Barnard Road, Armonk, NY 10504.

BLEEP BLOOP: Very distinctive NASA-style two tone beeper announces beginning and end of your transmission. Auto Mode finds you on the satellite. Kit \$15.95, Assembled \$19.95. John Day, 1440 #4 Ruby Court, Capitola, CA 95010.

LEARN CODE on your IBM-PC (or compatible). Commodore C64/128, or 512K Macintosh. Code-Pro takes you from no knowledge to proficient copy. Specify computer. \$10 plus \$2 S&H. Trio Technology, Dept. 862, P.O. Box 402, Palm Bay, FL 32906.

HAM RADIO REPAIR, all makes, all models. Robert Hall Electronics, PO Box 8363, San Francisco, CA 94128, 408-729-8200.

1988 CALLBOOKS: Prepublication orders this month; either, \$23. Both, \$45. Any 8 or more, \$19 each. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1555, 714-687-5910.

ELECTRONIC CENTER, INC. can save you money! Call for savings on Kenwood, ICOM, Yaesu, Encomm, Rohm Towers, SWL Receivers, and all accessories. Texas 1-800-441-0145; Nat'l 1-800-527-2156; Metro 263-7464; or 214-526-2023. Ham Department, home of the world-famous Sidewalk Sale, 2089 Ross Avenue, Dallas, TX 75201.

NICADS NEW AA 500mAh. Ten for \$11 plus shipping. Raymond Richard, 1787 Village Green Drive, Clairton, PA 15025.

VEC QUESTION POOL on disk. Interactive query and response program tests and improves your understanding for each license exam. Multiple choice and straight memory format. Novice, Technician, General available. IBM PCXT/AT 256k Floppy or Hard Disk. \$19.95 + \$1.50 S/H + \$9.95/license class. SASE more info. BDH SoftLabs, Box 997, Ruston, LA 71237.

AUTOMATIC ANTENNA ROTATOR by Jon Bloom, KE3Z, now available. See Sept. 86 QST magazine for circuit details. Kit w/PCB & EPROM \$87.75. For info SASE to: A & Engineering, 2521 W. LaPalma, Unit K, Anaheim, CA 92801 714-952-2114.

DANDYS FOR Kantronics - KPC2 - \$149, KPC4 - \$289, KAM - \$285, all PPD. Dandys, 124 S. Washington, Wellington, KS 67152 316-326-6314.

ATARI PACKET PROGRAM - Connect any TNC having TTL serial port directly to your Atari. No 850 Interface needed. Works great with Kantronics and MFJ. Features disk and printer capability. Cartridge \$35, Disk \$15. Electrosoft, 1656 South California Street, Loveland, CO 80537.

CLEAR GLASS Coffee Mug; Custom engraved with your call sign and your first name. Only \$10 per mug. Write: Regency Glass Engraving, P.O. Box 802, Novato, CA 94948.

WANTED: OLD 4-pin tubes such as -01A's, WD-11, WD-12, others, for my old radios. Please state price. Frank White, KB9TG, Box 2012, Olathe, KS 66061.

WANTED - COLLINS 32S-3 Transmitter with Power Supply. Must be Round Emblem and in excellent condition. WA1CPU, P.O. Box 133, Brooklyn, CT 06234.

SILENT KEY OF KB2VL complete station. Gear in excellent condition, sacrifice at \$2,600. Details: Contact Hollenbeck, Box 91, Spring Haven, Flat Rock, NC 28731.

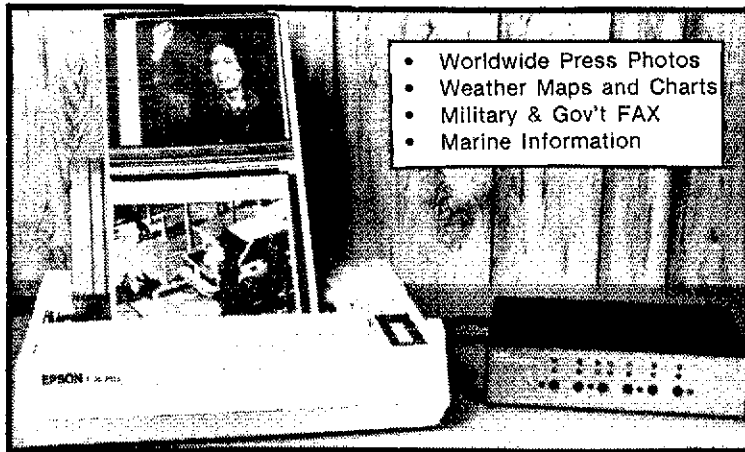
SMART BATTERY CHARGER for Gel Cells or lead-acid batteries, by Warren Dion, W1BBH. See June 87 QST Magazine for circuit details. Complete kit, nothing else to buy, only \$49.95 plus \$3.50 s/h. Order #150-KIT. A & A Engineering, 2521 W. LaPalma, Unit K, Anaheim, CA 92801, 714-952-2114.

SEND PERFECT CW with your computer. Name, QTH, etc. sent with single keyboard stroke. Much more. \$15 for Commodore 64/128 "COMKEY" program. Information included to build interface or \$17 for homemade. Nothing else needed. Money back guarantee. Write for free details. Fritz Reuning, K4OAG, 120 Elk Road, Bristol, TN 37620.

FINALLY!

HIGH QUALITY FACSIMILE ON A DOT-MATRIX PRINTER.

WRITE FOR FULL INFORMATION



- Worldwide Press Photos
- Weather Maps and Charts
- Military & Gov't FAX
- Marine Information

WRITE FOR FULL INFORMATION

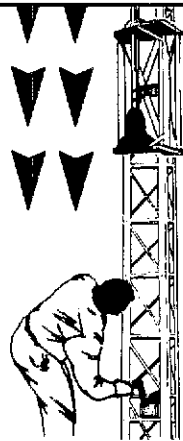
INFO-TECH M-800 ... YOUR "EYES" TO THE WORLD

Copies all speeds and IOC's. Positive/Negative, R-L-L-R Automatic Manual, Line/Gray

UNIVERSAL AMATEUR RADIO, INC.



1280 Alda Drive
Reynoldsburg, Ohio 43068
PHONE: (614) 866-4267



SAVE TIME and MONEY with THE HAZER

Bring things down for safety and convenience.

Never climb your tower again with this elevator system. Antennas and rotator mount on HAZER, complete system trams tower in verticle upright position. Safety lock system operates while raising or lowering. Never can fall.

Complete kit includes winch, 100 ft. of cable, hardware and instructions. For Rohm 20 and 25 G Towers.

Hazer 2 - Heavy duty alum. 12 sq. ft. load **\$297.00 ppd.**
Hazer 3 - Standard alum. 8 sq. ft. load **\$213.00 ppd.**
Hazer 4 - Heavy galv. steel 16 sq. ft. load **\$278.00 ppd.**
Ball Thrust bearing TB-25 for any of above **\$49.50 ppd.**

KENPRO Antenna Rotors

KR-400 11 sq. ft. Azimuth Rotor **\$214.95 ppd.**
KR-600 19 sq. ft. Azimuth Rotor **\$299.95 ppd.**
KR-2000 27 sq. ft. Azimuth Rotor **\$549.95 ppd.**
KR-5400 AZ-EL Satellite Rotor **\$399.95 ppd.**
KR-1000 22 sq. ft. Azimuth Rotor **\$490.95 ppd.**

Send for free details of aluminum towers specifically engineered for use with the Hazer.

Satisfaction guaranteed. Call today and charge to Visa, MasterCard or mail check or money order.

GLEN MARTIN ENGINEERING INC.
Route 3, Box 322
Boonville, MO 65233
816-882-2734



1986-87 CALL DIRECTORY

(On microfiche)

Call Directory \$8
Name index 8
Geographic Index 8

All three — \$20

Shipping per order \$3

BUCKMASTER PUBLISHING

Mineral, Virginia 23117

703: 894-5777

MULTI BAND TRAP ANTENNAS



TRAP DIPOLES:

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	35'	\$59.95
D-52	10/15/20/40/80	2	105'	84.95
D-56	10/15/20/40/80	6	92'	109.95
D-66	10/15/20/40/80/160	6	163'	129.95

TRAP VERTICALS - "SLOPERS":*

VS-41	10/15/20/40	1	29'	44.95
VS-52	10/15/20/40/80	3	49'	59.95
VS-53	10/15/20/40/80	3	42'	59.95
VS-64	10/15/20/40/80/160	4	73'	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 leadline works all bands - Instructions included - 10 day money back guarantee!

SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-60	60/75	100'	25.95
D-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-58	90'	12.00	16.95

DELUXE CENTER CONNECTOR

- NO RUST Brass Terminals
- NO Jumper Wires Used
- NO Soldering
- Built-in Lightning Arrestor
- With 50-239 Receptacle
- Handles Full Power
- Completely Sealed, Weatherproof
- Easy Element Adjustments
- Commercial Quality



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/ppr
For 5-band Dipole Ant.	80/40/20/15/10	\$38.00/ppr

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



EVERY ISSUE OF QST on Microfiche!!!

We are now accepting orders for the entire run of QST from December, 1915 thru December, 1986.

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 \$150.00 (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



COAX SALE!



High-quality precut 50 ohm coax lengths with "N" connectors that are better substitutes for RG-8; unused AT&T surplus: #RG-213-15, 15 ft. RG-213;

4 lbs sh. \$8.95 ea; 2 for \$16.00

#RG-214-45, 45 ft RG-214, silver-tinned conductor, double shield for low DC resistance;

15 lbs sh. \$24.95 ea; 2 for \$45.00

CENTRALAB 850 7.5 KV RF capacitors; 25, 50, 75, or 100 pf (specify). Used \$3.00 ea; 2 for \$5.00

4CX250R tube, 6.3 V fil: used-checked \$35.00 ea

EIMAC/JOHNSON SOCKET for 4CX250, used \$12.00

Prices F.O.B. Lima, O. • VISA, MASTERCARD Accepted.

Allow for Shipping • Write for latest Catalog Supplement

Address Dept. QST • Phone 419/227-6573

FAIR RADIO SALES

1016 E. EUREKA • Box 1105 • LIMA, OHIO • 45802



R & D ENGINEERS

HAL Communications Corp. has immediate openings for talented hardware/software design engineers. Particularly desired are engineers with qualifications in the following areas:

- Assembly programming (Z80 & 8086)
- C and PASCAL programming
- Z80 & 8086 hardware design
- Military and rugged commercial packaging
- HF Radio systems
- Data Modem design

U.S. Citizenship is required. Send resume and salary history to:

HAL Communications Corp.
Box 365, Urbana, Illinois 61801

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

1-800-84-72346

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

A RADIO JOURNAL From 1912 to 1940

Here is the book you have been waiting on. From spark gap to computers. W9CRC's 65 years experience in ham radio and radio broadcasting. Send \$9.00 to:

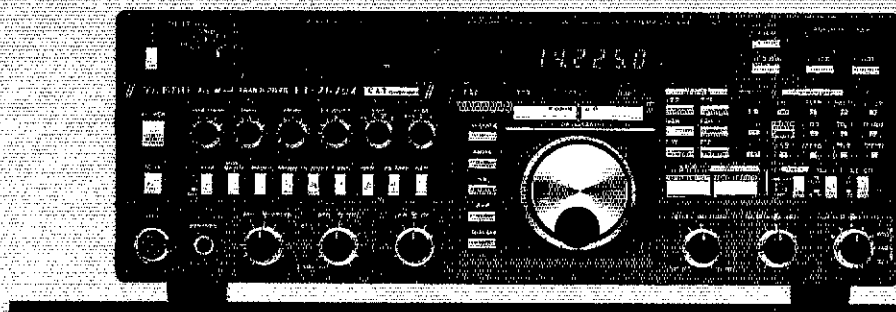
R & R Press
1011 Linda Drive
Kokomo, Indiana, 46902

To transform your shack into a DX powerhouse, combine the intelligence of Yaesu's FT-767GX HF/VHF/UHF base station and the muscle of our powerful FL-7000 HF amplifier.

You'll be amazed at how you can cut through pile-ups. Be heard anywhere in the world. And wake up otherwise inactive bands.

The brains of the operation: The FT-767GX. This intelligent HF/VHF/UHF base station includes four microprocessors for unparalleled flexibility and ease of operation.

Features include 160 to 10 meter transmit, including WARC bands. Optional plug-in modules for 6-meter, 2 meter and 70-cm operation. Receiver coverage from 100 kHz to 30 MHz. AM, FM, SSB, CW, AFSK modes built in. Ten memories that store frequency, mode, and CTCSS information (optional CTCSS unit for controlled-access repeaters). Memory check feature for checking memory status without affecting operating frequency. Dual VFOs with one-touch split frequency capability. VFO tracking for slaved VFO-A/VFO-B operation at a constant offset. Digital display in



GET THE BRAINS.

10 Hz steps. Slow/fast main dial tuning. Synthesizer step programming at up to 99.99 kHz per step. Digital SWR meter. Digital RF power meter. Built-in RF preamplifier. Adjustable drive level from 0 to 100 watts. Blue fluorescent display. Built-in AC power supply.

Up to 30 minutes continuous transmit (100% duty cycle). Full CW break-in. Built-in CW electronic keyer. Audio peak filter for CW (Yaesu patent). CW and AM wide/narrow filters. Woodpecker noise blanker.

RF clipping speech processor. IF shift for both receive and transmit (TX side allows you to adjust voice frequency response pattern). IF monitor. IF notch filter. Audio low-pass filter.

Built-in antenna tuner with memory of settings on each band. Separate antenna connectors for each VHF or UHF optional unit. Separate beverage antenna receive input on rear panel. Quick turnaround time from TX to RX for AMTOR, Packet, and QSK CW. AGC slow/medium/fast/off selection. Push-pull MRF423 transistors



Rob, WA3QLS

Delaware Amateur Supply



Paul, WA3QPX

71 Meadow Road, New Castle, Del. 19720

302-328-7728

Factory Authorized Dealer!

9-5 Daily, 9-8 Friday, 9-3 Saturday

**AEA • ALINCO • AMERITRON • CUSHCRAFT • ICOM
• KANTRONICS • KENWOOD • MOSLEY • SANTEC
• TELEX HY-GAIN • TENTEC • YAESU • AND MORE!**

Large Inventory, Daily UPS Service

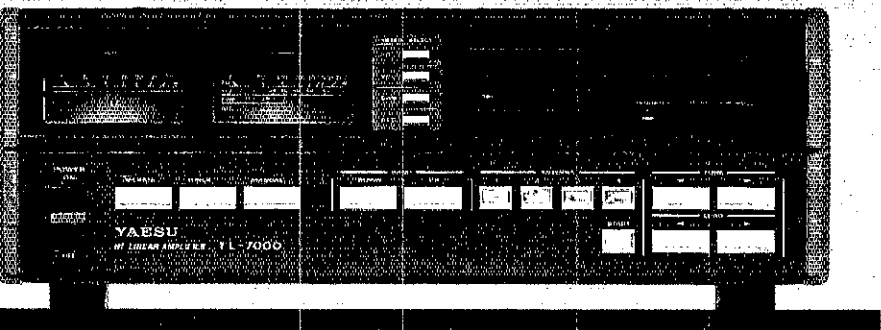
800-441-7008

Katherine, KA3IYO

New Equipment Order & Pricing

Prices are subject to change without notice or obligation. Products are not sold for evaluation.

**NO Sales Tax in Delaware! one mile off I-95
SERVICE, USED GEAR INFO: 302-328-7728**



AND THE BRAWN.

(rated dissipation 290 watts each) operated at 24 volts for excellent intermodulation rejection in transmitter.

Enhanced C.A.T. system for external control of transceiver from personal computer. (Software for Apple IIe/MAC, Commodore C-64, and IBM-PC is available through your Yaesu dealer.) There's also data communication with the FL-7000 linear amplifier for hands-free amplifier operation.

The muscle to get you out: The FL-7000. This solid-state amplifier covers 160 to 15 meters, and includes

a built-in power supply, automatic tuner and lots of powerful operating features.

There's fast turnaround time for break-in (QSK) CW, HF packet radio, and AMTOR. Only 70 watts excitation for full output, and 1200 watts PEP input power. Fully protected push-pull parallel wideband "no-tune" amplifier circuit powered by 47V, 25A DC power supply. Yaesu's exclusive "DVC" (Direct Vertical Cooling Heatsink System) with bottom-mounted fan. Automatic antenna matching sensor

turns off amplifier and rematches tuner circuitry if SWR rises above 2:1. Hands-free automatic band change when used with FT-767GX, FT-757GX or FT-980. Lithium battery backup remembers antenna selection and tuner settings. Dual 2-speed fans with independent thermal sensors. Connection to up to four antennas, including automatic selection via optional unit. Eight front panel LED status indicators. And more.

