

May 1986 \$3.00

QST

devoted entirely to Amateur Radio



Shooting the moon

Page 86



the tempo S-15

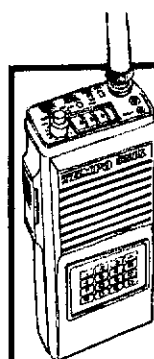
...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

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

Consider these features before you decide on any hand held:

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

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



now available!

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

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

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

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

- FMH-15S...** 138-174 MHz (10 MHz) frequency coverage
1 watt (low)/5 watts (high) RF power output
- FMH-44S...** 400-512 MHz (20 MHz) frequency coverage
1 watt (low)/4 watts (high) RF power output
- FMT-25S...** 138-174 MHz (10 MHz) frequency coverage
25 watts RF power output

Available at
your local Tempo
dealer or from...



Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-

Butler, Missouri 64730

(816) 679-

TOLL FREE ORDER NUMBER: (800) 421-6631

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

KENWOOD

...pacesetter in Amateur radio

Just arrived!

All-Mode Mobility!

TR-751A Compact 2-m all mode transceiver

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

• Automatic mode selection, plus LSB
144.0 144.1 144.5 145.8 146.0 148.0 MHz

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

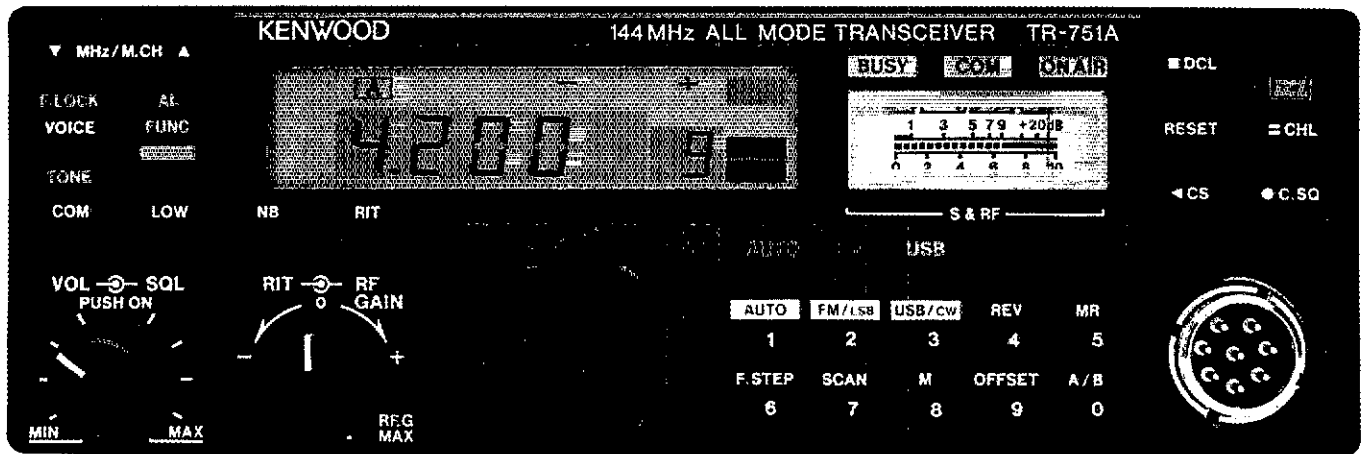
- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option

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

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

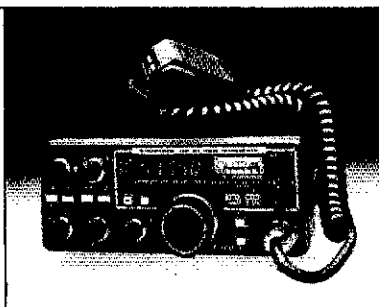
Optional accessories:

- CD-10 call sign display
- PS-430, PS-30 DC power supplies
- SW-100A/B SWR/power meter
- SW-200A/B SWR/power meter
- SWT-1 2-m antenna tuner
- TU-7 38-tone CTCSS encoder
- MU-1 modem unit for DCL system
- VS-1 voice synthesizer
- MB-10 extra mobile mount
- SP-40, SP-50 mobile speakers
- PG-2K extra DC cable
- PG-3A DC line noise filter
- MC-60A, MC-80, MC-85 deluxe base station mics.
- MC-42S UP/DOWN mic.
- MC-55 (8-pin) mobile mic.



TR-9500 70 CM SSB/CW/FM transceiver

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



Actual size front panel



KENWOOD

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

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



ICOM IC-751A

CAN YOU HANDLE THIS MUCH TRANSCEIVER?

- All HF Band Transceiver/General Coverage Receiver
- New Design
- 100% Duty Cycle Transmitter
- 105dB Dynamic Range
- All Modes Built-In USB, LSB, AM, FM, CW, RTTY
- 12 Volt Operation

The new IC-751A top-of-the-line HF base station transceiver is designed for the ham operator who demands high performance. Whether contesting or QSY'ing for pleasure, the 100 watt IC-751A incorporates the best features of the IC-751, plus brings you to the forefront with the following most-asked for additions.

More CW Control. For the CW enthusiast, the new IC-751A includes an electronic keyer unit, QSK rated at up to 40WPM, standard FL-32A 9MHz/500Hz CW filter and CW sidetone to

monitor your code in RX or TX modes... great for practice!

All Amateur Band Coverage. Plus general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

Improved Smooth Tuning. The IC-751A features a newly designed tuning knob for velvet smooth tuning.

Added LED Annunciator. For easily identifying if you're using the tuning speed, dial, or band switching functions.

32 Memories. Mode and frequency may be stored in any of 32 memories...all the memory capability that you'll ever need.

More Stable. Even in the receive mode, the IC-751A has a sophisticated thermal sensor to monitor the internal temperature. The sensor automatically activates the cooling fan which gives maximum stability...critical for contesting.

Newly Designed Features. The IC-751A boasts a number of newly designed features for better performance...new 9MHz notch filter to drastically reduce QRM, new AGC system, new compressor for better audio and a new AF gain control system to improve control of the CW sidetone volume.

Options Available. Options for the IC-751A include the IC-PS30 external AC system power supply, IC-PS35 internal AC power supply, IC-AT500 antenna tuner, IC-EX309 microprocessor interface connector, SM-8 or SM-10 desk mics, IC-2KL linear amplifier, RC-10 remote controller, SP-7 or SP-3 speakers, IC-EX310 voice synthesizer and GC-5 world clock.

Optional Filters. FL-52A CW 455kHz at 500Hz, FL-53A CW-N 455kHz at 250Hz, FL-63A CW-N 9.0106MHz at 250Hz, FL-33 AM 9.010MHz at 6000Hz, and CR-64 high stability 30.72MHz crystal filter.



ICOM
First in Communications

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

David Sumner, K1ZZ

Publisher

Paul L. Rinaldo, W4RI

Editor

E. Laird Campbell, W1CUT

Managing Editor

Joel P. Kleinman, N1BKE

Assistant Managing Editor

Andrew Tripp, KA1JGG

Editorial Supervisor

Paula McKnight, N1DNB

Editorial Assistant

Charles L. Hutchinson, 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, Robert Schatgen, KU7G,

Bruce O. Williams, WA6IVC, David Newkirk, AK7M

Assistant Technical Editors

Maureen Thompson, KA1DYZ

Technical Editorial Assistant

John F. Lindholm, W1XX

Operating News

Phillip M. Sager, WB4FDT

Happenings, League Lines

John C. Hennessee, KJ4KB

Correspondence, Washington Mailbox

Michael R. Riley, KX1B

Public Service

Michael B. Kaczynski, W1OD

Contests

Donald B. Search, W3AZD

DXCC

Leo D. Kluger, WB2TRN

Affiliated Clubs in Action

John Foss, W7KQW

In Training

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

Editorial Associates

Ed Tilton, W1HDQ, John Troster, W6ISQ,

William A. Tynan, W3XO, Stan Horzepa, WA1LOU,

Harry MacLean, VE3GRO, Bob Atkins, KA1GT,

Ellen White, W1YLA, Richard L. Baldwin, W1RU,

John Hurlton, W1RW, Doug DeMaw, W1FB8,

Scott Springate, N7DDM, Vern Riporella, WA2LQQ,

Joan Gibson, KG1F

Contributing Editors

Michelle Christjohn, WB1ENT, *Production Supervisor*

Sue Fagan, *Graphic Design Supervisor*

David Pingree, *Technical Illustrator*

Jodi McMahon, KA1JPA, *Layout Artist*

Rose Cyr, *Typesetter*, Leslie K. Bartcloth, KA1MJP,

Deborah J. Sandler, *Production Assistants*

Production Staff

Steffie Nelson, KA1IFB

Proofreader

Lee Aurick, W1SE

Advertising Manager

Sandy Gerli, AC1Y

Deputy Advertising Manager

Lorry Evans, KA1KQY, *Circulation Manager*

Debra Chapor, *Deputy Circulation Manager*

Offices

225 Main St. Newington, CT 06111 USA

Telephone: 203-666-1541

Telex: 650215-5052 MCI

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

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

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

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

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



OUR COVER

The most-recent EME Competition saw KB8RQ amass more than 600k points, good for a second-place finish. Gary's 32-antenna array may just have had something to do with his success! Look for him on 144.016 MHz, and look for the contest results on page 86. (photo courtesy KB8RQ)

CONTENTS

TECHNICAL

- 14 Beyond the Dipper *Wes Hayward, W7ZOI*
- 21 Under Construction—Part 6: Learning to Work with Preamplifiers *Doug DeMaw, W1FB*
- 24 A Mode-L Parabolic Antenna and Feedhorn for OSCAR 10 *Eugene F. Ruperto, W3KH*
- 28 Adventures in Satellite DXing—Part 2 *Dick Jansson, WD4FAB and Mark Wilson, AA2Z*
- 34 Spots Before Your Eyes *Jerry Hall, K1TD*
- 38 Technical Correspondence

NEWS AND FEATURES

- 9 *It Seems to Us: Good News for Packeteers*
- 11 Up Front in QST
- 40 Getting into Field Day Form *Mike Bellinger, K0UAA*
- 44 KORE—The Benefits of ARRL Membership *Stephen Mendelsohn, WA2DHF*
- 45 ARRL: A Good Deal, and a Good Deal More!
- 46 *Happenings: FCC Grants Temporary Waiver for Automatic Retransmission of Third-Party Traffic*
- 63 *IARU News: The CCIR and You*
- 76 *Public Service: Hurricane Kate and Her Evil Friends, the Tornadoes*

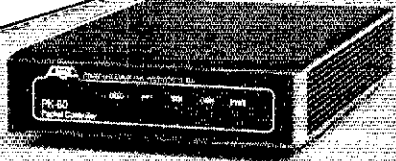
OPERATING

- 79 Field Day Rules
- 80 Results, 52nd ARRL November Sweepstakes *Mike Kaczynski, W1OD and Billy Lunt, KR1R*
- 86 Results, Ninth ARRL International EME Competition *Michael B. Kaczynski, W1OD*
- 88 Rules, June VHF QSO Party

DEPARTMENTS

Affiliated Clubs in Action	65	Index of Advertisers	174
Amateur Satellite Communications	70	League Lines	13
ARRL Financial Statements	50	Making Waves	61
Canadian NewsFronts	62	Mini Directory	90
Coming Conventions	72	Moved and Seconded	53
Contest Corral	89	The New Frontier	67
Correspondence	54	Next Month in QST	27
DX Century Club	58	QSL Corner	57
Exam Information	65	QST Profiles	60
FM/RPT	75	Section News	91
Ham Ads	149	Silent Keys	66
Hamfest Calendar	72	Special Events	90
Hints and Kinks	36	The World Above 50 MHz	68
How's DX?	55	YL News and Views	64
		50 and 25 Years Ago	66

UNIVERSAL PACKET CONTROLLER model PK-80



\$219⁹⁵ Suggested
Amateur Net Price

The AEA model PK-80 is a wired, tested, and calibrated version of the famous TAPR TNC-2 and comes with a one-year conditional AEA warranty.

You can interface the PK-80 with any ASCII terminal or a personal computer and standard terminal software. The PK-80 is loaded with all the latest AX.25 version 2.0 software and advanced packet hardware circuitry that makes the TNC-2 the newest benchmark for comparison.

Compare the following as representative of the advanced new features relative to the competition.