Get the DX advantage. Just combine the FT-767GX's brains, the FL-7000's brawn, and your special operating knowledge. What an impact you'll make on the world!

YAESU

Yaesu USA

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

Repair Service: (213) 404-4884

Parts: (213) 404-4847

Yaesu Cincinnati Service Center

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

Prices and specifications subject to change without notice.

1988 CALLBOOKS



The "Flying Horse" sets the standards

Continuing a 67 year tradition, we bring you three new Callbooks for 1988.

The North American Callbook lists the calls, names, and address information for 478,000 licensed radio amateurs in all countries of North America, from Canada to Panama including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The International Callbook lists 481,000 licensed radio amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1988 Callbook Supplement is a new idea in Callbook updates, listing the activity in both the North American and International Callbooks. Published June 1, 1988, this Supplement will include thousands of new licenses, address changes, and call sign changes for the preceding 6 months.

The 1988 Callbooks will be published December 1, 1987. See your dealer or order now directly from the publisher.

North American Callbook	
incl. shipping within USA	\$28.00
incl. shipping to foreign countries	30.00
International Callbook	
incl. shipping within USA	\$30.00
incl. shipping to foreign countries	32.00
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	\$55.00
incl. shipping to foreign countries	60.00

Illinois residents please add 6½% 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



IBM-PC RTTY/CW. New CompRtty II. The complete RTTY/CW program for IBM-PC's and compatibles. Now with larger buffers, better support for packet units, pictures, much more. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in screen editor! Adjustable split screen display. Instant mode/speed change. Hardcopy, discopy, break-in buffer, select calling, text file transfer, customizable full-screen logging, 24 programmable 1000 character messages. Ideal for MARS and traffic handling. Requires 256k PC or AT compatible, serial port, RS-232C TU. \$65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 25 Village View Bluff, Ballston Lake, NY 12019.

SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrac compatibility, extensive instructions, and strong user support. Send SASE for details. SUPER VR85: \$35 ppd (Calif. residents add 6% sales tax) RLD Research, McCloud, CA 96057. W6AMW owner.

WANTED SWAN WM2/3000 Watt Meter. K4NBN "No Bad News".

PC/MS-DOS HAM Software: Send \$1 for Software Catalog Disk to: K14OQ, Tom Zabka, Box 2538, Ormond Beach, FL 32076.

HAM RADIO Self-Study Course - Pass the new Enhanced Novice Voice Class written and code examinations quickly and easily. Illustrated textbook explains answers to all 302 questions. Two cassette tapes make code learning fun! Guaranteed! \$19.95 plus \$2 for same day shipping. VISA/MC accepted. Instructor discounts available. W5YI-VEC, P.O. Box 10101, Dallas, TX 75207.

MONTERRAT DXpedition Be DX for only \$300/week! Details: VP2ML, Box 4881, Santa Rosa, CA 95402.

SPECTRUM Communications SCR1000 2M Repeater. Wacom Duplexer WP-639. \$1650. Milton Onaga, KH6US, P.O. Box 6122, Kahului, HI 96732-8922.

OLDTIMERS! - N6AW is compiling information for a series of articles and a book about W6AM. If you have a story to tell about Don Wallace, jot it down. If you have pictures of Don or his station from past years, please make a copy. (Costs reimbursed.) Send to: Jan D. Perkins, N6AW, 6200 E. Ocean Bl. #7, Long Beach, CA 90803.

LINEMAN'S BELTS \$30; extra safety straps \$10; pole climbers \$15; extra climber straps \$4/pair; \$2.50 postage each item. N2RU, John Orr, 715 River Road, Fair Haven, NJ 07704, 201-747-7334.

FULL TRANSMIT Screen Editing in the DIGIPAC series of telecommunications programs for your packet or multimode controller and PC or compatible/clone. With full NTS traffic forms and other features. All under \$50. Write for information and pricing. Kalt and Associates, 2440 East Tudor Road, Suite #138, Anchorage, AK 99507, 907-248-0133. Charge Cards accepted.

FLORIDA QTH. 1983 Custom 2250 sq. ft. home. Master bedroom suite with ham shack. Fifteen miles from Gainesville in center of hunting and fishing. Tower, satellite, many extras. \$84,500. AA4FL, 904-481-2677.

UNIVERSAL eight voltage regulated power supply. Will power 99% of all discrete transistor and integrated circuit devices. Kit without case \$179.95. Complete kit \$239.95. Wired \$449.95. Pepperkit, 527-10th Street, Sparks, NV.

QRP KITS and parts. SASE brings brochures. W1FB, Box 250, Luther, MI 49656.

FOR SALE: Collins radio transmitter; crank-down tower and antenna. Call evenings 914-969-1223. Mrs. A.E. Kokinchak.

WANTED: 8874 tubes two - Roy Jones, 205 Industrial Avenue, Williston, VT 05495.

PERSONALIZED Shirts/Hats Call Signs Decals etc. Send SASE for details and sample lists. Paddy Daddy Productions. 5515 Jackson Dr. Ste. 819, La Mesa, CA 92041, 619-697-2145.

DXER'S Locator Blue Book. Instant prefix ID, DX Bearings, Locator Grid Map, DX Time, Zones, QSL, QTH info. SASE sample, satisfaction guaranteed \$4.50 W4UJY - JJC Enterprises, 4920 Mayflower Street, Cocoa, FL 32927.

ATLAS RADIO Repair Service—Factory trained technicians. Fast service and reasonably priced. Parts available. RF Parts, 1320 Grand, San Marcos, CA 92069, 619-744-0720.

CODE PROGRAMS. Apple/C-64. 37 Modes, Graphics, Lessons, etc. Laresco, POB 2018, 1200 Ring Road, Calumet City, IL 60409, 1-312-891-3279.

UNIVERSAL eight voltage regulated power supply. Will power 99% of all discrete transistor and integrated circuit devices. Handiest DC supply around. Every electronic workshop should have one. Kit without case \$179.95. Complete kit \$239.95. Wired \$449.95. F.O.B. Pepperkit, 527-10th Street, Sparks, NV 89431-0811. SELL: ICOM IC-751. excellent condition, one owner. \$675. KQ4O, 803-871-3190.

SELL: HW-16, VFO HG-10B \$130; Knight T-50 Transmitter. Al Hawkluk, N7JAK, Rt. 1, Box 1A, Charlo, MT 59824, 406-644-2335.

COMMODORE CHIPS (factory fresh) for the C64/128 Computer/Peripherals. Low prices eg: 6510-\$9.55, 6526-\$9.95, 6567-\$14.75, 6581-\$12.85, PLA-\$10.95, 901 ROMs at \$10.95 each. Just out new C128 ROMs - \$39.95 set of 3, and many others.... "The Commodore Diagnostician." A complete reference chart for fixing Commodore computers, etc. An absolute must. Over 3,000 sold. \$6.95 plus postage.... HD Power Supply for C64-\$27.95.... Send for complete catalog Kasara Microsystems, Inc., 33 Murray Hill Drive, Spring Valley, NY 10977, 800-642-7634 or 800-248-2983 (outside NY) 914-356-3131.

HIGH POWER - Low Cost: Hallicrafters SR-2000 "Hurricane," 1,000/2,000 Watt transceiver with spares, \$650 plus UPS or trade for late model rig, Phil, KG6KB, 805-962-8957, 120 Cedar Lane, Santa Barbara, CA 93108.

JENNINGS UCSSL-1000 Vacuum Variable capacitors, 10 to 1000 mmFd at 500V with gear drive train and mounting bracket. Ideal for that linear amplifier or tuner \$69.50. Plate transformers Genset p/n271-107 for models 903, 913A 2/6M 200W VHF linear amplifiers, using 4X150A, 4CX250B, 1650VDC at 400mA, size inches 5¼L x 4 1/2W x 4¼H. For replacement or amplifier construction \$37. HP608A Signal Generator 50 kHz thru 65 MHz \$375. HP608C Signal Generator 10 MHz thru 480 MHz \$345. Measurements Model 800 FM Signal Generator covers amateur/commercial FM bands 25 MHz thru 960 MHz, \$550 lab calibrated, have quantity, satisfaction guaranteed, VISA, M/C, check, add shipping. Phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441. Otto, NC 28763.

DIGITAL AUTOMATIC DISPLAYS for FT-101's, T8-520's (DG-5 clone), Collins, Drake, Swan, Heath and all others. 8x 1/2" digits, 5" wide by 1¼" metal cabinet. Reads receive and transmit frequencies. Send \$2 for information. Receive a \$30 discount. Includes comparison of the simple "BCD" readouts found in new radlos and our very accurate "Calculating Frequency Counter" readouts. Please be specific. Grand Systems, POB 3377, Blaine, WA 98230.

SELL: DRAKE TR4CW, AC4, MS4, RV4C, near mint, \$450; Clipperton L \$450; Globe Ring 500B, \$325; 75A4, 3.1, vernier No. 46 \$375; Heath Ham Scan, HO-10 Monitor, \$45; GSB-100, 75; GSB201 Amp, 4-811's, \$300; B&W 5100, \$85; pair of 1000T's; homebrew amp, 2500W dc out, 160, 80, 40, 20, 1500; KLM 10-30 log periodic, \$500; Telrex Christmas tree rotor, 50 foot tower, \$750 take down; all FOB, Dick Shear, KBCCV, 216-427-2303, 6-9 PM EST weekdays.

TENNATEST **** ANTENNA Noise Bridge. Out performs others. Accurate. Costs less. Compare 1-40 MHz, \$44, 1-150 MHz, \$72. Satisfaction guaranteed. Send stamp for details. W8JRR, 1025 Wildwood Road, Quincy, MI 49082.

PRC-64 XCVR. Excellent condition w/accessories. \$250. RT-6 spy xmr. new. \$80. USM-117 scope \$75. Gary Cain, 1775 Grand #302, St. Paul, MN 55105.

WANTED: EQUIPMENT AND Related Items. The Radio Club of Junior High School 22 NYC, Inc. is a non-profit organization, granted 501(c)(3) status by the IRS, incorporated under the laws of the State of New York with the goal of using the theme of Ham Radio to further and enhance the education of young people. Your property donation would be greatly appreciated and acknowledged with a receipt for your tax deductible donation. Please contact W8ZKJ using the Callbook or telephone 516-874-4072, 24 hours, seven days a week. Thank you!

ELECTRONIC COMPONENTS for special projects any solid state device, we have it for you all brands, hard to find, new releases call or write for information and quotes ask for Luis, WD4JQS, Telesys, Inc., 305-599-8558, 5084 NW 74th Street, Miami, FL 33186.

NEW, UNIQUE Logging and Contest Programs for the Commodore C128. Fast, generalized sort and print. SASE for description; \$24.95 for the package. Dave Kirk, KY3J, 1914 Yardley Road, Yardley, PA 19087.

RECENT TEN-TEC Century/22 \$295. RTTY Monitor Scope \$30 Heathkit Antenna load \$10. W6XXM, 619-459-5527.

FOR SALE: Computer Radio Shack TRS-80 Model III, 48K RAM, with 6 1/4" floppy disk drives, manuals, some 80 Micro Magazines, TRS-80 Model I Modem and some Ham Software. All for \$450. Call after 5:00 pm CDT 901-744-4644, WD4Q.

COLLINS KWM-380 mint condition options NB/SP/1.7 filter shop manual \$2800. 809-783-9143 from 8:00 PM to 11:00 PM EST. KP4MP.

KENWOOD: SM220 Monitor Scope mint condition \$275. BS-8 Pan Kit, never installed \$75. Kenwood AT-230 Antenna 1/2 meter mint \$100, KC2I, 201-939-2237.

HEATHKIT SB102 transceiver, SB810 speaker, HP23B power supply, and microphone with manuals, excellent condition, sold as set only \$200 plus UPS. Also Drake TR33C FM transceiver, excellent condition \$60 plus UPS, 513-426-0948 after 5 EST. Gary Sargent, W8BTPD, 4227 Willow Run Drive, Dayton, OH 45430.

FOR SALE: ICOM IC-451 430 MHz to 439.99 and Mirage D1010 430-450 MHz 100W. McClellan, W9KMY, 317-459-8243.

TOWER AND Tribander 70' Rohn 25 G and KLM KT-34A. You take down and remove, \$300 firm. KC4ZR, Lexington, KY, 606-223-2542.

SELL: HALICRAFTERS SX-117 Receiver \$130. Call: 607-987-7298 after 5 PM ask for Kurt, K2MGR.

COLLINS KWM-380 mint condition options SP/CW Filter shop manual \$2300. 809-783-9143 from 8:00 PM to 11:00 PM EST. KP4MP.

SELL PDP-8/S, A-D Converter, 8-level Punch and Reader, patch panels in DEC cabinets (2) with all pwr supplies. Pick-up or might consider delivery. Cheap! Make offer. K4RN, Box 312, Versailles, KY 40383, 606-233-1061 days.

FOR SALE: Heathkit Linear Model SB-220 Series 21804 \$375. Drake TR4C with a Drake RV4-AC4 Power Supply \$265. W8BQW, 614-263-7897, Charlie, 1872 Radnor Avenue, Columbus, OH 43224.

WANTED: TS-670 Quad Bander, buy or trade for 71-ANRD-515. N4JQC after 2200 GMT, 313-894-2382.

SELL: KENWOOD TWINS T-599D and R-599D with S-599 speaker. Recently factory overhauled. \$300 plus shipping. Paul, W8DVP, 319-752-8858.

FOR SALE: Kenwood VFO-230 \$200 will ship prepaid, used once. W.E. Nixon, 55 Radcliff Avenue, Port Washington, NY 11050, 516-883-4784.

FOR SALE - Radio Shack Computer Model 4A, 128K RAM. Included is Modem with cable; Vidtex; PFS:File; PFS:Report; SuperScript; Visicalc; Speech Talker Hardware/Software; Operator & Technical Manuals; Keyboard Cover; Screen Filter; Diskette File Box with Diskettes. Above to be sold as a set, will not breakup into parts. Also, Atari 5200 Game Set with Trak-Ball Controller & 12 games. Make offer. John Heacock, K3YCP, 2650 Bluffton Road, Buford, GA 30518, 404-932-2448.

COLLINS KWM-380 mint condition options SP/Keyboard Interface/Pad manual \$2100. 809-783-9143 from 8:00 PM to 11:00 PM EST. KP4MP.

WANTED: MOTOROLA HT-220 Handtalkie and charger. K0LZF, 612-537-1431.

SELL: SB230 AS IS, needs new 8873, otherwise mint. with manual, make offer to original owner WB3JFW. I will UPS.

CLEANING SHACK: Sell many goodies, also QST, CQ, 73, HamRadio back to 1946. SASE/37 cents. No fonecalls pls. W2MOB.

TS940SI/AT new warranty card 2-500 Hz CW Filters. \$1800. George Zielinski, W9QA, 312-361-0969.

WANTED: HALLICRAFTERS Model HA-10 LF/MF Tuner. Joseph Karr, N9FAU, 3800 Cheyenne Court, Racine, WI 53404.

FIRE SALE: Collins KWM-380 Pro-Mark, mint, no options, includes Collins Desk Mic, Collins Manual, WARC. \$2000; ICOM 720 A, w/PS 15, H/H mic, WARC, mint, \$600; ICOM 02AT, BP-3, BP-4, BP-7, BC-35, BC-16U, CP-1, HM-9, HS-10, HS-10SA, HS-10SB, CA-5, as package only, \$2200; also additional items, call N4PIH, 813-921-7291.

WANTED: LINEAR, no tune HF amplifier, 80 thru 10 mtrs, for mobile service. Carl Vincent, KA5MXX, 2317 Rio Grande, Orange, TX 77630.

TEN-TEC CORSAIR 2 new warranty card, \$1025 Model 263 Remote VFO, \$110, Drake SP75 Speech Processor, \$80. George Zielinski, W9QA, 312-361-0969.

WANTED - CENTURY 21 with PS to loan to new Novice operators - Escondido Amateur Radio Society, PO 271117, Escondido, CA 92027.

SELL: ICOM PS-35 internal power supply \$149. Tokyo Hy-Power HC400L antenna coupler \$150. Regency HX1200 scanner with charger \$135. Sears RT-40 CB radio converted to ten meter base and mobile cords and two mikes \$135. Barker and Williamson A8-80 80-10 meter trap dipole with balun \$50. Isopole 2 meter antenna \$45. Calrad 8 amp power supply \$40. WA1WED, S. Powers, 41 Elsie Road, Brockton, MA 02402.

DRAKE TR4CW/RIT 34PNB AC4 MS4, excellent \$475. B&W 593 Coax Switch \$15. Wanted Corsair II, MN2700, B1000, Radio Shack Time Cube, Drake memorabilia, HP21 Calculator. WB4ZCD, 806-441-9684.

HELP! HK0BKK needs good 3-500Z or pair 572B's. Write N3JT, Box 19346, Washington, DC 20036.

TRADE Chicago 1936 Wouff Hong for commercial built watt-meter. W6BIH.

NEED TWO new or used 572B tubes. State condition and price. Bob, WB0QIT, 19628 Flamingo Street NW, Cedar, MN 55011, 612-753-2752.

WANTED: Heathkit Electronic Keyer model HD-1410. Good condition. Will pay premium price and shipping. Write or call K4HRY, John Alden, 1324 Trotwood, Columbia, TN 38401, 615-388-6060 day - 6500 nite.

FOR SALE: Tri-Ex free standing telescoping tower, W-67. Motorized with HAM IV. New base and hardware. Call evenings after 7:00 - Tuesdays through Friday 203-488-6234 or mornings 203-787-2149. K1SEO, P.O. Box 1064, Branford, CT 06405.

WANTED: Mint Ten-Tec Argonaut 515 plus or minus accessories; parts for SB220 or disabled SB220 for parts. Sell: Yaesu FT7 \$260. John M. Glezen, P.O. Box 2171, Syracuse, NY 13220.

WILSON T-1402SM 2-meter HT. Charger, nicads, speaker mike, leather case. WB2BWE, 213-305-9341.

RIGID PLEXIGLAS key cover Bencher \$9.95; MFJ-422 \$9.95. George Chambers, K0BEG, 302 S. Glendale Avenue, Coffeyville, KS 67337.

SINGER NF-105A Field Intensity Meter, 14kHz - 1 GHz, \$1000. Cleveite Brushmark 260, 6 channel recorder, \$300. Precision Signal Generator, series E-200-C, 80 kHz - 120 MHz, \$25. Stoddard Field Intensity Meters, 150 kHz - 1 GHz, \$50. Swan 350 SSB transceiver, \$200. Hamtronics, R75A-137 VHF - weather satellite receiver, \$100. Dennis Hennigan, WA1HOG, 43 Foliage Way, Rindge, NH 03451, Days: 617-935-4850.

FREE Ham Catalog: SASE. Bahr, 2549-G6 Temple, Palmbay, FL 32905.

AMATEUR Radio Service. Quick and reasonable SIGMA-TECH. UPS: 304 Pony Trail, Mt. Shasta, CA 96067, 916-926-3777.

WANTED MANUAL(S) for D&A "PHANTOM" linear amp. Also, OS-51/USM-24C oscilloscope. Write Jim Danowski, KA7RHN, 5401 E. Sweetwater, Scottsdale, AZ 85254.

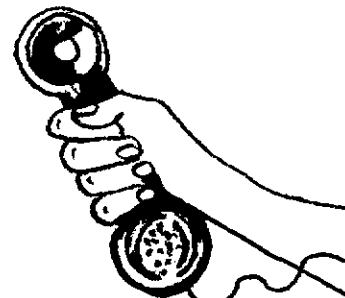
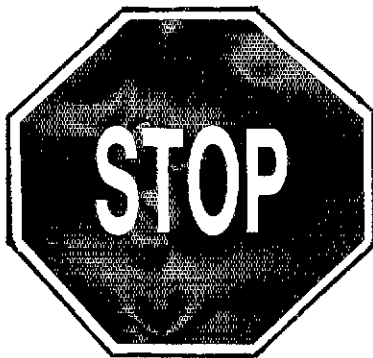
WANTED: Schematic for BC924A, N9AXX, Ken Smith, 1344 W. Winnebago Street, Appleton, WI 54914, 414-739-6187.

YAESU FT-726R Multimode Transceiver, 2M/70CM, satellite duplex, CW filter, SP-102 speaker, mics. Mint condition, almost unused, \$995, or trade for mint S-Line. Keith Kunde, K8KK, 8355 Dalepoint Road, Independence, OH 44131, 216-524-7898.

COLLINS 519-1, 300 Hz CW filter, weighted knob, Cover Craft, 55G-1, cables, manuals, etc., 1977 R/E, new in boxes. As package, serious inquiries only, \$1750 or better. 180S-1 tuner, as new, \$150. CP-1, new, 2/78 date codes, \$150. SM-1 microphone, as new, R/E, \$45. S-Line weighted knob, new, \$70. 75A-4, 32S/75S, KWM-2 Cover Craft covers, new, \$10/each. John, WB8IFG, 183 Tacoma, Troy, MI 48064, 313-362-2706, 362-2656 message.

ROBOT 300 SSTV converter for sale. With manual and schematic. \$95. Ron, W2GTE, P.O. Box 10588, Rochester, NY 14810.

ICOM IC-271H 2-mtr xcvr all mode internal IC-PS35 100 watts mint w/mike es HY-GAIN V-25 5/8wv vertical ant sell \$800 or trade for HF rig. Bill, W5VGU, Box 567, Edmond, OK 73034, 405-341-4189.



For your best price on KENWOOD, YAESU, ICOM and all MAJOR BRANDS dial

800-227-7373

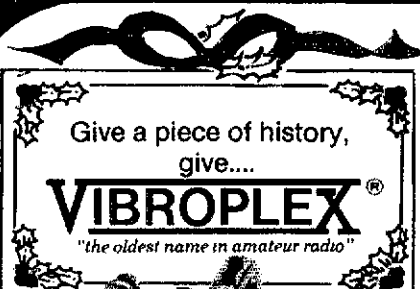


COLORADO COMM CENTER


303-288-7373
525 E. 70th Suite 1W



CODS Welcome
Denver, CO 80229



Give a piece of history,
give....
VIBROPLEX[®]
"the oldest name in amateur radio"



NOW ORDER TOLL-FREE!
DIAL 1-800-AMATEUR

Hear what experienced operators say about Vibroplex

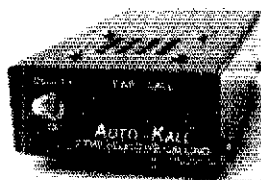
Barney E. Severns WB6QGG
"... It's a pleasure to find a few "old-time" companies still doing business in the old manner. 73's ..."

Richard M McGarry W4CXH
"After more than 40 years of dealing with Vibroplex, I would like to thank you for the many courtesies extended to me. I think you are exemplary of the old-time American companies that provide service ..."

Now that you have their word on it, take our word. Vibroplex guarantees satisfaction. Order your key today. Also available: carrying cases and other key gifts.

See your dealer or write for an **The Vibroplex Company, Inc. P.O. Box 598 DTS** illustrated catalog detailing our **98 Elm St. Portland, Maine 04101** world famous products to:

AUTO-KALL



GIVE YOUR EARS A-BREAK!

The AUTO-KALL plugs into the speaker jack on your VHF/UHF FM transceiver, scanner, etc. The built-in speaker is muted until your personal 3-digit code is received. Anyone with a Touch-Tone pad on their rig can activate the AUTO-KALL. Great for families with 2 or more hams. activation of emergency nets, etc.

• Assembled ready to use. Set your personal 3-digit code in seconds with small rotary switches. No jumpers to solder. Decodes all 16 keys. • Speaker automatically reverts to silent-standby and leaves red LED on to let you know someone called. • R-15 VDC. Low current CMOS circuitry.

Mofren Electronics
695 W. 21st Ave
Eugene, OR 97405
Call or write for more info. 503-687-2118



Only \$89.95
(Plus \$3.00 shipping/handling)
ATC power supply and 8-voic batch-card included.

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 1988 ARRL HANDBOOK

This is 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. The 65th edition is

ANTENNA BOOKS

THE ARRL ANTENNA BOOK represents the best and most highly regarded information on antenna fundamentals, transmission lines, and propagation. 328 pages copyright 1982.

Paper #4149 \$8 US, \$8.50 elsewhere

W1FB's Antenna Notebook Practical wire and vertical antenna designs #0488 \$ 3

TRANSMISSION LINE TRANSFORMERS, cover baluns, use of ferrites, and other aspects of antenna transmission line design and operation. 128 pages ©1987 #0471 \$10

packed with information on digital communication modes as well as new power supplies and amplifiers. Ready-to-use etching patterns are provided for many projects. This *Handbook* belongs in every ham shack.

Hardcover only #1658 \$21 US, \$23 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 by Dr. James L. Lawson, W2PV. Over 210 pages of practical theory and design information.

©1986 #0410 \$15

OPERATING

The ARRL Operating Manual 688 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.

©1987 3rd ed. #1086 \$15

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, 1987-88 ed.

#0437 \$ 4

The ARRL Net Directory-free shipping.....#0275 \$1

Field Resource Directory Lists thousands of ARRL officials and appointees, packed with organizational material. 1986 514 pages.

#0321..... \$10

HOLA CQ Learn to communicate with Spanish-speaking radio amateurs. 90 min. cassette and 15 page text. #901N..... \$7

Passport To World Band Radio 350 pages of information and listings of shortwave broadcast stations with frequency, times, and languages. 1988 ed \$15

1987 Callbooks pub. 12/1/86

North American Ed. #C087 \$25

International (outside N. America) #C187 \$25

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.

6th Computer Networking Conference Papers

1987 \$10

5th Computer Networking Conference Papers

©1986 #033X \$10

AX.25 Link Layer Protocol #0119 \$8

Get *Connected to Packet Radio** #Q221 \$13

DX

The Complete DX'er by W9KNI

#2083 \$10 US, \$11 elsewhere

DX Power by K5RSG #T740 \$10

DXCC Countries List - free shipping #0291 \$1

Low Band DXing ©1987 #047X \$10

QRP

QRP Notebook by Doug DeMaw, W1FB. An exciting book for the low power enthusiast and experimenter.

Copyright 1986, 12 pages #0348 \$5

OTHER PUBLICATIONS

21st Central Sts. VHF Conf. \$10

Microwave Update 1987 Conf. \$10

Fifty Years of ARRL #0135 \$4

GIL: Collection of cartoons from QST .. #0364 \$5

Instructor Guide-Tech./General #0313 \$6

Instructor Guide-Adv./Extra #0445 \$6

Oscarlocator #3037 \$8.50 US, \$9.50 elsewhere

200 Meters and Down #0011 \$4

The Satellite Experimenter's Handbook by Martin Davidoff, K2UBC. 208 pages, copyright 1985.

#0046 \$10 US, \$11 elsewhere

Radio Frequency Interference #4254 \$4

Solid State Design for the Radio Amateur. First published in 1977; just reprinted by popular demand.

#0402 \$17.50

RSGB VHF/UHF Manual #R630 \$12.50

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

RSGB Buyer's Guide #R754 \$12

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 1987 edition

Kit with book and cassettes #0380 \$15

Book only #0399 \$12

Cassettes \$10

License Manual Series

Technician/General Class #0143 \$ 5

Advanced Class #016X \$ 5

Extra Class #0178 \$ 5

FCC Rule Book 7th Ed. #0453 \$ 5

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

MEMBERSHIP SUPPLIES

INVITATION TO MEMBERSHIP



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

Chams
 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
 8 1/2 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 8 1/2 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 #1425 \$ 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 8 1/2 x 11 sheets #1360 \$ 3.00

QST Binders
 6 1/2 x 9 1/2 for QST 1975 and prior #1370 \$ 9.00
 8 1/2 x 11 for QST 1976 and after #1380 \$10.00

Apparel
 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

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 flea market; 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	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.	
2 Years	47	63		
3 Years	65	89		
Amateurs who are age 65 or over with proof of age:				
1 Year	\$20	\$28	Family Membership An immediate relative of a full dues paying member may become a family member without QST for \$2 per year.	
2 Years	37	53		
3 Years	50	74		

USE THIS FORM OR PHOTOCOPY

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.

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

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 _____

Boost Your Contest Power!

THE NEW LK-500ZC

This self-contained, full QSK high frequency linear power amplifier is capable of amateur continuous operation at output power levels of 1500 watts. It is manually tunable from 1.8-2.4 and 3.5-22 MHz continuous. The HF tank coil and Centralab bandswitch are silver-plated.

INTERNAL POWER SUPPLY

All 500 Series amplifiers have a Peter Dahl Hipersil plate transformer and a separate filament transformer. The fullwave bridge rectifier system—unlike other systems that utilize weak voltage doublers—uses computer grade electrolytic capacitors.

COMPATIBILITY GUARANTEED

Customer feedback in 1986 insisted on system compatibility. Responding to this challenge, a special Plug and Play Harness to hook your favorite radio to the LK500 is offered as an accessory. Of course, all Amp Supply amplifiers have our famous ATI-6 tuned input systems, assuring a perfect 50 ohm load to your transceiver.

AUTOMATIC LOCK OUT "NEW"

All the new LK-500ZC Series amplifiers are equipped with the ALO which stops amplifier operation when it senses an unacceptable SWR, improper tuning, or overcurrent on the tubes.

2-SPEED FANS

Most manufacturers have had to compromise on fan speed, one of the noisiest and objectionable aspects of amateur radio operation. But, our 500 Series amplifiers are different; they are the result of our perfected system of customer communication and engineer response.

THE LK-500ZC WITHOUT QSK

A version of the 500ZC is available without the Jennings vacuum antenna changeover relay and a companion sealed relay QSK system. A super buy at \$1199.00!

THE LK-500NTC NO-TUNE

Our no-tune amplifier is the same dependable amplifier as the LK-500ZC with the new ALO system and full QSK, and completes our popular 500 Series. This desirable version allows you to merely switch to your favorite amateur band and transmit at full power. We have preset internal capacitors and coils for each of the traditional six amateur bands. The LK-500NTC is also available for special MARS and commercial channelized frequencies.



SPECIFICATIONS LK-500ZC

Frequency Range: 160 Meters 1.8-2.2 MHz, 80 meters 3.5-4.5 MHz, 40 meters 7.0-7.5 MHz, 30 meters 10.1 to 10.15 MHz, 20 meters 14.0-14.9 MHz, 17 meters 18.0-19.2 MHz, 15 meters 21.0-21.5 MHz, Export models: 12 meters 24.8-24.9 MHz, 10 meters 28.0-29.7 MHz.

Drive Power: 100W Nominal for 1500 Watt SSB PEP output, 125W Nominal for 1500 Watt CW output.

RF Output SSB 1.5 KW PEP continuous, CW 1.2 KW Average continuous, RTTY, SSTV 1 KW Average 1.5 KW PEP.

Plate Voltage: RTTY/AM/SSTV/CW/SSB 3.2 KV DC

Harmonic Suppression: -50 dB minimum.

Intermodulation Distortion Products: -33 dB down minimum.

Circuit Type: Class AB₂ grounded grid. Type of Emission: SSB, CW, RTTY, AM, SSTV

Duty Cycle: Amateur continuous duty in all modes at specified output.

Output Circuit: Pi-network (silver plated tubing HF coil).

Power Requirements: 115/230 VAC, 30/15 amps (230 VAC factory wired and recommended).

Dimensions: 8" H x 14" W x 16" D (including knobs).

UPS Shippable: 59 lbs.

Warranty: Two years on amplifier.

LK-500ZC Full QSK \$1395.00 Reg. \$1295.00 SALE

LK-500ZC Without QSK \$1199.00 Reg. \$1099. SALE

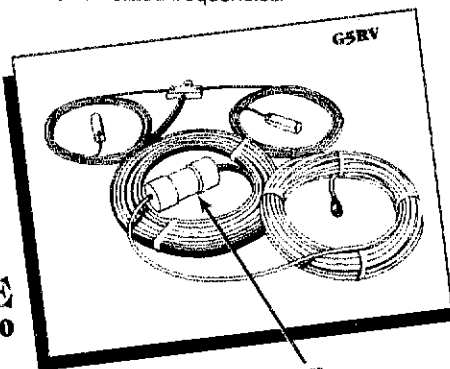
LK-500NTC No-Tune Version \$1695.00 Reg. \$1595. SALE

Plug & Play Harness (Specify your radio) \$9.95

AT3000 Matching 3K Tuner \$499.00

LK-550 New 3 Tube w/Power Pac \$1895.00

LK-450 New Single 3-500Z Amp \$899.50



SALE
\$49.50

New Matching Transformer

THE G5RV ANTENNA

Reg. \$60.00 SALE \$49.50

The G5RV Signal Injector™ antenna is an excellent all band (3.5-30 MHz) 102 ft. dipole. On 1.8 MHz the center and shield of the coax at the transmitter end may be joined together and the antenna may be used as a Marconi with a tuner and a good earth ground. The proper combination of a 102 ft. flat-top and 31 ft. of 300 ohm transmission line achieves resonance on all the amateur bands from 80 to 10 meters with only one antenna. There is no loss in traps and coils. The impedance present at the end of the 300 ohm line is about 50-60 ohms, a good match to the new RG8X mini foam coax.