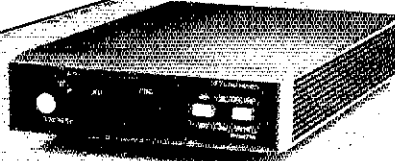
- Hardware HDLC for full duplex
- True Data Carrier Detect (DCD) for HF operation
- Operates with 300, 1200, 2400, 4800, and 9600 baud terminals
- Five front-panel status indicators
- Multiple connect
- Connect check (poll final bit) fully implemented
- Connect AUTO response message
- Only three commands necessary for making standard contacts
- 82 software commands possible for the most demanding requirements

Prices and Specifications Subject to Change Without Notice or Obligation.

ADVANCED ELECTRONICS APPLICATIONS, INC.
P.O. Box C-2160, Lynnwood, WA 98036-0918
TELEX: 6972496 AEA INTL UW
(206) 775-7373

AEA BRINGS YOU THE
BREAKTHROUGH

UPGRADE YOUR TNC FOR H.F. PACKET OPERATION



\$169⁹⁵ Suggested
Amateur Net Price

Virtually all existing Packet Terminal Node Controllers (TNC's) use phase-locked-loop detection or a "World Chip" decoder intended for telephone quality circuits. These schemes work well for VHF FM radio operation, but leave a lot of room for improvement in H.F. radio environments.

The new AEA Model PM-1 Packet Modem is designed to interface between your existing TNC and your radio. No internal modifications to your TNC or radio are necessary. The PM-1 contains independent dual channel filtering with A.M. detection for maximum sensitivity and selectivity under poor H.F. conditions. The PM-1 is optimized for 300 baud operation. A shift frequency of 200 Hz or 600 Hz may be selected from the front panel.

A front panel bar graph tuning indicator is provided to assist the user in precise H.F. tuning of an incoming packet radio signal. There is also a front panel squelch control (variable DCD) provided for sensitivity adjustment under various noise conditions. Just to make your TNC as flexible and useful as possible, we have included two output radio cables. Now you can switch between VHF and HF packet operation by simply pushing this PM-1 front panel switch.

Enjoy Packet Radio to its fullest with the new AEA model PM-1 Packet Modem. Work DX on the low bands and monitor packet mail boxes from the other side of the country. See the PM-1 at your favorite dealer now.

Prices and Specifications Subject to Change Without Notice or Obligation.

ADVANCED ELECTRONICS APPLICATIONS, INC.
P.O. Box C-2160, Lynnwood, WA 98036-0918
TELEX: 6972496 AEA INTL UW
(206) 775-7373

AEA BRINGS YOU THE
BREAKTHROUGH

ISOPOLE™ "BREAKTHROUGH" BENEFITS

THE IDEAL OMNIDIRECTIONAL PACKET ANTENNA

- Greatest Simplex Range for Price
- Maximum Decoupling Minimizes Computer Hash
- No Feedline Radiation to Lock Up Computer

PERFORMANCE

- Low Vertical Radiation Angle
- No Feedline Radiation
- Wideband Matching Network
- Efficient Design
- Omnidirectional Pattern

DEPENDABILITY

- High Quality Materials
- Weatherproof Design
- Rugged Construction
- Advanced Engineering

PRICE & CONVENIENCE

- Low Cost
- Easily Installed
- Compact & Lightweight
- UPS Shippable
- Inexpensive TV Mast Support (not Included)

ISOPOLE™ is available for 144 MHz, 220 MHz, 440 MHz. Ask for our spec sheet and radiation pattern plots, or visit your favorite AEA dealer for more information.

(Prices and specifications subject to change without notice or obligation)

AEA

Advanced Electronics Applications, Inc.
P.O. Box C-2160
Lynnwood, WA 98036
(206) 775-7373
TELEX: 6972496
AEA INTL UW

AEA BRINGS YOU THE
BREAKTHROUGH

Our numbers talk

424B

SUCCESS

BOOMERS WIN
 1983 Central States VHF
 Conference, Antenna Contest

144MHz BOOMER	1st Place
	2nd Place
220MHz BOOMER	1st Place
432MHz BOOMER	1st Place
	Commercial

BOOMERS WIN AGAIN
 1983 EME CONTEST WA1JXN

1st PLACE 2 METERS
 WITH 12 X 32-19
 PLUS

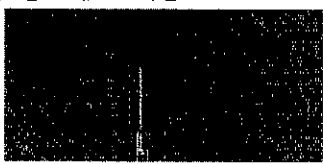
1st TO WORK SPACE
 SHUTTLE

They have talked to winning scores in many important amateur activities including the 1979, 80, 81 June VHF contests, 1981 Central States antenna measuring contest, 1981, 82 EME contests, 1982 Rocky Mountain antenna measuring contest and many more. Now there are three new numbers: the 424B, 24 elements for 432 MHz; the 410B, 12 elements at 432 MHz; and the 416TB, 16 elements at 435 MHz for satellite communications. The new Boomer models feature insulated elements, stainless steel hardware, N type connector, T match feed and trigon reflectors.

THREE EXCITING NEW BOOMERS

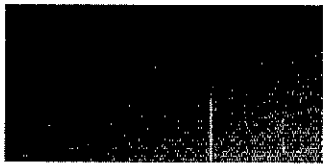
HIGHEST GAIN BOOMER XL

Boomer XL is "the antenna for 2 meter DX" with higher gain and cleaner pattern this antenna is designed to perform and survive in harsh environments. It has 18 elements on a 28.8 ft. 8.8 m tapered boom.
MODEL 4218XL 144-145 MHz



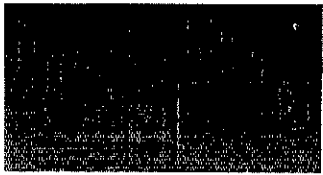
WIDEBAND BOOMER 215WB

Featuring the latest in wideband technology. The 215WB is high performance across the entire 2 meter band, for FM, SSB or CW. It features 15 elements on a 15 ft. 4.57 m boom.
MODEL 215WB 144-148 MHz



FM BOOMER POWER PACK

A combination of 215WB Boomers vertically polarized with support boom, power divider, and interconnect harness. Like all boomers it features all stainless steel hardware. You'll easily work those distant repeaters.
MODEL 230WB 144-148 MHz



OSCAR BOOMERS

Enjoy the thrill of OSCAR 10 with a Cushcraft antenna system, featuring the fabulous 416TB BOOMER, giving more performance through better electrical design and superior construction.

Order a complete package as shown left: 416TB, A144-20T and A14T-MB. For less than \$200.00* you'll enjoy the thrill of worldwide OSCAR communications.