- 2 KW PEP
- Completely assembled
- Use as horizontal or "V" configuration
- Consists of: 102 ft. copper antenna wire, 31 ft. 300 ohm transmission line, 70 ft. RG-8X coax, 2 end insulators, 1 center insulator, 1 PL-259 and sleeve, connector and the **new transformer coupler**.

Add an automatic SWR lock-out brain to your present amplifier (any brand). Self contained plug and play.

ALO-1 Accessory \$ 94.50

Trade in amps accepted. Reconditioned and guaranteed trade-in amps available. We now have a full line of wire antenna and accessories.

Order Today.

For fastest delivery, send cashiers check, money order, or order by credit card. Personal checks, allow 18 days to clear. North Carolina residents, add 4% sales tax. Hours: Monday-Friday 9:00 a.m. - 5:00 p.m. E.S.T.



Shipping and handling \$4 on any Amp product.
We've Moved! New Address!

Call 919-851-7388

6307 Chapel Hill Rd.
Raleigh, North Carolina 27607
Telex: 980131WDMR
FAX: 919-851-8139

Amp
Supply Co.

YAESU FT-107M with CW filter, FP-107E external power supply, YM-34 desk mike, manual. Like new, \$565. KE7KN, 602-298-4820.

WEST COAST SWAP SHEETS: Special offer. Free ad for a full year, SASE: WD6AFC, Bill, 4076 No. Hammel, Fresno, CA 93727.

WANT: TS-430S. Sell: Heathkit SB-104A with N2EO improvements, CW filter, N/Blanker, SB-644A VFO, SB-604 speaker, HP-1144A supply, microphone, extras, all as new, \$375 or b/offer. Heathkit SM-21A bench VTVM, FB, \$10. Superior Instruments tube checker, FB, \$25. 1920's learner telegraph set, looks new, \$40. John, WB8IFG, 183 Tacoma, Troy, MI 48064, 313-362-2706, 362-2656 message.

FOR SALE: Motorola C74MSY UHF 90 watt C-duty community repeater. Motorola (Bell) IMTS VHF-HI and UHF 250 watt C-duty bases/repeaters. Yaesu FT-2700RH. DVP for Micor rpt. MX parts. All excellent. NDCAM, 303-632-8413.

YAESU FT-727-R computer interface. For info write Gerald Hogssett Consulting, 1581 Woodland, Palo Alto, CA 94303.

FOR SALE: Heath HD-4040 TNC & HDA-4040-TNC Status Indicator, \$150; MFJ 752-B Signal Enhancer, \$50; HP-87 calculator and accessories, \$125; TI SR-52 calculator and accessories, \$100. Paul White, WB6BDN, days 1-800-832-6637, nights 213-650-4001.

WANTED on VHF-HI (140 MHz - 170 MHz) and UHF (420 MHz - 470 MHz): Motorola MF5-5000, MSR-2000, Micor and Motrac repeaters (10 watts - 375 watt S). Battery backup for above. Micor UHF 375 watt PA (new single tube model), ICOM 2AT, 3AT, 4AT. Acc. drv, RC-850 controller. NDCAM, 303-632-8413.

MILWAUKEE AREA - Sell complete: Wilson 33 3 EL Tribander Beam - Alliance HD-73 rotator - 10 ft. tripod - manuals, coax, and rotor cables - \$150 - no ship - KA9HUX.

COLLINS MICROWAVE Surplus - Tested with documentation. Small, solid state amplifiers, many unused: 2.3 GHz, 5.5 watt, 7.5 dB gain; \$40; same, 1.7-2.0 GHz, \$25; 2.3 GHz, 7.5 watt, 10 dB gain; \$55; 1.7 GHz, 13 watt, 31 dB gain; \$80; 5.7 GHz, 6 watt GASPET, 36 dB gain, \$95; 10.5 GHz, 2 watt IMPATT, 25 dB gain, \$95. TWT's - Varian 3.7 GHz, 15 watt with PS; \$175; same, 10.5 GHz, \$100. List - SASE. Alan Dickinson, N5BHX, 154 Basswood, San Antonio, TX 78213, 512-344-9575 home, 522-2899 work.

KENWOOD TR2600A with 2-PB-26, 2-BT-3, 1-DC-26. Absolutely like new. Cost \$357.75 sell \$270. UPS paid. Satisfaction guaranteed. K6GLJ, 805-398-2111.

VHF/UHF Products: 8877 QRO VHF amplifiers, HV power supply, parts, coaxial power relays, pre-amps. "Q" Products, now under new ownership. Same great products. SASE for catalog. "Q" Products, Larry Price, N7BJN, 10412 38th Street E, Puyallup, WA 98372, 206-841-7485 evenings.

DEAD BATTERY PACK?? Ni-Cad cells / inserts / rebuilding. AA 500mAh \$1.50, (W/Tabs \$1.65) 2/3AA 270mAh \$1.85, 2/3AA 400 mAh \$2.40, ICOM BP3 270mAh insert \$14.95, KW/TR 2400 insert (minus plug) \$18.95. OR: mail your pack to us for a Rebuild-Quote. If you don't accept, we return, NO CHARGE! In PA add 6%. Add \$2 S&H/order. Cunard Associates, R.D. 6, Box 104, Bedford, PA 15522.

TS830S CW FILTER SALE - Save \$25! Genuine top-rated 8-pole Fox-Tango 400Hz, 455.7kHz drop-in units. Hundreds sold for \$110, now only \$85 while supplies last. Satisfaction guaranteed. Shipping US/Canada: \$5; Overseas \$12. For fastest service/information, phone 305-683-9587. Or write to Fox Tango Corporation, Box 15944-A, W. Palm Beach, FL 33416.

SELL HUSTLER 6BTU \$45 get second one for \$5 more. Cannot ship. W1MG, 617-987-5075.

COLLINS MICROWAVE Surplus - Tested with documentation. Small, solid state devices, many unused. 5.7-6.4 GHz crystal controlled receive converters, if 28-150 MHz; \$50; matching transmit source; \$35. 6 GHz dielectric resonator Gunn oscillators with varactor AFC; \$15; same, 11 GHz, no AFC; \$20. Crystal controlled local oscillators (bricks), with crystals, by frequency west: 1.5-1.8 GHz for weather; 3.4-4.2 GHz; 5.5-6.8 GHz; 10-12 GHz; \$35 each. List - SASE. Bob Seydler, N5KET, Rt. 2, Box 2170, Boerne, TX 78006, 512-249-2152 evenings.

CW FOREVER Key Co. New and Used Keys, Buggs, Paddles and Keyers. Trade your present key. Send stamp for list. POB 659, Manchester, MO 63011.

COLLINS 30L1 Wing. Excellent \$550. AA6S, 209-732-7163.

WANTED Ten-Tec Argosy II Model 525D. Also, Bird wattmeter. James Lucas, WB4LPU, 406 Ellen Way, Brandon, FL 33511.

FOR SALE: Kenwood TS-820S transceiver, 500 Hz cw filter, MC60 desk top mic, manuals \$525, Kenwood TS-700A two meter all mode \$250, Heathkit antenna tuner model SA-2040 \$125. All price neg. All equipment is in excellent working order. Call Jim, N3EZX after 5PM EST 717-622-2232.

KENWOOD TS830S SP23D, mike \$630. Transmatch Murch UT2000A \$105. SWR power meter Heathkit HM2140 \$35. SW ratio Sony ICF-2001 \$105. KWL1, 203-259-9376.

CRYSTALS. Build something. Homebrew, it's your own, it's fun. QRP, CW, low power phone. It's easier with crystals. Inexpensive FT-243's made to order. 40M \$2.50, five or more \$1.95 each. 30M \$2.95, five \$2.50. 60M \$2.95, five \$2.50. 160M \$3.95, five \$2.95. 40M x 4 to 10M \$2.50, five \$1.95. 12M overtones \$3.95. Sockets 75 cents. Airmail 30 cents per crystal. Stamps or long SASE for listings-circuits. 1700 - 60,000 kilohertz. Crystals Since 1933. W0LPS, C-W Crystals, Marshfield, MO 65706.

PRESTIGIOUS Boca Raton, Florida ham QTH. One of just 33 homes in a cul-de-sac surrounded by the south nine of a 27 hole PGA golf course, 2200 plus square feet, A/C, 3BR/2B, with full Dining, Kitchen, Breakfast and Utility rooms. Two car A/C garage. 850 square foot screened shuttered patio. 40 foot crankup foldover tower with KLM KT34A beam, 80/40 dipoles, 2 meter J vertical, underground power, cable TV. Lot 125 x 100 close to ocean, shopping, airport and I-95. A rarity in location and desirability where you can combine ham radio, golf, tennis, swimming, country club activities and nations best stores. Bascum-305-994-1242.

National Tower Company

P.O. Box 15417 Shawnee Mission, KS. 66215

Hours 8:30-5:00 M-F

Price Subject to Change Without Notice

913-888-8864



ROHN FREE BASE STUBS WITH EACH BX TOWER

256	10' section	\$52.90
25AG2 & 3	model 2 or 3 top section	\$53.00
25AG4	model 4 top section	\$70.00
455	10' section	\$117.00
45AG3 & 4	model 3 or 4 top section	\$129.00
556	10' section	\$161.00
TB3	thrust bearing	\$56.25
M200	10' mast, 2" o.d.	\$12.00
BX-40	40' self supporting 16 sq. ft.	\$178.00
BX-48	48' self supporting 16 sq. ft.	\$238.00
BX-56	56' self supporting 16 sq. ft.	\$319.00
BX-64	64' self supporting 16 sq. ft.	\$411.00
HXB-40	40' self supporting 10 sq. ft.	\$218.00
HXB-48	48' self supporting 10 sq. ft.	\$293.00
HXB-56	56' self supporting 10 sq. ft.	\$373.00
HXB-64	40' self supporting 18 sq. ft.	\$272.00
HDBX-48	48' self supporting 18 sq. ft.	\$367.00

* GUY WIRE SPECIAL *
500' galvanized 7 strand \$40.00
500' galvanized 7 strand \$50.00
1,000 Foot Also Available - Call for PRICES

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
4218XL	18 element 2 mtr, 28.8' boomer	\$101.50
A4	4 element triband beam	\$290.50
AV4	40-10 mtr. vertical	\$94.50
AV5	80-10 mtr. vertical	\$101.00
ARX2B	2 mtr. 'Ringo Ranger'	\$35.00
ARX450B	450 MHz. 'Ringo Ranger'	\$35.00
A144-11	144 MHz. 11 ele. VHF	\$47.50
A147-11	11 element 146-148 MHz. beam	\$47.50
A147-22	22 element 'Power Packer'	\$128.50
A144-101	10 element 2 mtr. 'Oscar'	\$50.50
A144-201	20 element 2 mtr. 'Oscar'	\$74.50
215WB	15 element 2 mtr. 'Boomer'	\$81.00
220B	17 element FM 'Boomer'	\$94.00
230WB	144-148MHz. 30 element.	\$216.00
32-19	19 element 2 mtr. 'Boomer'	\$94.00
474B	24 element 'Boomer'	\$81.00
10-40C	4 element 10 mtr. 'Skywalker'	\$108.00
15-40C	4 element 15 mtr. 'Skywalker'	\$121.50
20-40C	4 element 14 MHz 'Skywalker'	\$270.00

HUSTLER ANTENNAS

4RTV	40-10 mtr. vertical	\$79.00
5BTV	80-10 mtr. vertical	\$105.00
6BTV	6 band trap vertical	\$124.00

ROTORS

Alliance	HD73 [10.7 sq. ft.]	\$104.00
Alliance	U110	\$47.00

ROTOR CABLE

12-18 & 6-22	4080 - per foot	\$0.18
12-16 & 6-20	4090 - per foot	\$0.35
RG8U Mini 8	low loss foam per foot	\$0.17
500' roll		\$79.00
RG8U Columbia superflex	\$29/100' or 500' for	\$125.00

MAXON \$26.95



Model 495A
49 MHz, FM 2-WAY RADIO
hands free operation, voice activated transmit up to 1/2 mile. Batteries optional

Model 49B \$34.95
same features as 495A except uses "AA" nicad batteries and comes with battery charger

TENNA PHASE III POWER SUPPLIES

PS3 \$13.90
Output: 13.8V DC - 3 amp constant 5 amp surge, electronic overload protection w/instant auto reset, fuse protected.



PS4 \$16.90
Fully regulated, 13.8 VDC - 4 amp constant with surge protection, overload protection w/instant automatic reset.

PS7 \$19.95
Fully regulated, 7 amp constant, 10 amp surge capacity.

PS12 \$29.95
Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset.

PS20 \$59.95
Fully regulated, 25 amp surge capacity, 13.8 VDC, 20 amp constant, with meter.

PS25 \$69.90
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, low ripple output, electronic overload protection w/instant auto reset, fuse protected, w/dual meter for current & voltage.

PS35 NEW \$89.90
Same as above except, 35 amp constant, 37 amp surge, adjustable from 10 to 15 volts.

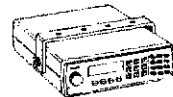
ASTATIC

D104 SILVER EAGLE \$79.90
Chrome plated base station amateur microphone. Factory wired to be easily converted to electronic or relay operation. Adjustable gain for optimum modulation.

ETS D104 SE \$99.90
NEW, same as above with end of transmission 'Roger Beep'.



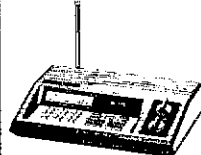
uniden



BC560XLT \$219.90
100 Channel mobile scanner with service search, programmable, 11 band with aircraft, weather, priority, channel lockout, scan delay, auto search, illuminated controls, track tuning, direct channel access.



BC210XL \$179.90
40 Channel split into 2-20 Ch banks, 11 band, weather & aircraft, weather search, priority, channel lockout, scan delay, auto search, programmable, auto squelch, track tuning, direct channel access, AC/DC.



BC145XL \$99.90
16 channel 10 band, programmable, 2 digit LED display, priority, memory backup, channel lockout, weather search, AC/DC.



BC590XL \$109.90
10 ch 10 band, hand held, 2 digit LCD, keyboard lock, Ch lockout, battery-low light, memory backup, built in delay, direct Ch access, track tuning.

BC800XLT \$279.90
40 channel 12 band, including aircraft & 800 MHz, instant weather, priority, programmable, track tuning, scan delay, auto search, direct channel access, auto squelch, channel lockout, AC/DC.

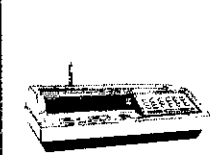
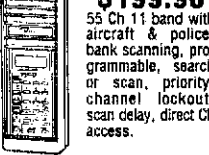
BP55C Battery pack/charger for BC50XL \$29.50
BC100XL 16 chan, 9 band, aircraft, adaptor/charg \$179.00
BC70XL 20 chan, 10 band, HAND HELD \$159.90
BC175XL 16 ch, 11 band aircraft \$159.00
BC200XL 200 Ch, 12 band Hand Held, air & 800MHz \$279.90

Regency



R1070 \$89.90
10 channel 6 band programmable, scan & search, permanent memory backup, dual level digital display, channel lockout, step control, AC only.

FREE AC ADAPTER CHARGER & CARRY CASE
HX1500
\$199.90
55 Ch 11 band with aircraft & police, bank scanning, programmable, search or scan, priority, channel lockout, scan delay, direct Ch access.



Z60 \$139.90
60 Channel 8 band, programmable, aircraft, search or scan, alarm clock, priority, permanent backup system, dual level display, channel lockout, scan delay, AC/DC.

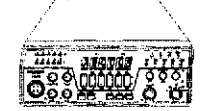


MX3000 \$199.90
30 Ch 6 band, programmable, search or scan, digital display, ch 1 priority, dual scan speed, scan or search delay, brightness control, with mounting bracket, AC adaptor/charger & DC cord.

R806 8 chan, 6 band, mobile, crystal, AC/DC \$69.90
R1075 15 chan, 6 band, programmable, AC only \$99.90
R1090 45 chan, 6 band, programmable, AC only \$139.90

RANGER

10 meter TRANSCIEVER, 25 watt, can be programmed to split transceiver, SSB, CW, AM, FM, programmable scanning, fully automatic, noise blanker, 2/3/8H, 734W, 11D.



ARS300 \$329.00

MFJ TUNERS

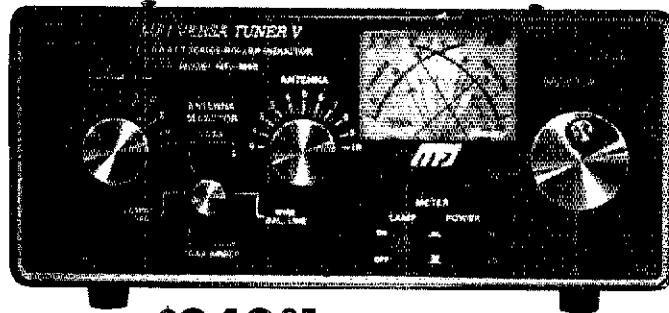
This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

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.



MFJ989B

\$349.95

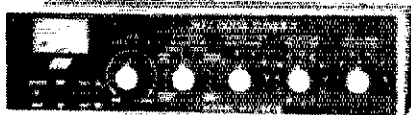
Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

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

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

MFJ's Fastest Selling TUNER

MFJ-941D **\$99.95**



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

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

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output. Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

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

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **\$229.95**



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

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

MFJ's Best VERSA TUNER

MFJ-949C **\$149.95**



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

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

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

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

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

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

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **\$19.95**



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

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

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

\$29.95 MFJ-1701



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

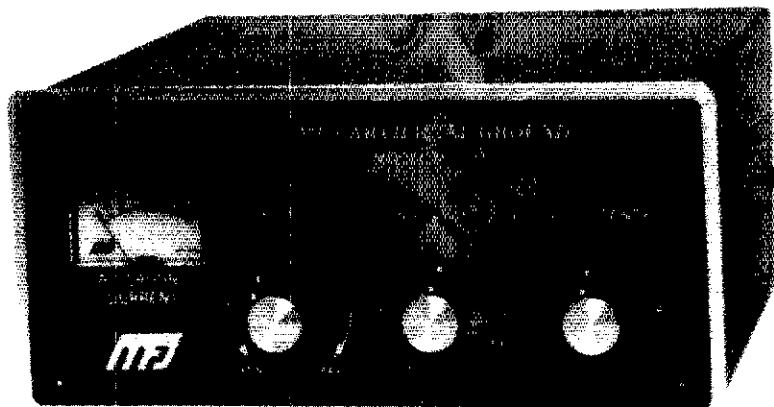
TO ORDER OR FOR YOUR NEAREST DEALER, CALL TOLL-FREE

800-647-1800

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



MFJ-931 creates artificial RF ground with random wire also, electrically places far away ground directly at your rig



NEW

MFJ-931
\$79⁹⁵

- **Creates artificial RF ground with random length wire**
- **Electrically places a far away ground directly at your rig**
- **RF ammeter makes tuning for maximum RF ground current easy**
- **Eliminates "RF bites", RF feedback, TVI/RFI and other problems due to inadequate RF ground**
- **Improves radiation pattern distorted by poor RF ground**

Don't we all sometimes have problems getting a good RF ground?

Unpleasant problems. Problems like RF "hot spots" that "bite" our lips or fingers when we transmit; like RF feedback that causes our rigs to quit working on certain bands; like excessive RF coupling to AC lines that causes everything to quit working; like our neighbors screaming about TVI and RFI; like our computers computing jibberish; or like being unable to talk across town because of extreme ground losses or radiation pattern distortion.

"Hey, my rig is on the second floor. There's no way I can get a good ground," you're thinking, or "I already have an excellent ground but the long ground connection wire causes reactance and acts like a high impedance circuit, isolating my rig from true RF ground."

What to do

Use the new MFJ-931 to create an artificial RF ground! It resonates a random length of wire thrown along the floor and

produces a tuned counterpoise. This artificial ground effectively places your rig near actual earth ground potential even if your rig is on the second floor or higher with no earth ground possible.

Also, the MFJ-931 electrically places a far away RF ground directly at your rig -- no matter how far away it is. The MFJ-931 reduces the electrical length of the ground connection wire to virtually zero by tuning out its reactance.

How it works

The MFJ-931 connects between the ground connection of your transmitter or antenna tuner and a random length of wire thrown along the floor. Two knobs are adjusted for maximum RF ground current using its built-in RF ammeter. This resonates the random wire, converts it into a tuned counterpoise and presents an effective low impedance near ground potential to your rig, thus creating an artificial RF ground.

To electrically place a far away ground directly at your radio equipment simply connect the

MFJ-931 between your rig and the connecting ground wire and adjust its two knobs for maximum RF current using its RF ammeter. This tunes out the reactance of the connecting wire, reduces the electrical ground lead length to virtually zero and electrically places your far away ground directly at your rig.

Get an effective RF ground

Get an effective RF ground. Eliminate "RF bites", RF feedback TVI, RFI and many other annoying problems due to inadequate RF ground, and -- at the same time -- improve your radiation and radiation pattern for more DX.

The MFJ-931 covers 1.8 to 30 MHz and has a built-in RF ammeter for indicating RF ground current. It's ruggedly built in an all aluminum cabinet with a brushed aluminum front panel and measures 7 1/2 x 3 1/2 x 7 inches. It comes with a one year unconditional guarantee.

It's available only from MFJ. MFJ-931, \$79.95.

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 • Add \$5.00 each shipping/handling • Call or write for free catalog, over 100 products.

MFJ

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

To Order or for Your Nearest Dealer
800-647-1800

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



MFJ . . . making quality affordable

National Tower Company

P.O. Box 15417

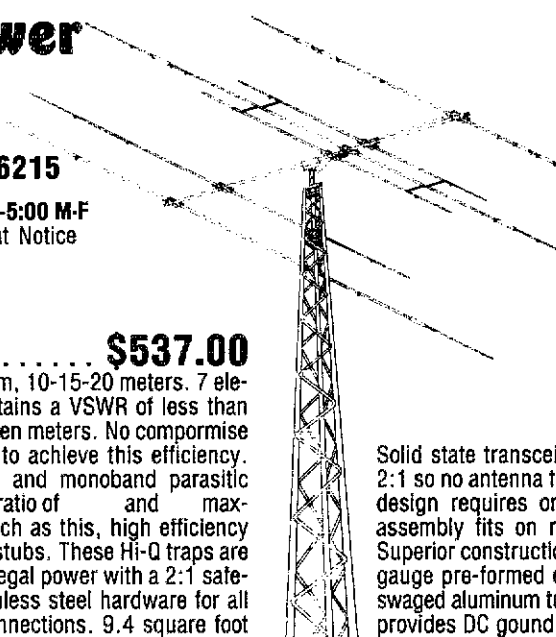
Shawnee Mission, KS 66215

913-888-8864 Hours 8:30-5:00 M-F

Prices Subject to Change Without Notice

TELEX

hy-gain



TH7DXS \$537.00

7 element, broadband, triband beam, 10-15-20 meters. 7 element system on a 24' boom maintains a VSWR of less than 2:1 on all bands, including ALL of ten meters. No compromise on gain performance was needed to achieve this efficiency. A unique combination of trapped and monoband parasitic elements produces a front-to back ratio of and maximum gain. In a parasitic array such as this, high efficiency traps are used rather than parallel stubs. These Hi-Q traps are capable of handling the maximum legal power with a 2:1 safety margin. The TH7DXS uses stainless steel hardware for all electrical and most mechanical connections. 9.4 square foot surface area.

TH3JRS \$221.00

3-element 10-15-20 meter triband beam. Hy-gain's Tunderbird Junior offers top performance with a compact design that makes it ideal where space is a limiting factor. Featuring seperate and matched air dielectric Hy-Q traps for each band, it feeds with 52 ohms coax, delivers maximum F/B ratio without compromise. Has a VSWR of less than 1.5:1 at resonance on all bands. All hardware and clamps are stainless steel. Maximum power, 300 watts CW and 600 watts PEP output. maximum gain, 12' foot boom diameter, 3.4 surface area.

204BAS \$300.00

HF Monobanders famous Long John. 20 meter, four elements on a 26' boom. Feeds with 52 ohm coax and is Beta Matched for gain. The 204BAS has tiltable cast aluminum boom-to-mast clamp, heavy gauge machined-formed element-to-boom brackets and stainless steel hardware and clamps. 7.3 sq ft surface area.

18AVT/WBS \$123.00

HF multiband vertical for 80-10 meters. Five band capability with automatic band switching is accomplished through the use of three improved Hy-Q traps featuring large diameter coils for a more favorable L/C ratio. 2:1 or lower SWR at band edges on 40-10 meters. Approx. 40 kHz band width below 2:1 VSWR on 80 meters. Includes all stainless steel hardware and SO239 connector. 25 foot overall length.

EXP14 \$365.00

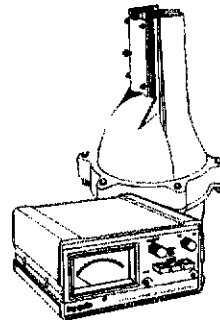
10-15-20 Meter broadband 4 band tribander beam. A unique para-sleeve concept optimizes edge-to-edge bandwidth. Solid state transceivers load to full output with VSWR below 2:1 so no antenna tuner is needed. The revolutionary compact design requires only 17'3" turning radius and the entire assembly fits on roof tripod, mast or medium duty tower. Superior construction includes stainless steel hardware, heavy gauge pre-formed element and mast brackets and thick wall swaged aluminum tubing. A BN86 is included and a Beta Match provides DC ground to reduce lightning hazard and static. maximum gain, 14.1' boom length, 7.5 sq. ft. surface area.

V2S \$51.00

VHF Vertical, 138-175 MHz. A 2-meter vertical, gain derived from the famous extended double zepp antenna design. The radiating elements are two collinear 5/8 waves fed in phase. Two sets of 1/4 wave radials properly decouple the lower radiator from the mast. 9.3' longest element, .67 square foot surface area.

T2X \$309.00

Capable of handling antennas with 20 sq ft wind loads. Electric locking wedge braking, North of South center scale, illuminated directional indicator. Mounting hardware: clamp plate, stainless U-bolts, requires 8 cond. cable.



HAM IV \$259.00

15 sq ft wind load area, electric locking wedge brake, North or South center scale, illuminated directional indicator. Mounting hardware: clamp plate, stainless U-bolts, requires 8 conductor cable.

CD45 II \$182.00

8.5 sq ft wind load. North or South center scale, illuminated directional indicator, disk brake. Mounting hardware: plated mast clamps, stainless steel U-bolts, requires 8 conductor cable.

AR40 \$130.00

For large FM-TV and compact antenna arrays up to 3 sq ft wind load. Automatic positions sensor, fully automatic control. Disc brake, mounting hardware: plated mast clamps, stainless U-bolts, requires 5 conductor cable. (Control box not pictured)

HF TRIBAND ANTENNAS

TH5MK2S	Thunderbird, 5 elements	\$461.00
TH2MK5	Thunderbird, 2 element	\$202.00
TH6DXX	Conversion kit to TH7DXS	\$180.00
QK710	30/40 M Conv. EXP14	\$91.00

HF MONOBAND ANTENNAS

105BAS	Long John, 5 element 10 meter	\$156.00
155BAS	Long John 5 element 15 meter	\$240.00
205BAS	Lang John 5 element 20 meter	\$408.00
7-1S	Discoverer dipole 30/40 meter	\$129.00
7-2S	Discoverer 2 element 40 meter	\$379.00
7-3S	Director Kit, converts 7-2S to a 3 element beam	\$238.00
BN86	ferrite balun for 10-80 meters	\$23.00

HF MULTIBAND VERTICALS

18HTS	Hy-Tower 10-80 meters	\$502.00
14RMQ	roof mt kit for 12AVD, 14AVD, & 18AVT/WB	\$42.00
18VS	Base loaded 10-80 meters	\$35.00
12AVQS	Trap vertical 10-20 meters	\$56.00
14AVQ/WBS	Trap vertical 10-40 meters	\$76.00

HF MULTIBAND DOUBLET

18TD	Portable tape dipole 10-80 mtr	\$139.00
2BDQ	Trap doublet 40-80 meters	\$71.00
5BDQS	Trap doublet 10-80 meters	\$149.00

VHF OSCAR LINK ANTENNAS

218S	Complete Oscar Link system	\$231.00
215S	70cm, 435 MHz antenna	\$89.00

VHF ANTENNAS

23BS	2 meter 3 element beam	\$24.50
25BS	2 meter 5 element beam	\$29.50
28BS	2 meter 8 element beam	\$42.00
214BS	2 meter 14 element beam	\$50.00
64BS	6 meter 4 element beam	\$76.00
V-3S	Collinear gain vertical 220MHz	\$51.00
V-4S	Collinear gain vertical 430-470MHz	\$61.00
GPG2A	Base, 2 mtr ground plane	\$28.00

VHF & UHF MOBILES

HR-144-GRI	fiberglass 2 mtr,	\$72.00
HB-144-GRI	HyBander 2 mtr,	\$59.00
HB-144-MAG	HyBander, 2 meter	\$22.50

SIGNAL GENERATORS, quality laboratory types: HP606A 50 kHz - 65 MHz \$375, HP608C 10 MHz - 480 MHz \$345, HP614A 900 - 2100 MHz \$345, HP616A microwave 1.8 GHz - 4.2 GHz \$345, HP618B microwave 3.8 GHz - 7.6 GHz \$375, HP620A microwave 7 GHz - 11 GHz \$375. SG-13/U aircraft VOR/ILS range 108 MHz - 135.9 MHz and 329.9 - 335 MHz ideal for aircraft radio repair \$285. Jerrold 900A sweep generator 0.5 - 1200 MHz built-in RF detector \$345, Motorola T-1034B FM commercial/amateur bands 25 MHz to 960 MHz plus deviation \$375, HP8640B 500 kHz - 1024 MHz \$5,500. All lab calibrated, satisfaction guaranteed, have quantity, VISA, M/C or check. Add shipping. Phone Bill Step 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

WANT LATE model transceiver and accessories. Bay Area, Rosen, 408-988-3270.

ROSS'S\$\$\$ Used October Specials: Kenwood TS-700A \$309.90, TS-700SP \$439.90, TS-830S w/2CWFL \$749.90, ICOM PS-20 \$159.90, 3PA \$39.90, IC-211 \$329.90, AEA PK-64 \$109.90, ROBOT 1200 \$999.99 400 \$299.90. Phone or send SASE for used items list. Over 8,777 new ham items in stock. Mention Ad. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830, P.O. Box 234.

FT-102 transceiver, FV-102DM external VFO, SP102 speaker, MD-1 microphone, \$795. Bill Jay, K4KG, 404-942-3192.

COLLINS S-Line 325-3 with DX ENG processor and 516F-2 \$550, 312B-3 \$15, 312B-4 150, 755-3C without extra tail board (rcvr needs small repair), has Collins 2100, 800 and 500 cycle filters \$450. Collins SM-3 mic \$50, Collins xtal pack \$140, spare new tubes for S-Line \$275. Tubsters for rcvr and xmtr \$150, Hallicrafters TO keyer \$35, and Heil SS2 speaker \$35. You ship. W0Y2B, 501-855-9641.

PC/MS-DOS ham software. \$5.50 for sample disk and catalog. Rockford Systems, 7474 Hessler, Rockford, MI 49341.

WANTED: Bencher Paddle. Give your lowest price. J. Waskowitz, 580 83rd Street, B'klyn, NY 11209.

NEED Teletype PN195160, Plinion; PN195161, Shaft. New or used in good condx. Send info, price to W4PJL, Richard M. Gillingham, 1685 W 62nd Street, Hialeah, FL 33012.

LIMITED SPACE Dipoles for 160/80, 160/40, 80/40, co-ax fed, no tuning, \$89.50 postpaid. G5RV multi-bander \$35. G5RV Junior \$32. SASE. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

NCL-2000 Linear, 2 KW, 80 through 10 meters. \$100 with 2 spare tubes. M. Adams, 152 Hamilton Court, Los Altos, CA 94022, 415-948-3060.

ROSS'S\$\$\$ New specials (October only): Kenwood TM-211A \$329.90, TS-940S \$1698.90, TH-205AT \$216.90, TM-2570A \$434.90, ICOM IC-781 \$2099.90, IC-28A \$329.90, IC-47A \$455.90, Yaesu FT-757GX \$799.90, FT-2700RH \$469.90, FT-270RH \$309.90, FT-209RH \$274.90, all LTO. Phone or send SASE for pricing on popular items. Over 8,777 ham-related items in stock for immediate shipment. 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, P.O. Box 234.

DIGITAL Automatic Displays for FT-101's, TS-520's (DG-5 clone), Collins, Drake, Swan, Heath and all others. Six 1/2" digits. 5" wide by 1 1/4" metal cabinet. Reads receive and transmit frequencies. Send \$2 for information. Receive a \$30 discount. Includes comparison of the simple BCD readouts found in new radios and our very accurate Calculating Frequency Counter readouts. Please be specific. Grand Systems, POB 3377, Blaine, WA 98230.

KENWOOD TS-430S w/PS-430 P.S. - original cartons, manuals and dust covers. Mint - used less than 30 hours. Will ship. \$695. FOB KFSJ, Bob, 1-918-445-1433.