48 Perimeter Road, P.O. Box 4680
 Manchester, NH 03108 USA
 TELEPHONE 603-627-7877
 TELEX 953-050 CUSHSHG MAN

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, HF attenuator, RIT/XIT, and optional filters fight QRM.

MC-42S UP/DOWN mic. included

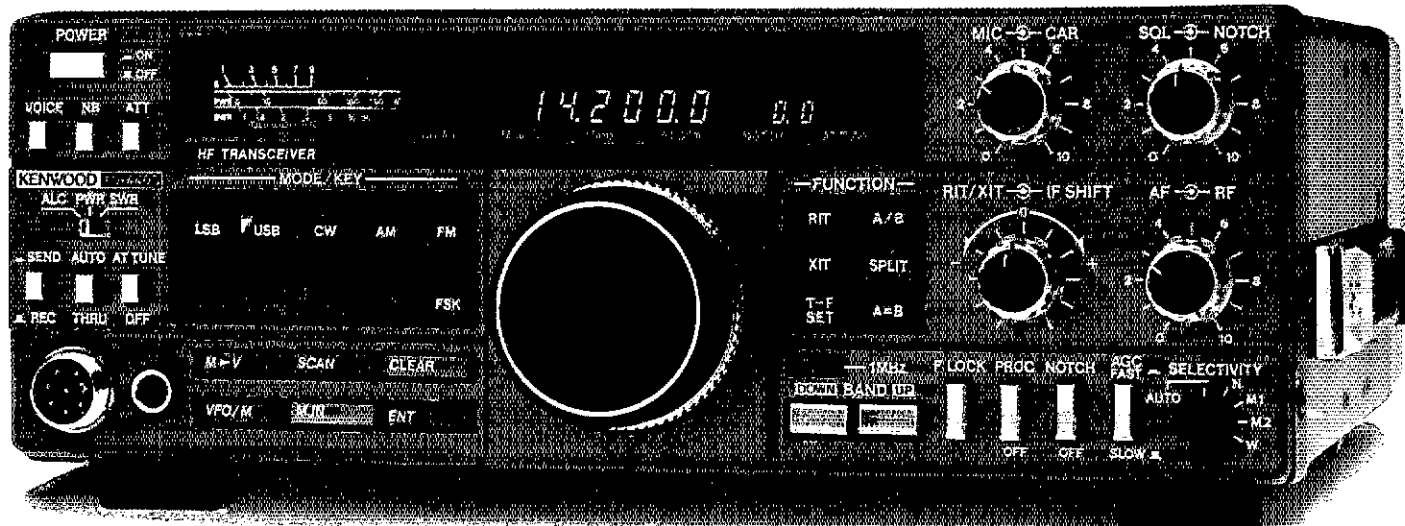
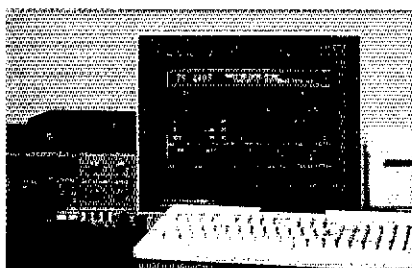
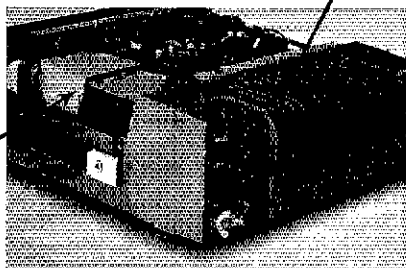
Computer interface port

5 IF filter functions

Dual SSB IF filtering

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

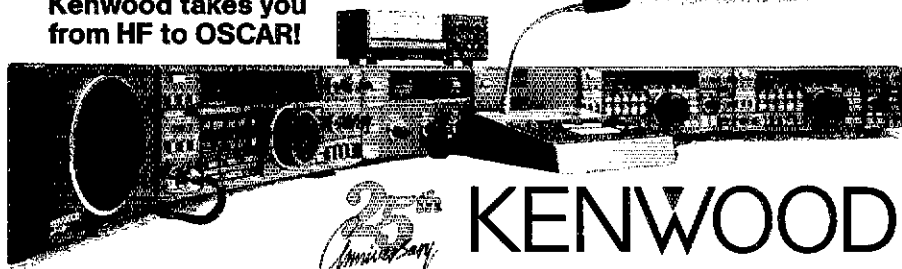
VOX, full or semi break-in CW; AMTOR compatible.



Optional accessories:

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S-88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-4/5/6/7 headphones
- SP-40/50 mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2C extra DC cable.

Kenwood takes you from HF to OSCAR!



KENWOOD

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

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

KENWOOD

...pacesetter in Amateur radio

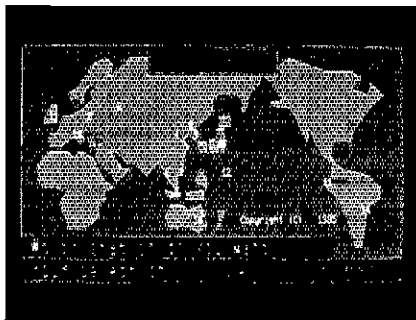
NEW!
Computer Interface!

Complete Control...

- IF-232C** Level translator
- IF-10A** Computer interface for TS-711A/TS-811A
- IF-10B** Computer interface for TS-940S
- IC-10** IC kit for TS-440S computer control