WANTED: Modulation Transformer that will handle 500 watts or more. Such as any of the following types: T-11M78; T-82M25; T-6430; T-6210; A-3896; CMS-3; T-8225. W.H. Martin, W8MHO, Box 922, Berryville, VA 22611.

LEARN MORSE Code the easy way on your Macintosh Computer. MacMorse V2.04. Select the characters you want randomly sent. All English ham characters available. Vary speeds from 5 to 22 wpm. Make that next license painless with MacMorse. Send \$19.95: Kall 700 Marine Parkway -314, New Port Richey, FL 33552.

FOR SALE: Ameritron AL-80A amplifier. Like new. Will ship UPS. \$500. WSUDA, North Richard Hills, TX, 817-281-3628.

SALE - Rohn HDBX40 W/Base, HAM IV W/Cables, never used, selling half price. \$235. You pay shipping. Evenings or leave message. W2MDL, 914-277-3578.

POWERFUL Zenith Z-171 portable computer, mint condition, fully IBM compatible, 640K-RAM, dual 5 1/4" floppy drives, software, built-in modem, battery, 110 VAC supply, carry-case. Almost new! Asking \$895. Hank, WB2JJD, 212-998-3384 or 212-677-6071, N.Y.U. ROBLAB., 715 Broadway, N.Y.C. 10003.

WANTED: ICOM-701. Will pay top cash for new in box or mint/flawless unit. Prefer manuals & box. Name your price. Also wanted, National Radio Co. rcvr/trans/amps in new cond, (latest models only). Sell Collins ART-13. Dick, WA1DEJ, 1-617-233-1414.

WANTED: Converted 10M CB's! Mahagan, 2606 Red Pine Road, Hillsborough, NC 27278, 919-477-6161.

KENWOOD AT-250, \$220; PS-430, \$110; MC-80, \$45; MB-430, \$15. KA7WYU, Big Arm, MT 59910, 406-849-5322.

ENDECO Soldering/Desoldering Irons. The Professional Iron with the lifetime warranty! 20/40W, safety light in handle, flexible burn-resistant neoprene cord, unbreakable polycarbonate handle, stainless construction. SASE for details and prices. Endeco, 5127 E. 65th Street, Indianapolis, IN 46220-4865, 317-251-1231.

SELL: Cubic Astro 103 HF transceiver with PSU-6A AC Supply. All WARC Bands, 235 WPEP full featured with digital P/O, dual PTO, RIT, PBT, 2.4 and .4 filters. US made. Comes with all documentation including factory recommended mods. Used only as second receiver. \$750 firm, 1 ship. Ken, WB9OZR, 201-492-9319.

SIGNAL ONE - CX7B with main manual and Collins mike \$430 plus UPS. K5DZP, 915-942-9650.

LINEAR Amplifier, three 813's with PS. Will sell or swap for HF transceiver. Photo for SASE. NQ4W, 65 Marigold, Jackson, TN 38301, 901-424-0302.

FREE SHIPPING. Butternut products, lowest prices, new 10-11 meter Butterfly beam, stamp for flyer, Hart Eastern Communications, 1444 Darlington, Derby, NY 14047.

GROUND RADIAL Wire for verticals or slopers, improves performance, new -16 bare solid copper, 1000 feet, \$29, includes shipping. Davis, P.O. Box 230, Carlisle, MA 01741, 617-369-1738.

FOR SALE: Hot Air Balloons. Daedalus AX4-1 with wicker basket (damaged) and Raven S50A with aluminum gondola, trailer and inflater. \$7000 firm or will consider trade for ham gear. Fred H. Wujek, KA9WVK, 1216 Ninth Street, LaSalle, IL 61301, 815-223-8316.

JOBS FOR HAMS

ENGINEERS Wanted RF design, HF to microwaves, digital communications and packet systems. Also, system engineer with knowledge of LANs, WANs, wireline, terrestrial and satellite communications. Both positions require innovative engineers with good client skills at least 8 years experience. Work for the largest independent product development consulting firm. Apply to the president, PA Technology, 279 Princeton Road, Hightstown, NJ 08520.

THE EXPERT'S EDGE
HELP AT LAST FOR
Computerizing Radios:
Faster Operation, Instant QSY's and Mode Control
Contesting:
Faster QSO's, Integrated Terminal, and Radio Operation
Digital Operators:
Novice to Extra

FEATURES

- Computerized radio and terminal control
- Menu driven choice selection
- 40 function keys
- Pop-up Menus
- Split screens, color windows show speeds & frequencies
- Keyboard radio frequency control
- 5000 bytes memory keyer with automatic transmit, receive transitions

SUPPORTED EQUIPMENT

Radios	Terminal Units	Computers
Kenwood TS-940 TS-440, TS-711, TS-811	AEA PK 232 Pakratl™ Kantronics KAM Heathkit HK-232	IBM PC & Clones, PS/2 Color or Monochrome 320K Free Ram 1 Serial Port Par Controlled Device 2 Disc Drives

EXPERTQ
10245 Leatherwood Fort Worth, Texas 76108
(817) 248-7410

TNT RADIO SALES INC.

IN MINN.: (612) 535-5050
SERVICE: (612) 535-7533
TELEX NO.: 650 329 9719
MCI MAIL: TNT

1-800-328-0250

When You Want the BEST
...CALL TNT FOR THE QUOTE!

ICOM IC761

New ICOM superior HF transceiver. Built-in AC supply. Built-in automatic antenna tuner. 160-10M/general coverage rcvr. Passband tuning plus IF shift. QSK up to 60 WPM.

CALL TNT FOR QUOTE!

KENWOOD TS 940S

Dx-celence! Top of the line transceiver for the serious operator. 100% duty cycle xmtr. High stability dual digital VFO's. Graphic display of operating features. 40 memory channels.

CALL TNT FOR QUOTE!

TEN-TEC PARAGON

New 200 watt full featured HF. Digital transceiver for the operator who needs the ultimate! Gen. coverage rcvr. Microprocessor controlled. 62 memory channels. QSK for CW.

CALL TNT FOR QUOTE!

Model 585 Made in U.S.A.

SEE THE NEW ALINCO DUAL BANDER!
It'll knock your socks off for the \$\$\$.

SASE FOR "Cherry" previously owned equipment.

SERVICE

Once you buy your new rig... who will take care of it for you?

TNT SERVICES WHAT WE SELL!

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

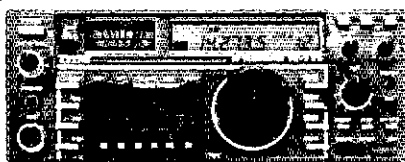
4124 West Broadway, Robbinsdale, MN 55422 (Mpls./St. Paul)



ICOM

KENWOOD

YAESU



IC-735

HF Equipment	List	Juns
IC-761 New Top Of Line	\$2499	Call \$
IC-735 Gen. Cvg Xcvr	999.00	Call \$
IC-745 Gen. Cvg Xcvr	1049.00	Call \$
IC-751A Gen. Cvg. Xcvr	1649.00	Call \$
IC-575A 10m/6m Xcvr	TBA	Call \$
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1099.00	Call \$
IC-R71A 100 kHz-30 MHz Rcvr	949.00	Call \$
VHF		
IC-275A All Mode Base w/PS	1199.00	Call \$
IC-275H All Mode Base 100w	1389.00	Call \$
IC-271A All Mode Base 25w	859.00	Call \$
IC-27A FM Mobile 25w	429.00	Call \$
IC-27H FM Mobile 45w	459.00	Call \$
IC-28A FM Mobile 25w	429.00	Call \$
IC-28H FM Mobile 45w	459.00	Call \$
IC-38A FM Mobile 25w	459.00	Call \$
IC-2AT FM HT	299.00	Call \$
IC-02AT FM HT	399.00	Call \$
IC-μ2AT Micro HT	329.00	Call \$
IC-900 Six Band Mobile	TBA	Call \$
UHF		
IC-475A All Mode 25w	1399.00	Call \$
IC-47A FM Mobile 25w	549.00	Call \$
IC-48A FM Mobile 25w	459.00	Call \$
IC-4AT FM HT	339.00	Call \$
IC-04AT FM HT	449.00	Call \$
IC-μ4AT 440 FM HT	369.00	Call \$
IC-3200A FM 2m/70cm 25w	599.00	Call \$
220 MHz		
IC-375A All-Mode, 25w, Base Sta.	TBA	Call \$
IC-38A 25w FM Xcvr	459.00	Call \$
IC-37A FM Mobile 25w	499.00	Call \$
IC-3AT FM HT	339.00	Call \$
IC-03AT Deluxe HT	449.00	Call \$
1.2 GHz		
IC-1271A All Mode 10w	1229.00	Call \$
IC-120 1w, FM, Xcvr	579.00	Call \$
IC-12AT Deluxe 1w HT	459.00	Call \$



TS-440S/AT

HF Equipment	List	Juns
TS-940S/AT Gen. Cvg Xcvr	\$2249.95	Call \$
TS-940S Gen. Cvg Xcvr	2049.95	Call \$
TS-930S/AT Gen. Cvg Xcvr	1849.95	Call \$
TS-830S Xcvr	1099.95	Call \$
TS-430S Gen. Cvg Xcvr	859.95	Call \$
TS-440S/AT Gen. Cvg Xcvr	1199.95	Call \$
TS-440S Gen. Cvg Xcvr	999.95	Call \$
TL-922A HF Amp	1499.95	Call \$
TS-670 40,15,10,6 Meter Quad	TBA	Call \$
Receivers		
R-5000 100 kHz-30 MHz	899.95	Call \$
R-2000 150 kHz-30 MHz	649.95	Call \$
VHF		
TS-711A All Mode Base 25w	899.95	Call \$
TR-751A All Mode Mobile 25w	599.95	Call \$
TM-221A Compact FM 45w	399.95	Call \$
TM-2530A FM Mobile 25w	429.95	Call \$
TM-2550A FM Mobile 45w	469.95	Call \$
TM-2570A FM Mobile 70w	559.95	Call \$
TH21-BT FM, HT	259.95	Call \$
TH-205 AT, NEW 2m HT	259.95	Call \$
TH-215A, 2m HT Has It All	349.95	Call \$
UHF		
TS-811A All Mode Base 25w	1049.95	Call \$
TR-851A 25w SSB/FM	699.95	Call \$
TR-9500 10w All Mode	649.95	Call \$
TM-421A Compact FM 35w	419.95	Call \$
TM-411A FM Mobile 25w	449.95	Call \$
TH-415A 2.5w 440 HT	359.95	Call \$
TH-41BT FM, HT	269.95	Call \$
TH-4100A, 2m/70cm FM	649.00	Call \$
TR-50 1w 1.2GHz FM	549.95	Call \$
220 MHz		
TM-3530A FM 220 MHz 25w	449.95	Call \$
TH-31BT FM, 220 MHz HT	269.95	Call \$
TM-321A Compact 25w Mobile	TBA	Call \$
TH-315A Full Featured 2.5w HT	TBA	Call \$



FT 757GX

HF Equipment	List	Juns
FT-ONE Gen. Cvg Xcvr	\$2859.00	Call \$
FT-980 9 Band Xcvr	1795.00	Call \$
FT-757 GX II Gen. Cvg. Xcvr	1079.95	Call \$
FT-767 4 Band New	1895.00	Call \$
FT-890R 6m, 10w All Mode	TBA	Call \$
FL-7000 15m-160m Solid State Amp	TBA	Call \$
Receivers		
FRG-8800 150 kHz- 30 MHz	699.95	Call \$
FRG-9600 60-905 MHz	679.95	Call \$
VHF		
FT-211RH FM Mobile 45w	459.95	Call \$
FT-290R All Mode Portable	579.95	Call \$
FT-23 R/TT Mini HT	299.95	Call \$
FT-209RH FM Handheld 5w	359.95	Call \$
UHF		
FT-711RH FM Mobile 35w	TBA	Call \$
FT-730R 10w 440 FM	399.95	Call \$
FT-770RH FM Mobile 25w	479.95	Call \$
FT-73 R/TT Mini HT	314.95	Call \$
FT-709RH FM HT 4w	359.95	Call \$
VHF/UHF Full Duplex		
FT-726R All Mode Xcvr	1095.95	Call \$
HF/726 Module for 10,12,15M	289.95	Call \$
430/726 430-440 MHz	329.95	Call \$
440/726 440-450 MHz	329.95	Call \$
SU-726 Sate Duplex	129.95	Call \$
FT-690R MKII, 6m, All Mode, port.	569.95	Call \$
Dual Band		
FT-2700RH FM 2m/70 cm 25w	599.95	Call \$
FT-727R 2m/70 cm HT	479.95	Call \$
220 MHz		
FT-109 RH New HT	379.95	Call \$
Repeaters		
FT-2410 2m Repeaters	1249.95	Call \$
FT-5410 70cm Repeaters	1289.95	Call \$

JUN'S ELECTRONICS
800-882-1343

JUN'S BARGAIN BOX SPECIALS-THIS MONTH ONLY

YAESU
FT-727R, 2m/70cm HT

***KENWOOD**
*R-2000 Gen. Cov. Receiver
*TM-2570A, 70w, 2m Mobile

ICOM
IC-μ2AT, Mini 2m HT
IC-04AT, 440 HT
IC-900, New Mobile System

SPECIAL BARGAIN PRICES*

ENCOMM • TE • MIRAGE/KLM • AMERITRON • AMP SUPPLY
BIRD • KANTRONICS • AEA • ASTRON • RFconcepts • ALINCO
• AMATEUR • TWO WAY • MARINE • CELLULAR MOBILE PHONE
• SCANNER • Free U.P.S. Cash Order • SE HABLA ESPANOL
(Most Items, Most Places)

(213)390-8003 3919 Sepulveda Blvd. Culver City, CA 90230

AMATEUR TELEVISION

HAMS SHOULD BE SEEN AS WELL AS HEARD!

TVC-4G
Now Only \$99 *delivered.



70 CM ATV DOWNCONVERTER
FEATURES: Contains sensitive GaAsfet preamp & mixer - Tunes 420-450 MHz down to ch. 2, 3, or 4. 120 Vac or 12vdc. Cabinet 4x2.5x7". TVC-2G tested board \$59.

P.C. ELECTRONICS
2522 PAXSON ARCADIA CA 91005
Maryann WBGYSS Tom W6ORG

WHAT IS REQUIRED: It's EASY! Just connect your TV set, 70 CM antenna and coax to the TVC-4G and get ready to watch live action color video and sound.

ATV APPLICATIONS: See the shack, home video tapes, computer video, Space Shuttle, weather radar and other public service events. Many areas have ATV Repeaters; see ARRL Repeater Directory & 1986 Handbook chapters 20 and 7.

CALL (818) 447-4565 or write for our catalog. Give your amateur call if also interested in our transmitting equipment. We have all your ATV needs: antennas, coax, downconverters, transmitters, etc., 70, 33, & 23 CM.
*Includes UPS surface shipping in cont. USA

KENWOOD



TS-940S LIST \$2249
NEW Top-of-the-Line
HF Transceiver
 • 100% Duty Cycle
 • 40 Memory Channels
CALL FOR SPECIAL PRICES!!



TS-440S NEW! LIST \$1199
CALL FOR SPECIAL SALE PRICE



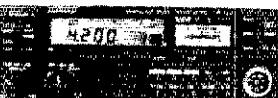
TS-430S LIST PRICE \$859
CALL FOR SPECIAL SALE PRICE!



TS-711A LIST \$899
TS-811A LIST \$1049
CALL FOR SPECIAL PRICE



TW4100A LIST \$649
CALL FOR SPECIAL PRICE



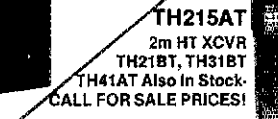
TR-751A LIST \$599
All Mode 2m Mobile



COMPACT 2M FM MOBILE
TM 2570A (70W) LIST \$559
TM 2550A (45W) LIST \$469
TM 2530A (25W) LIST \$429
TM 3530A (25W) LIST \$449
CALL FOR SPECIAL PRICE



TH 205 AT
High Tech 2M
HT XCVR

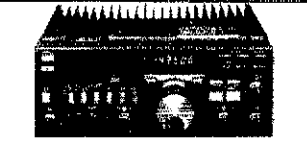


TH215AT
2m HT XCVR
TH21BT, TH31BT
TH41AT Also In Stock-
CALL FOR SALE PRICES!

YAESU



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



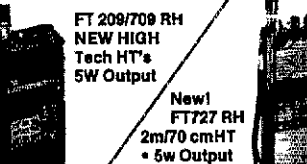
FT-757GX/II LIST PRICE \$1,049
CALL FOR SPECIAL SALE PRICE!



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



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



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

New!
FT727 RH
 • 5w Output
 • 10 memories
 • Battery saver
Call For Sale Prices



FT 23R 2m HT LIST \$299.95
FT 73R 70 cm HT LIST \$314.95
 • compact size
 • up to 5W output W/FNB 11
CALL FOR SALE PRICES!

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

Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	\$ 39
RS7A	5	7	49
RS12A	9	12	89
RS20A	16	20	89
RS20A	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	194
RS50M	37	50	229

ICOM



IC-761 New HF XCVR
 • Built-in AC Power Supply
 • Built-in Automatic Tuner
 • PBT Plus IF Shift
 • QSK Up To 80 WPM
LIST PRICE \$2499
CALL TODAY FOR SALE PRICE



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



IC-27A LIST \$429 **IC-27H LIST \$459**
IC-28A LIST \$429 **IC-28H LIST \$459**
IC-37A LIST \$499 **IC-47A LIST \$549**
IC-38A LIST \$459 **IC-48A LIST \$459**
CALL TODAY FOR SPECIAL ICOM PRICES!

IC02AT - 2mtr **NEW**
IC03AT - 220 MHz **IC-μ2AT**
IC04AT - 70cm **2m HT**
High Tech
HT XCVRs

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

CALL FOR SALE PRICE!



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

581 Corsair II SALE \$1,149.95
980 Power Supply \$209.95
229 2KW Tuner \$259.95
425 Titan Amplifier \$2,299.95

MIRAGE

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	\$289
B23A	2M	Yes	2W	30W	\$129
B108	2M	Yes	10W	80W	\$159
B1018	2M	Yes	10W	160W	\$259
B3018	2M	Yes	30W	160W	\$229
D1010N	440	No	10W	100W	\$319

concept

r/c 2-317 2M
30W in = 170W out
LIST \$299.00

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

Call For Sale Prices

ROHN TOWERS

hy-gain

Ask For Package Quotes On Complete Tower Assemblies Including Phillystran, Guy Wire, Antennas, Rotors, Etc.

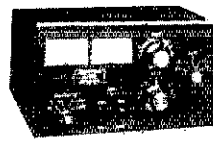
AMP SUPPLY



Model	List	Model	List
LA 1000	\$ 499	LA 1000 NT	\$ 579
LK 500 ZB	\$1295	LK 500 NT	\$1595
LK 800 A	\$2695	LK 800 NT	\$2995
AT 1200	\$ 229	AT 3000	\$ 499

CALL AND SAVE \$\$\$\$\$

AMERITRON



180A NEW 1000 W 3-500Z Amplifier \$749.
184 600 W PEP Output (4-6MJ6 Tubes) \$399.
RCS-4 4 Pos Remote Antenna Switch \$119.95
RCS-5v 5 Pos Remote Antenna Switch \$119.95

AEA



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

Other AEA products also in stock call!!!!

ALINCO

ELH-230G	69.95	ELH-730D	
ELH-230D	89.95	ALR-22T	
ELH-260D	129.95	ALR-22HT	
		ALR-72T	
		ALD-24T	

Other items in stock - call!

Kantronics

NEW All Mode KAM
\$289.95

KPC II Packet Controller \$159.95
KPC 4 Node Controller \$299.95
UTU-X7P Terminal \$269.95

MP

1270B/1274 TNC Units \$129.95/159.95
1224/1229 Interface \$89.95/159.95
202/204 Antenna Bridges \$59.95/79.95
250 Oil Load \$39.95
280/282 Dry Loads \$29.95/59.95
407/422 Elect. Keyers \$69.95/119.95
901/941D Tuners \$59.95/99.95
949C/989 Tuners \$139.95/299.95

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

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

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

(Prices & Availability Subject To Change Without Notice)



the HAM STATION

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

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

SEND SASE FOR NEW & USED SHEETS
WARRANTY SERVICE CENTER FOR:
ICOM, YAESU, TEN-TEC

TERMS:

Prices Do Not Include Shipping.
Price and Availability Subject to
Change Without Notice

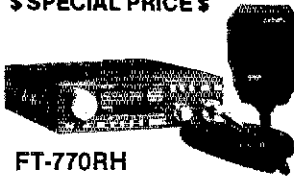
Most Orders Shipped The Same Day

COD's Welcome



FT-767

- HF/VHF/UHF Base Station
- Plug-in Modules for 6m, 2m, 440 MHz
- Loaded with Features



FT-770RH

- 440 MHz Mobile, FM Transceiver
 - 25 w Output High 3 w Output Low
 - Dual VFO's, 10 memories
- EXTRA SPECIAL PRICE**
Call Now - Limited Supply



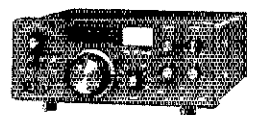
IC-735

- Full Featured, Compact, All Band HF Transceiver
- General Coverage Receiver
- Built-in USB, LSB, AM, FM, CW
- 12 Memories
- Up to 100 w output

IC-μ2AT



- Pocket-Sized 2 meter HT
- TX-140-150 MHz RC-139-174 MHz
- 10 Memories and LCD Readout
- Up to 3 w Output (Option)

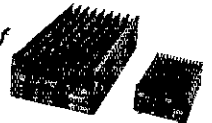


525D ARGOSY II

- Argosy II, SSB/CW HF Transceiver (Model 525D)
- 10-80 m Bands
- 100 w Input with Solid State, No Tune, Final
- Famous Ten Tec QSK CW



VHF/UHF AMPS



- High VSWR and Overdrive Protection
- 5 Year Warranty, 6 Months on RF Transistors
- All Units have GaAsFET Receive Pre-amps

DISCOUNTS ON RIGS AND ACCESSORIES FROM: AEA, ARRL, ALINCO, ALLIANCE, ALPHA-DELTA, AMECO, AMERITRON, AMP SUPPLY, ANTENNA SPECIALISTS, ASTRON, BENCHER, BUTTERNUT, B & W, CSI, CALLBOOK, CUSHCRAFT, DAIWA, DIAMOND, ENCOMM, HAL, HEIL, HUSTLER, ICOM, KDK, KANTRONICS, KENPRO, LARSEN, MFJ, MICROLOG, MIRAGE/KLM, NYE, PALOMAR, RF CONCEPTS, ROHN, SANTEC, SHURE, TE SYSTEMS, TELEX/HYGAIN, TEN-TEC, TOKYO HY-POWER, VIBROPLEX, W2AU BALUNS, WELZ, YAESU

For Orders and Price Checks Call 800-523-7731

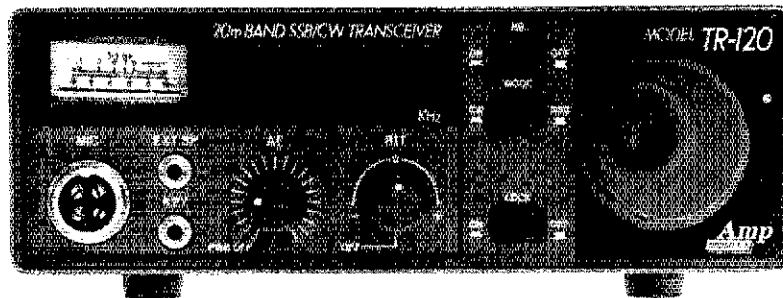
Indiana and Information
Call 1-812-422-0231

NEW

MONO-BANDERS

NEW

Great Novice Radios



Presenting the new TR-1 series of single band portable, mobile or novice transceivers. The TR-1's are fully synthesized solid state digital radios. Each model, including the 10 meter version, covers its entire specific band.

- SSB and CW
 - VFO-PLL synthesized digital VFO
 - 4-digit LED display
 - Receiver sensitivity 0.4uv, S+N/N= 10 dB min
 - RIT ± 1 KHz
 - Transmitter output 20 watt max
 - 13.8 VDC @ 5.0 A
 - Only 7" w x 2 1/4" h x 9 3/4 d
 - Weight 5.7 lbs.
 - Complete with microphone and DC power cord
- Order model number:
TR-110 - 10 meter band
TR-115 - 15 meter band
TR-120 - 20 meter band
TR-140 - 40 meter band
TR-180 - 80 meter band

329⁵⁰ ppd USA



Call Today
919-851-7388

Telephone (919) 851-7388
FAX (919) 851-8139
TELEX 980131 WDMR
6307 Chapel Hill Road
Raleigh, North Carolina 27607

antennas


H. C. Van Valzah Co.
Downers Grove, IL 312/852-0472

Dual Band for 2 Meters & 70 cm.

DP-SR770 A 1/4 wave for VHF and
DUAL MOBILE 5/8 wave for UHF.
only 22" high. PL259 base
as pictured \$34.95

DP-EL770H A 5/8 wave for
DUAL BANDER VHF and stacked 5/8
waves for UHF.

Still only 38" high. PL base

 with chrome
loading coil \$39.95
loop

Both by Diamond
Antenna Company

Mounts

MAGNET	DPSM	34.95
Trunk LIP	DPTRB	34.95
Hole	EC5	14.95

Larsen dual antennas - Call

VHF UHF ANTENNAS

Diamond Dual Band Base Station Antennas

DX50 51" high
5/8 wave on 2M
Double 5/8 on 440
Fiberglass 79.95

DX200 97.5" high
Double 5/8 on 2 M
Triple 5/8 on 440
Fiberglass 104.95

Duplexer DF72S 29.95
In stock - UHF & VHF beams
and mobiles by Cushcraft,
Hustler, Larsen, KLM, Mosley
and Avanti, plus the Squalo.

Get our catalog or call for
more information.

Send \$1.00 for 64 page antenna catalog.
All prices plus shipping. \$1.75 for VISA, MC

CALL **1-800-HAM 0073**

H. C. Van Valzah Co.

 1140 Hickory Trail
Downers Grove, IL 60515 

Satisfaction Guaranteed

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

MULTIFAX 2.0

AN UPDATED MULTIFAX PROGRAM TO COPY

- WEFAX FROM GOES SATELLITES
 - HF FAX FROM NAVY WEATHER BROADCASTS
 - APT FROM NOAA POLAR ORBITING SATELLITES
 - WEFAX REBROADCASTS FROM TV TRANSPONDERS
- IN UP TO 8 COLORS (BY RE-USING FOUR) ON YOUR IBM OR COMPATIBLE PC.

MULTIFAX 2.0(MF2) displays the full picture on the monitor as it is being recorded. Meanwhile memory is filled with fine-grain data so that ANY AREA on the picture may be selected and repeatedly magnified for viewing in greater detail. All data and any view may be saved on disk. MF2 is adaptable to all known fax speeds and PC clock rates since timing is keyboard adjustable. MF2 now records more, such as a full NOAA pass and the longer weather charts and schedules. 448K of memory for DOS, MF2, and normal recording space. More memory gives a longer recording in 64K increments.

OBTAIN hard copies by using your GRAPHICS print program OR using MF2 to dump a full picture in maximum detail to the printer.

DATA entry is via the PC game port or parallel printer port.

PRICE is \$49 (US) for MF2 on disk with instructions and interface circuit information. For previous MULTIFAX buyers, MF2 is \$15 (US). Add \$4 (US) for delivery outside USA, Canada, and Mexico. MF2 was written by an author of "WEFAX Pictures on Your IBM PC" published in the June issue of "QST".

SEND for free descriptive material on these and other new features in MULTIFAX 2.0. Send \$1 (US) for a copy of a typical picture memory dump to the printer.

Elmer W. Schwitek, K2LAF

429 N. Country Club Drive, Atlantis, FL 33462

305-439-1370

IBM registered trademark of IBM Corp

Multifax is a registered trademark of E. W. Schwitek

NEW ONLINE! "HAMCALL" SERVICE

Instantly, you can have access to over 462,000 FCC call sign records, with QSL name & address information, via your telephone and computer terminal. Unlimited access 24 hours a day, 7 days a week! Inquiry by U.S. call sign at 300, 1200 or 2400 Baud. You pay for phone call. More current and complete than any book!

Introductory individual subscription for one full year is only \$29.95.

Club subscription is available for \$149.95/year (up to 20 members).

Send payment, name, address, call sign, phone number and terminal type to get your password and instructions — Money back guarantee VISA/MC/Choice accepted.

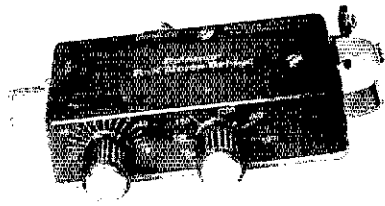
SUCKMASTER Publishing

"Whitehall"

Route Three, Box Fifty-Six
Mineral, Virginia 23117

703: 894-5777

R-X NOISE BRIDGE

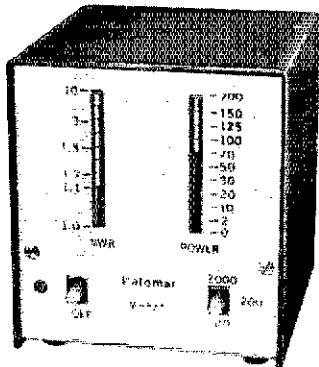


•Learn the truth about your antenna.

The Palomar R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals from 1 to 100 MHz.

Why work in the dark? Get the instrument that really works, the Palomar R-X Noise Bridge. Model RX-100 \$59.95 + \$4 shipping/handling in U.S. and Canada. California residents add sales tax.

SWR & POWER METER



•The only meter that shows PEP output directly, accurately, instantly.

Shows power and SWR on bright red light bars. See PEP and SWR while you talk! Automatic "hands-off" SWR reading. Power ranges 20-200-2000 watts. Works from 1-30 MHz. For 115-v AC, 220-v AC and 12-v DC models also available.

Model M-827 \$129.95 + \$4 shipping/handling in U.S. and Canada. California residents add sales tax.

MasterCard

VISA

Send for FREE catalog that shows our complete line of noise bridges, SWR meters, preamplifiers, 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

Bruce O. Williams, WA6IVC,
Advertising Manager
Angela Beebe, Advertising Assistant
203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

Index of Advertisers

Advanced Computer Controls Inc: 112, 113
Advanced Receiver Research: 118
AEA: Advanced Electronics Applications Inc: 4
AGW Enterprises: 104
Alinco Electronics Corp: 148
All Electronics: 149
Alpha Delta Communications Inc: 98
Amateur Electronic Supply: 126, 136, 151
Amateur Radio School - KB6MT: 113
Amateur Wholesale Electronics: 154
American Radio Relay League: 106, 109, 128, 134, 138, 139, 144, 146, 147, 150, 152, 156, 162, 163
Ameritron: 103
Amidon Associates: 149
Amp Supply Company: 164, 172
Antenna Systems Inc: 100
Antennas Etc: 94
Associated Radio Communications: 113
Austin Amateur Radio Supply: 99
Autocode: 153
AVC Innovations Inc: 104
Barker & Williamson Inc: 149
Barry Electronics: 114
Bencher Inc: 153
Buckmaster Publishing: 153, 157, 158, 173
Butternut Electronics Co: 109
CBC International: 101
Certified Communications: 137
Coax Plus Electronics: 108
Colorado Comm Center: 161
Communication Concepts: 106
Computer Hacker Sof'Wear: 153
Cover Craft: 116
Cubex Corp: 137
Curtis Electro Devices: 173
Cushcraft Corp: 5, 97
C-Comm Inc: 107
DAIWA Electronics Corp: 96
Delaware Amateur Supply: 159
Delta Loop Antennas: 105
DX Edge, The: 118
EEB/Antenna Bank: 135, 137
EGE Inc: 110
ETO-Ehrhorn Technological Operations Inc: 132, 133
ExpertQ: 169
Fair Radio Sales: 158
Fox River Radio League: 96
Fox Tango Corp: 105
Glen Martin Engineering: 157
Gordon West Radio Schools: 130

HAL Communications Corp: 108, 158
Ham Radio Outlet: 90, 91, 92, 93
Ham Station, The: 172
Heaster Co, H. L.: 158
Henry Radio Stores: Cov II
ICOM America Inc: 2, 124, 125, 127, 129, 131
IIX Equipment Ltd: 114
International Electronic Wire & Cable Co: 141
International Radio: 98
Jun's Electronics: 101, 170
K2AW's Silicon Alley: 114
Kantronics: 95
Kenwood USA Corporation: Cov IV, 1, 6, 7, 117, 119, 121, 123
Larsen Electronics Inc: 104
Memphis Amateur Electronics Inc: 173
MFJ Enterprises Inc: 166, 167
Micro Control Specialties: 109
Microcraft Corp: 108
Mini-Products Inc: 101
Missouri Radio Center: 130, 176
Moli Energy Ltd: 144
Motron Electronics: 161
Multifax: 173
N & G Electronics: 112
National Tower Company: 165, 168
Nemal Electronics Inc: 98
Northeast Electronics Supply Inc: 103
Nye Co., William M.: 106, 116
Orion Hi-Tech Creative Design Co: 140
Palomar Engineers: 102, 108, 174
PC Electronics: 170
Periphex Inc: 105
Pounders True Value: 132
R & L Electronics: 105
R & R Press: 158
Radio Amateur Callbook: 160
Radio Central Amateur Radio Club: 137
Radio Shack: 111
rf Concepts: 101
rf Enterprises: 115
RF Parts Co: 122, 135
Ross Distributing Co: 141
Satellite City: 120
Schultz, Jack: 101
Spider Antennas: 130
Spi-Ro Mfg Inc: 157
Stone Mountain Engineering Co: 108, 141
Telex Communications Inc: 145
Telrex Labs: 102
Ten Tec: 142, 143
Texas Towers Inc: 171, 175
Timberline Electronics: 132
TNT Radio Sales Inc: 169
Universal Amateur Radio Inc: 157
UPI Communications Systems Inc: 137
US Tower Co: 100
Van Gorden Engineering: 153
Van Valzah Co, H.C.: 173
Vibroplex Co: 161
W9INN Antennas: 114
Wacom Products: 108
Western Electronics: 98
Williams Radio Sales: 141
Wrightapes: 137
Yaesu U.S.A.: Cov III, 10, 155, 158, 159
E.H. Yost & Co "Mr. Nicad": 105

ANTENNA/TOWER SALE!

hi-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

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

ROHN Self Supporting Towers On SALE! FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save \$
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Lead*	Weight	Delivered Price*
HGX40	40 ft	10 sq ft	228	\$359
HGX48	48 ft	10 sq ft	303	\$459
HGX56	56 ft	10 sq ft	385	\$539
HDBX40	40 ft	18 sq ft	281	\$429
HDBX48	48 ft	18 sq ft	363	\$529

*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, wire/bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

Model 25G	Model 45G	Model 55G
50' \$ 629	\$1119	\$1489
60' 689	1259	1669
70' 749	1379	1829
80' 909	1539	2019
90' 979	1809	2189
100' 1059	1969	2369
110' 1259	2099	2769
120' 1329	2259	2959

US TOWER CORPORATION

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

Check these features:

- All steel construction
- Hot dipped galvanized
- Totally self-supporting—No guys needed

Coax arms, Thrust bearings, Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock.