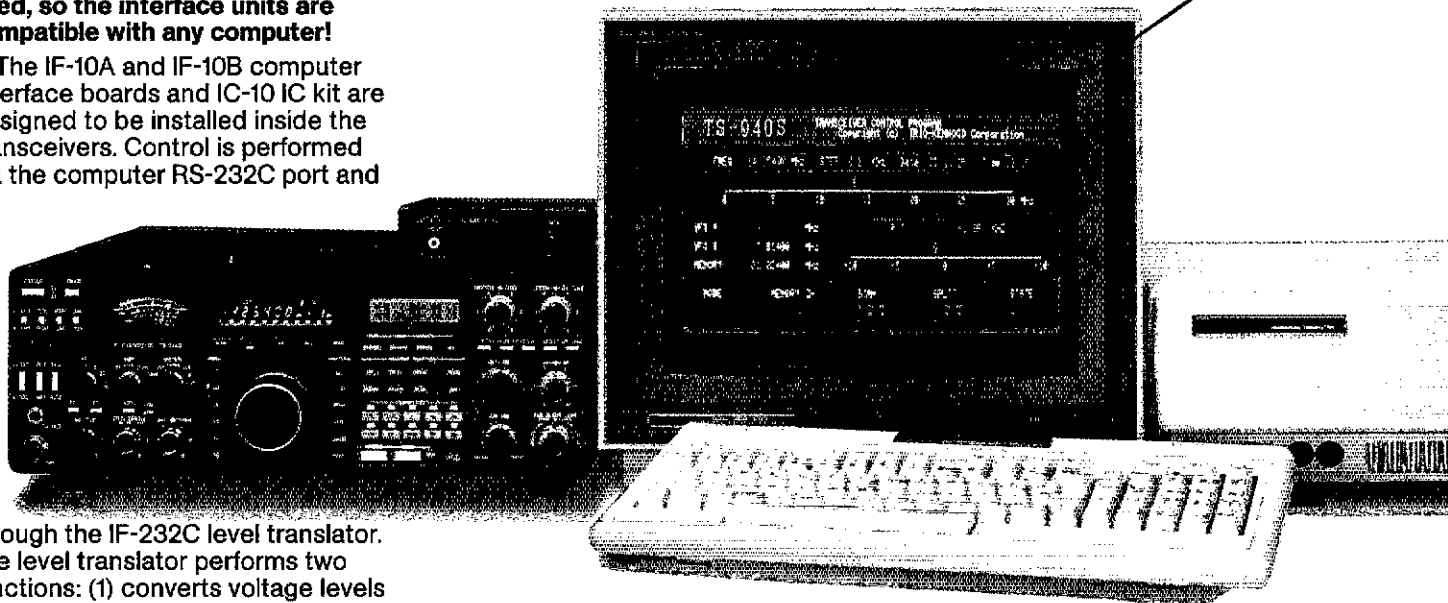
Attention "computing" hams! The Kenwood IF-Series computer interface units will enable you to connect your TS-711A, TS-811A, TS-940S, or TS-440S transceivers to your home computer. RS-232C standard is used, so the interface units are compatible with any computer!

The IF-10A and IF-10B computer interface boards and IC-10 IC kit are designed to be installed inside the transceivers. Control is performed via the computer RS-232C port and



Short Wave Listener's map and directory—simply select the QTH you'd like to listen to, and the pre-programmed frequency is "dialed up!"

Display frequency, band, and mode data. Control your rig via keyboard!



through the IF-232C level translator. The level translator performs two functions: (1) converts voltage levels from the RS-232C port to the TTL levels in the transceiver, (2) and acts as a noise suppressor. A complete interface "kit" would include the appropriate computer interface units (IF-10A, IF-10B, or IC-10) and the IF-232C level translator.

The applications of automated station control are almost endless! Just imagine... work DX from your hand-held... operate OSCAR "automatically"... remote operation of your station... or put together the "ultimate" contest station.....

• **Interchangeable commands**

This means that one program may be used with several rigs, to minimize program changes.

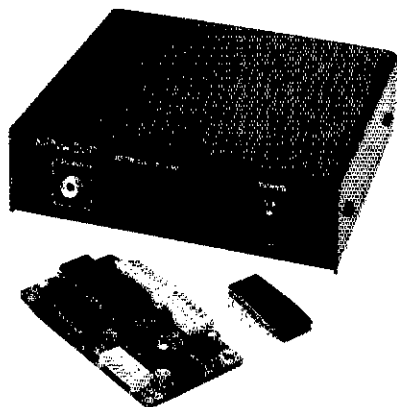
• **Simultaneous operation of the computer and transceiver is possible**

• **Powerful, easy-to-understand instruction set**

• **Wide variety of commands**
Memory input and recall, frequency selection, frequency step, sub-tone frequency, offset, antenna tuner, DCS, scan, and many, many more functions are accessible with the Kenwood computer interface unit!

• **AC-10 AC power adapter (optional)**

More IF-232C and computer interface information is available from authorized Kenwood dealers.



KENWOOD

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

CRT display shown is a sample program, not available from Trio-Kenwood Communications.

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



Directors

Canada

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

Vice Director: Harry MacLean, VE3GRO,
500 Riverside Dr, London, ON N6H 2R7
(519-473-1668)

Atlantic Division

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

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

Central Division

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

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

Dakota Division

Howard Mark, W0QZC, 11702 River Hills Dr,
Burnsville, MN 55337 (612-890-9114)

Vice Director: Richard Whiting, W0TN, 4749 Diane Dr,
Minnetonka, MN 55943 (612-870-2071)

Delta Division

CLYDE O. HURLBERT, W5CH, PO Box 541,
Biloxi, MS 39533 (601-435-5544)

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

Great Lakes Division

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

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

Hudson Division

LINDA S. FERDINAND, N2YL, Sunset Trail,
Clinton Corners, NY 12514 (914-266-5398)

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

Midwest Division

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

Vice Director: Richard Ridenour, KB0ZL,
9 Lake Pembroke Dr, Ferguson, MO 63135
(314-521-2520)

New England Division

TOM FRENAYE, K1KI, 23 Pinehurst Rd,
Box 62, Unionville, CT 06085 (203-873-5429)

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

Northwestern Division

MARY E. LEWIS, W7QGP, 10352 Sandpoint Way, NE,
Seattle, WA 98125 (206-523-9117)

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

Pacific Division

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

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

Roanoke Division

GAY E. MILIUS, JR, W4UG,
1418 Rutland Dr, Virginia Beach, VA 23454
(804-481-5095)

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

Rocky Mountain Division

LYS J. CAREY, K0PGM, 13495 West Center Dr,
Lakewood, CO 80228 (303-986-5420)

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

Southeastern Division

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

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

Southwestern Division

FRIED HEYN, WA6WZO, 962 Cheyenne St,
Costa Mesa, CA 92626 (714-549-8516)

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

West Gulf Division

RAYMOND B. WANGLER, W5EDZ, 642 Beryl Dr,
San Antonio, TX 78213 (512-733-9632 home,
512-522-2221 business)

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

*Executive Committee Member

Section Managers of the ARRL

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

Canada

Alberta
British Columbia
Manitoba
Maritime/Nfld
Ontario
Quebec
Saskatchewan

Bill Gillespie, VE6ABC, 10129 90th St, Edmonton T5H 1R5
H. E. Savage, VE7FB, 4553 West 12th Ave, Vancouver V6R 2R4 (604-224-5226)
Jack Adams, VE4AJE, 227 Davidson Ave E, Dauphin R7N 2Z4 (204-638-9270)
Donald R. Wellington, VE1WF, 36 Sherwood Dr, St. John, NB E2J 3H6 (506-696-2913)
L. P. Thivierge, VE3GT, 34 Bruce St W, Renfrew K7V 3W1 (613-432-5967)
Harold Moreau, VE2BP, 80 Principale, St Simon Co, Bagot J0H 1Y0 (514-798-2173)
W. C. "Bill" Munday, VE5WV, 132 Shannon Rd, Regina S4S 5B1 (306-586-4963)