CALL FOR SALE PRICES!

Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	\$ 549
MA550 mast	22'	50'	10 sq ft	899
TX436	22'	38'	18 sq ft	629
TX456	22'	55'	18 sq ft	1248
TX472	23'	72'	18 sq ft	2058
HDX265	22'	55'	30 sq ft	1879
HDX872	23'	72'	30 sq ft	3229

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

*Note-towers rated at 50 mph to EIA specifications

RG-213U

\$.29/ft \$279/1000 ft Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG6 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

\$.19/ft \$179/1000 ft

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

9086

\$.39/ft \$379/1000 ft

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

HARDLINE HELIAX®

Lowest Loss for VHF/UHF!

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	6	5	2.3	5.2
RG58	52	4	1.2	3.5	5.0
9086	50	4	6.4	1.7	3.1
1/2" Alum	50	3	5	1.2	2.2
1/2" HeliAx	50	2	4	1.8	1.6
3/4" HeliAx	50	1	2	5	9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF	FML	UHF	MALEN	FML	N	MALE
1/2" Alum	\$19	\$19	\$19	\$19	\$25	\$25	\$25
1/2" HeliAx	\$25	\$25	\$25	\$25	\$25	\$25	\$25
3/4" HeliAx	\$49	\$49	\$49	\$49	\$49	\$49	\$49

COAX CONNECTORS

Amphenol Silver PL259 \$1.25

UG21B N Male \$2.95

9086/9913 N Male Connector \$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga. \$.10/ft.

1/4 mile 18ga copper-clad steel wire \$30

Dog bone end insulator \$.79 ea.

Van Borden

1:1 Balun \$11 Center Insulator \$6

Dipole Kits DB0 \$31.95/DB40 \$28.95

Short Dipole Kits SD80 \$35.95/SD40 \$33.95

All-band Dipole w/ladder line \$29.95

GSRV all band antenna \$49.95

ALPHA DELTA

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

CUSHCRAFT

A3 3-el Tribander \$229

A4 4-el Tribander Beam \$299

A743 & A744, 30/40 mtr KIT for the A3 & A4 ea \$79

AP8 80-10 mtr Vertical \$139

AV5 80-10mtr Vertical \$109

D40 40mtr Dipole \$159

40-2CD 2-el 40 mtr Beam \$299

ASO-5 5-el 6 mtr Beam \$85

215 WB NEW 15-el 2 mtr Beam \$85

230 WB NEW 30-el 2 mtr Beam \$229

4218 XL 18-el 2 mtr Beam \$105

3219 19-el 2 mtr Beam \$99

220B 17-el 220MHz Beam \$99

424B 24-el 432MHz Beam \$85

ARX2B 2 mtr Vertical \$39

hi-gain

Discoverer 2-el 40-mtr Beam

Discoverer 3-el Conversion Kit

EXPLORER-14 SUPER-SPECIAL

QK710 30/40 mtr. Add-On-Kit

V2S 2-mtr Base Vertical

V4S 40MHz Base Vertical

TH5MK2S Broad Band 5-el Triband Beam

TH7DXS 7-el Triband Beam

TH3JRS 3-el Triband Beam

20SBAS 5-el 20-mtr Beam

15SBAS 5-el 15-mtr Beam

10SBAS 5-el 10-mtr Beam

20ABAS 4-el 20-mtr Beam

6ABS 4-el 6-mtr Beam

12 AVQ 20-10 mtr vertical

14 AVQ 40-10 mtr vertical

18 AVT/WB 80-10mtr Vertical

18HTS 80-10 mtr Hy-Tower Vertical

23BS 3-el 2 mtr Beam

25BS 5-el 2 mtr Beam

28BS 8-el 2 mtr Beam

21ABS 14-el 2-mtr Beam

2BDQ 80/40 mtr Trap Dipole

5BDQ 80-10 mtr Trap Dipole

BNBS 80-10 mtr KW Balun W/Coax Seal

HUSTLER

6BTV 80-10 mtr Vert \$129 5BTV 80-10 mtr Vert \$109

4BTV 40-10 mtr Vert \$89 G7-144 2-mtr Base \$119

G6-144B 2-mtr Base \$89

Mobile Resonators 10m 15m 20m 40m 75m

400W Standard \$16 \$17 \$19 \$22 \$26

2KW Super \$20 \$22 \$25 \$29 \$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF8V 80-10m Vertical \$129 Delivered

- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical \$129 Delivered

- Full Legal Power
- Automatic Band Switching

Accessories:

RMK II Rot Mt. Kit \$49

STR II Stub-Tuned Radials \$29

TBR180 180m Coil Kit \$49

30m Add-on Kit \$29

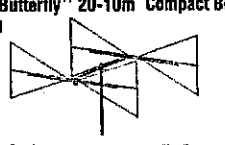
20m Add-on Kit \$39

17/12m Add-on Kit \$27

HF8V

FREE UPS on ACCESSORIES when purchased w/antenna

HF4B "Butterfly" 20-10m Compact Beam \$199.00



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

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam \$399.95

KT34XA 6-el Broad Band Triband Beam \$589.95

ROTORS

Daiwa MR 750 PE (16.1 sq ft rating) \$289

Additional Motor Units \$89

Alliance HD73 (10.7 sq ft rating) \$119.95

Alliance H110 (3 sq ft rating) \$49

Telax CD 45II (8.5 sq ft rating) \$Call

Telax HAM 4 (15 sq ft rating) \$Call

Telax Tallwister (20 sq ft rating) \$Call

Telax HDR300 Heavy Duty (25 sq ft rating) \$Call

Kenpro KR500 Heavy Duty Elevator Rotator \$189

Kenpro KR5400 AZ/EL Rotor Package \$319

ROTOR CABLE

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

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

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G \$45.00 45G \$116.00

25G \$52.00 55G \$160.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	\$ 999.
FK2558	58 ft.	13.3 sq. ft.	1049.
FK2568	68 ft.	11.7 sq. ft.	1099.
FK4544	44 ft.	34.8 sq. ft.	1319.
FK4554	54 ft.	29.1 sq. ft.	1399.
FK4564	64 ft.	28.4 sq. ft.	1499.

25G Double Guy Kit \$249.

45G Double Guy Kit \$269.

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

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	\$ 15/ft
1/4 EHS Guywire (6650 lb rating)	\$ 18/ft
5/16 EHS Guywire (11,200 lb rating)	\$ 29/ft
5/32 7 X 7 Aircraft Cable (2700 lb rating)	\$ 15/ft
3/16 CCM Cable Clamp (3/16" or 5/32"	\$.45
1/4 CCM Cable Clamp (1/4" Cable)	\$.55
1/4 TH Thimble (fits all sizes)	\$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	\$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	\$7.95
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)	\$18.95
3/16" Preformed Guy Grip	\$2.49
1/4" Preformed Guy Grip	\$2.99
6" Diam - 4 ft Long Earth Screw Anchor	\$14.95
500 D Guy Insulator (5/32" or 3/16" Cable)	\$1.69
502 Guy Insulator (1/4" Cable)	\$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	\$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating) \$.29/ft

HPTG4000 Guy Cable (4000 lb rating) \$.49/ft

HPTG6700 Guy Cable (6700 lb rating) \$.69/ft

9901LD Cable End (for 2100/4000 cable) \$8.95

9902LD Cable End (for 6700 cable) \$9.95

Socketfast Polting Compound (does 6-8 ends) \$14.95

BALVANIZED 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

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

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)

MISSOURI RADIO CENTER

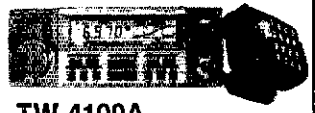
1-800-821-7323

1001 N.W. 24th Street, Ft. Lauderdale, FL 33305 • 954-561-1234

MADE IN U.S.A. —
MasterCard — VISA — Discover

Dependable Service At The Right Price . . . Everytime

KENWOOD



TW-4100A

- 2m/70cm FM Dual Band Transceiver
- 45W on 2m, 35W on 70cm
- Frequencies: 142-149 MHz 440-449.995 MHz
- Selectable Full Duplex Cross Band Operation

KENWOOD



TM-221A

- 2m FM Mobile Transceiver
- 45W Output w/HiLo Switch
- 14 Multi-Function Memories
- TM-421A Available For 440 MHz

KENWOOD

TH-215A



"FULL FEATURED 2m HT"

- 141-183 MHz Receive
- 144-148 MHz Transmit
- 2.5w Output (5w Optional)
- 10 Memories
- Built-in CTCSS Encoder
- Nine Types of Scanning

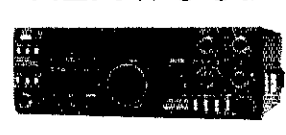
KENWOOD



TS940S "DX-celence"

- Programmable Scanning
- High Stability, Dual Digital VFO's
- 40 Channel Memory
- General Coverage Receiver

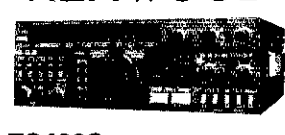
KENWOOD



TS440S "DX-CITING"

- 100% Duty Cycle
- 100 Memories
- Direct Keyboard Entry
- Optional Built-in AT
- On Sale Now, Call for Price!

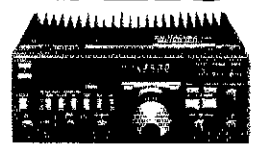
KENWOOD



TS430S

- Compact SSB, CW & AM Transceiver
- 160-10m w/General Coverage Receiver
- Solid-State Lightweight
- Dual VFO's

YAESU



FT-757GX/II

"CAT SYSTEM"

- All Mode HF Transceiver
- Dual VFO's
- Full Break-In CW
- 100% Duty Cycle

YAESU



FT-767GX HF/VHF/UHF BASE STATION

- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

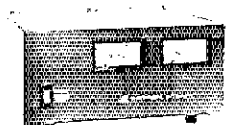
YAESU



FL-7000

- Solid State Amp for 160-15M
- Built-In Power Supply
- Automatic Tuner
- 1200W PEP Input

ASTRON CORPORATION



Power Supply

- RS7A \$48
- RS12A \$88
- RS20A \$88
- RS20M \$105
- VS20M \$125
- RS35A \$133
- RS35M \$149
- VS35M \$165
- RS50A \$189
- RS50M \$215
- RM50A \$219
- VS50M \$229

YAESU



FT-109RH

- 220 MHz Handheld
- 5W Output
- Ten Memories
- Battery Saver
- Memory And Priority Scanning
- FT-209RH-2m
- FT-709RH-440 MHz

YAESU



FT23/73R

- Super "Mini" HT's
- Zinc-Aluminum Alloy Case
- 10 Memories
- 140-164 MHz, 440-450 MHz
- 2W Battery Pack or Optional 5W Pack

YAESU

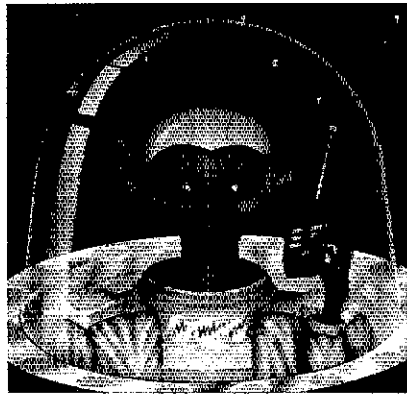


FT-727R

- Two Affordable Radios in One
- 2m/440 MHz Handheld
- 5W on Both Bands
- Ten Memories
- Multi-Scan Systems
- Battery Saver

VEHICULAR COMMUNICATIONS • AIRBORNE COMMUNICATIONS • MARINE COMMUNICATIONS • COMMERCIAL COMMUNICATIONS • AMATEUR COMMUNICATIONS • CB COMMUNICATIONS • PORTABLE COMMUNICATIONS • SPECIALTY COMMUNICATIONS

Yaesu's FT-736R. Because you never know who's listening.



Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450-MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

Crossband full duplex capability is built into every FT-736R for satellite work. And the satel-

lite tracking function (normal *and* reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz, and 70 cm. And 10 watts on 6 meters and 1.2 GHz. Store frequency, mode, PL frequency, and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating your

tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

YAESU



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

Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc. FT-736R shown with 220-MHz option installed.

KENWOOD

...pacesetter in Amateur Radio

220 MHz
TM-321A
Coming Soon!

Here's One for You!

TM-221A/321A/421A

2 m and 70 cm FM compact mobile transceivers

The all-new TM-221A, TM-321A and TM-421A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- TM-221A provides 45 W. TM-321A, 25 W. The TM-421A is the first 35 W 70 cm mobile! All three models have adjustable 5 W low power.
- Selectable frequency steps for quick and easy QSY.

- TM-221A receives from 138-173.995 MHz. This includes the weather channels! Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.) (Specifications guaranteed for Amateur band use only.)
- TM-321A covers 220-224.995 MHz. The TM-421A covers 438-449.995 MHz.
- Built-in front panel selection of 38 CTCSS tones. TSU-5 programmable decoder optional.
- Simplified front panel controls—makes operating a snap!
- 16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.
- Kenwood non-volatile operating system. All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up—est. life 5 yrs.)

- Packet radio compatible!
- 14 full-function memory channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are two channels for "odd split" operation.
- Programmable band scanning.
- Memory scan with memory channel lock-out.
- Super compact: approx. 1-1/2"Hx5-1/2"Wx7"D.
- New amber LCD display.
- Microphone test function on low power.
- High quality, top-mounted speaker.
- Rugged die-cast chassis and heat sink.



RC-10 Remote Controller

For TM-221A/321A/421A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to two transceivers with the optional PG-4G cable. When both transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



Optional Accessories:

- RC-10 Multi-function handset remote controller
- PG-4G Extra control cable, allows TM-221A/TM-421A full duplex operation
- PS-50/PS-430 DC power supplies
- TSU-5 Programmable CTCSS decoder
- SW-100A Compact SWR/power/volt meter (1.8-150 MHz)
- SW-100B Compact SWR/power/volt meter (140-450 MHz)
- SW-200A SWR/power meter (1.8-150 MHz)
- SW-200B SWR/power meter (140-450 MHz)
- SWT-1 Compact 2 m antenna tuner (200 W PEP)
- SWT-2 Compact 70 cm antenna tuner (200 W PEP)
- SP-40 Compact mobile speaker
- SP-50B Mobile speaker
- PG-2N Extra DC cable
- PG-3B DC line noise filter
- MC-60A, MC-80, MC-85 Base station mics.
- MC-55 (8-pin) Mobile mic. with gooseneck and time-out timer
- MA-4000 Dual band antenna with duplexer (mount not supplied)
- MB-201 Extra mobile mount

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

KENWOOD

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