Atlantic Division

Delaware
Eastern Pennsylvania
Maryland-DC
Southern New Jersey
Western New York
Western Pennsylvania

Harold K. Low, WA3WYI, Rte 6, Box 66, Millsboro 19966 (302-945-2871)
James B. Post, KA3A, 15 Monarch Rd, Wilkes-Barre 18702 (717-825-3940)
John A. Barolet, KJ3E, 108 Elliott Ct, California, MD 20619 (301-832-3201)
Richard Baier, WA2HEB, 1226 Audubon Dr, Toms River 08753 (201-270-9292)
William Thompson, W2MTA, RD 1—Rock Rd, Newark Valley 13811 (607-842-8930)
Otto Schuler, K3SMB, 3732 Colby St, Pittsburgh 15214 (412-231-6890)

Central Division

Illinois
Indiana
Wisconsin

David E. Lattan, WD9EBQ, RR 1, Box 234, Makanda 62958 (618-529-1578)
Bruce Woodward, W9UMH, 6208 Bramshaw Rd, Indianapolis 46220 (317-251-5606)
Richard R. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-228-0312)

Dakota Division

Minnesota
North Dakota
South Dakota

George E. Frederickson, KC0T, RR #2—Box 352, South Haven 55382 (612-558-6312)
Mike Mankey, WB0TEE, 518 E. Columbia Dr, Bismarck 58501 (701-258-5114)
Roland Cory, WB0YMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

Delta Division

Arkansas
Louisiana
Mississippi
Tennessee

Joel M. Harrison, Sr., WB5IGF, Star Rte 3—Box 306, Judsonia 72081 (501-729-3301)
John M. Wonderglass, K5KR, 800 Smith Dr, Mairlea 70065 (504-837-1485)
Paul Kemp, KW5T, 3581 Beaumont Dr, Pearl 39208 (601-939-7812)
John C. Brown, NO4Q, PO Box 37, Eva 38333 (901-584-7531)

Great Lakes Division

Kentucky
Michigan
Ohio

Dale Bennett, WA4JTE, 320 Loy St, Columbia 42728 (502-384-2639)
James R. Seeley, WB8MTD, 21615-29 1/2 Mile Rd, Springfield 49284 (517-857-2013)
Jeffrey A. Maass, K8ND, 9256 Concord Rd, Powell 43065 (614-873-3234)

Hudson Division

Eastern New York
NYC-Long Island
Northern New Jersey

Paul S. Vydrareny, WB2VJK, 259 N Washington, North Tarrytown 10591 (914-631-7424)
John H. Smale, K2IZ, 315 Kensington Ct, Copiague 11726 (516-226-4835)
Robert R. Anderson, K2BJG, 69 Page Dr, Oakland 07436 (201-337-7858)

Midwest Division

Iowa
Kansas
Missouri
Nebraska

Rollin J. Sievers, WB0AVW, Rts 3-Box 62, Storm Lake 50588
Robert M. Summers, K0BXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Benton C. Smith, K0PCK, 3001 Sinclair, Rte 3, Box 196-A, Columbia 65103 (314-443-5168)
Vern J. Wirtz, WB0GQM, Rural Route, 81 Capehart Rd, Papillion 68133

New England Division

Connecticut
Eastern Massachusetts
Maine
New Hampshire
Rhode Island
Vermont
Western Massachusetts

Robert Koczur, K1WGO, 84 Whetstone Rd, Harwinton 06791 (203-485-0338)
Luck Hurdur, KY1T, PO Box LL, North Eastham 02651 (617-255-2029)
Clevis O. Lavery, W1RWG, 17 Fair St, Norway 04268 (207-743-2353)
William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-882-0021)
John Vota, WB1FMY, 41 Brookside Ave, Centerdale 02911 (401-231-1934)
Raiph T. Stetson, III, KD1R, PO Box 123, Milton 05468 (802-893-4856)
R. Donald Haney, KATT, RD 1—Box 237, Myrick La, Harvard 01451 (617-772-4126)

Northwestern Division

Alaska
Idaho
Montana
Oregon
Washington

James L. Moody, Jr., NL7C, PO Box 102841, Anchorage 99510 (907-694-4077)
Lemuel H. Allen, W7JMH, 1800 S. Atlantic St, Boise 83705 (208-343-9153)
L. C. "Les" Belyea, N7AIK, PO Box 327, Belgrade 59714 (406-388-4253)
William P. Shrader, W7CMU, 2042 Jasmine Ave, Medford 97501 (503-773-8624)
Gene E. Sprague, KD7G, 10716 23rd Dr SE, Everett, WA 98204 (206-337-3459)

Pacific Division

East Bay
Nevada
Pacific
Sacramento Valley
San Francisco
San Joaquin Valley
Santa Clara Valley

Bob Vallo, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (415-537-6704)
Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)
Amy Curtis, AH6P, PO Box 4271, Hilo, HI 96720 (808-959-8985)
Robert H. Watson, W6IEW, 10994 Clinton Br Rd, Pine Grove, CA 95665 (209-223-0101)
Robert Odell Smith, N6AT, 320 Park St—PO Box 1425, Fort Bragg, CA 95437 (707-964-4931)
Charles P. McConnell, W6DPD, 1658 W Mesa Ave, Fresno, CA 93711 (209-431-2038)
Glenn Thomas, WB6W, 564 Simas Dr, Milpitas, CA 95035 (408-263-9450)

Roanoke Division

North Carolina
South Carolina
Virginia
West Virginia

Rae Everhart, K4SWN, PO Box 41, Lexington 27293-0041 (704-249-8734)
James G. Walker, WD4HLZ, Rte 1, Box 5395, Marion 29571 (803-423-3645)
Claude E. Fegley, W3ATC, 135 The Main—RR #1, Williamsburg 23185 (804-253-0658)
Karl S. Thompson, K8KT, 5303 Pioneer Dr, Charleston 25312 (304-776-4352)

Rocky Mountain Division

Colorado
New Mexico
Utah
Wyoming

William "Bill" Sheffield, KQ0J, 1444 Roslyn St, Denver 80220 (303-355-2488)
Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-4581)
James R. Brown, NA7G, 865 Manchester Rd, Kaysville 84037 (801-544-0056)
Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82003 (307-634-7385)

Southeastern Division

Alabama
Georgia
Northern Florida
Southern Florida
West Indies

Joseph E. Smith, Jr., WA4RNP, 1211 13th St, N, Bessemer 35020 (205-424-4866)
Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2856)
Phillip O'Dwyer, W4FX, 543 Mooney Rd, NE, Fort Walton Beach 32548 (904-862-2353)
Richard D. Hill, WA4PFK, 3800 SW 11th St, Ft. Lauderdale 33312 (305-583-8932)
Alberto L. Valdejuar, WP4CSG, V-11 19 St, Berwind Estates, Rio Piedras, PR 00924

Southwestern Division

Arizona
Los Angeles
Orange
San Diego
Santa Barbara

James E. Swafford, W7FF, 5906 W Miramar Dr, Tucson 85715 (602-298-7793)
Eugene R. "Bob" Poole, AJ6F, 2059 Reynosa Dr, Torrance, CA 90501 (213-326-2801)
Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)
Arthur R. Smith, W6JNL, 4515 Melissa Way, San Diego, CA 92117 (619-273-1120)
Byron W. Looney, K6FI, 6540 Buckley Dr, Cambria, CA 93428 (805-927-8733)

West Gulf Division

Northern Texas
Oklahoma
Southern Texas

Phil Clements, K5PC, 1313 Applegate La, Lewisville 75067 (214-221-2222)
Dave Cox, NB5N, 1812 S Umbrella Ct, Broken Arrow 74012 (918-250-2285)
Arthur R. Ross, W5KFR, 132 Sally La, Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC



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

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

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

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

All 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: 215-6052

(user name: ARRL)

Founding President

Hiram Percy Maxim, W1AW

Officers

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

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

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

Third 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 Lane, 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: Lee Aurick, W1SE.

Manager: Sandy Gerli, AC1Y, Deputy Manager

Circulation Department: Lorry Evans, KA1KQY,

Manager: Debra Chapor, Deputy Manager

Production/Editorial Department

Laird Campbell, W1CUT, Manager

Joel Kleinman, N1BKE, Deputy Manager

Technical Department

Charles L. Hutchinson, K8CH, Manager

Gerald L. Hall, K1TD, Deputy Manager

Membership Communications Services

Manager: John F. Lindholm, W1XX

Deputy Manager: Robert J. Halprin, K1XA

Volunteer Resources

Manager: Stephen C. Place, WB1EYI

Volunteer Examiner Department

Jim Clary, WB9IHH, Manager

Club Services Department

Curtis R. Holsopple, K9CH, Manager

Field Services Department

Richard K. Palm, K1CE, Manager

Administrative Services

Controller: Michael R. Zeigler

Purchasing/Office Services Department

Kathy McGrath, Manager

Counsel

Christopher D. Imlay, N3AKD

*Executive Committee Member

“It Seems to Us ...”

Good News For Packeteers

In this space last month, we sang the praises of packet radio and told you about the League's efforts to clear a regulatory obstacle that had threatened to stop the Packet Express in its tracks. This month, we're mightily pleased to report that these efforts have met with at least temporary success. On March 14, the very day on which new rules were to take effect that would have made it virtually impossible for the fledgling packet-radio network to continue operating, the FCC issued the necessary waivers to keep things going, at least on VHF/UHF. As detailed in this month's "Happenings," packet stations operating under automatic control (i.e., without a control operator physically present at a control point) above 50 MHz are permitted to retransmit third-party traffic as long as the traffic was originated by a station with a control operator on duty and as long as AX.25 (or compatible) protocol is used. As in other cases where automatic control is authorized, devices and procedures must be used to ensure compliance with the rules.

This happy outcome arose because the officials and staff of the League and the Commission alike recognized packet radio development as something that should be encouraged, for the benefit of Amateur Radio and the public that we serve. Finding a mutually satisfactory solution was relatively easy, because everyone agreed what the problem was. Our hats are off to the Commission for recognizing the importance of quick action—and for acting accordingly. Assuming that problems (such as unauthorized access to the network by unlicensed people, or commercial traffic) don't crop up on VHF/UHF in the months to come, there's no reason for the Commission not to put the essence of the waivers into our permanent rules. Perhaps the rules can be made even less restrictive—to permit protocols other than AX.25, for example. The shape of these things to come will emerge from Commission consideration of the score of Petitions for Reconsideration that were filed back in February by as many concerned amateurs and groups, and we may see the result later this year.

So far, so good. But one important issue remains: that of unattended operation below 30 MHz. And here, things get a good deal more complex.

The HF bands are crowded. The actions of one station can have international implications: If you sneeze on 20 meters, someone in Germany may say "Gesundheit." If we're to make the most effective use of our limited allocations, we must work to accommodate everyone who wants to get on the air with a minimum of mutual interference. Traditionally, this has been done by confining incompatible modes to different parts of the band, and within those subbands (whether FCC

mandated or not) by educating everyone to select their operating frequency so as to cause the minimum possible disruption to others. Because we don't generally require totally interference-free communication to accomplish our personal objectives, this works pretty well.

But unattended operation changes the rules of the game. Unless there is international agreement as to frequencies that should be set aside for unattended operation (and at this point, there isn't) the potential exists for interference from a "robot" station to living, breathing human beings. And such interference is at best unnecessary, at worst life-threatening. Unattended, computer-controlled stations can be "educated" to not transmit on an occupied channel, but as a community we don't yet know enough about the best ways to do so to be comfortable with removing all the fetters. We also don't yet know enough about how to get the greatest efficiency from the tools that packet radio has placed at our disposal; anyone who has monitored HF packet will tell you that the number of retries—retransmissions of the same information until an acknowledgment is received from the receiving station—is all out of proportion to what it should be.

We need more information. And the best way to get it is by controlled experiment. Accordingly, at its March 22 meeting the League's Executive Committee authorized staff to solicit candidates for up to 15 one-year Special Temporary Authorizations for automatic control of packet-radio operations on not more than one frequency per band below 30 MHz, using AX.25 or compatible protocol, at speeds not to exceed 1200 bauds, with frequency shift not to exceed 600 Hz, and otherwise subject to the provisions of the March 14 waivers. Staff was authorized to select candidates based upon the need for geographical coverage. A key objective of the study will be to determine the interference potential of the technique to other users of the HF bands, and how best to minimize the possibility of such interference. Probably most, if not all, of the stations will be "gateways" to regional VHF networks, which in turn will generate the large volumes of traffic needed to provide a realistic test. Use of speeds up to 1200 bauds may allow (propagation conditions permitting) even greater efficiency in time-sharing of the single authorized channel.

Precedents exist for such an STA. The same thing was done for slow-scan and medium-scan television, AMTOR, spread spectrum, and other new modes. But there is no guarantee the Commission will grant as many, or as much flexibility, as we might like. It will be up to us to make the case, just as we did for the March 14 waivers—and, we hope, with the same result.—David Sumner, K1ZZ

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



KWAV

MONTEREY, CALIFORNIA

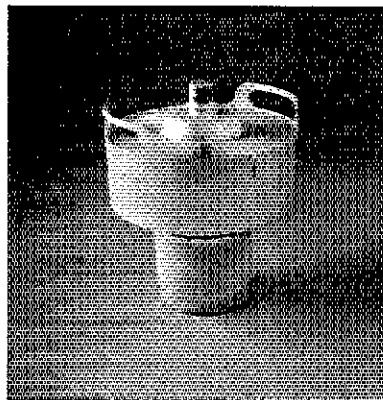
Ken Warren, Chief Engineer at KWAV reports that their 10 kW FM transmitter went on the air in November, 1972, equipped with EIMAC power tubes. The original tubes are still in operation after over 13 years of continuous duty!

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

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

EIMAC backs their proven tube

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



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

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

Write to:

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





There was plenty of communicating going on when the ARRL Ad Hoc Committee on Amateur Radio Digital Communication met in Orlando, Florida on March 8. Among the issues discussed were ways to alleviate congestion on packet-radio frequencies and the status of FCC PR Docket 85-105 (see VHF Packet Radio, this page). Working prototypes of both virtual-circuit and datagram networking protocols were unveiled the next day at the 5th Computer Networking Conference. All papers given at the Conference are available in booklet form from ARRL (see order form, page 158). Clockwise around the table are Marshall Quat, AG0X, Phil Karn, KA9Q, Terry Fox, WB4JFI, Paul Rinaldo, W4RI (center), Harold Price, NK6K, Lyle Johnson, WA7GX, Wally Linstruth, WA6JPR, and Doug Lockhart, VE7APU. (WA2FTC photo)



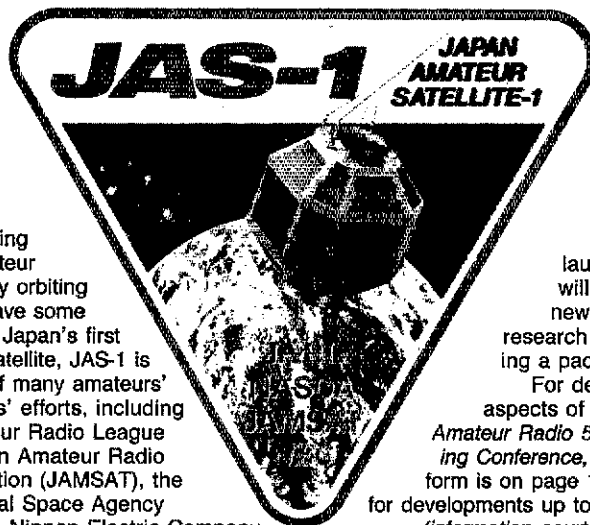
Another ARRL-affiliated club comes through on behalf of young radio amateurs. Ted Marks, W2FG, of the New Jersey DX Association, presents a \$1000 check to ARRL Foundation Director Linda Ferdinand, N2YL, to be applied toward the ARRL Scholarship Honoring Barry Goldwater. Special thanks go to the NJDXA and all others who have contributed to ARRL Foundation scholarships. [Applications and supporting materials for the Goldwater Scholarship are due by June 1, 1986. For an application, write to ARRL Foundation Scholarships, 225 Main St, Newington, CT 06111.—Ed.] (W2TQC photo)

VHF Packet Radio to Continue Under Automatic Control

Third-party VHF packet radio rides again! In response to an ARRL request, the FCC has temporarily suspended parts of its Rules that prohibited packet stations operating under automatic control on the 50-MHz and higher bands to pass third-party traffic (PR Docket 85-105). See this month's Happenings for full details.

FCC Trying to Pull Plug on CB Linears

A study by the FCC last summer of reported interference cases produced some alarming statistics—and renewed FCC efforts to stop the illegal sale and use of CB linear amplifiers. Of the cases studied by the Field Operations Bureau—which involved CB interference to home-entertainment equipment—57 percent could be attributed to overpowered stations, of which 91 percent involved linear amplifiers. As a result, FCC field offices have stepped up efforts to stop the illegal use of this kind of equipment. Anyone having information concerning the use, manufacture or marketing of CB linear amplifiers is encouraged to contact the nearest FCC field office.



If all goes according to schedule, amateur satellites presently orbiting earth will soon have some company: JAS-1. Japan's first Amateur Radio satellite, JAS-1 is the culmination of many amateurs' and organizations' efforts, including the Japan Amateur Radio League (JARL), the Japan Amateur Radio Satellite Corporation (JAMSAT), the Japanese National Space Agency (NASDA) and the Nippon Electric Company

(NEC). Scheduled for launch in August, JAS-1 will offer amateurs many new communications and research opportunities, including a packet-radio experiment. For details on the technical aspects of JAS-1, see the *ARRL Amateur Radio 5th Computer Networking Conference*, March 9, 1986 (order form is on page 158). Also, watch *QST* for developments up to and after the launch. (information courtesy JS1UKR, of JARL)

Handbook for the Disabled—A Cornucopia of Information

ARRL has recently updated and expanded a publication just for persons with disabilities who are interested in or are presently involved in Amateur Radio. Among the many subjects covered in the ARRL Program for the Disabled Handbook are how to

get licensed, sources of information and special equipment, readers' ideas, and articles on topics ranging from building a Morse readout for your digital dial to operating wheelchair mobile. This Handbook is free from the ARRL to persons with disabilities.



Phone ops might be a little wary about walking around this section of Haight-Ashbury in San Francisco, considering the "fist" fights they might encounter. (N5MG/6 photo)

Going to Canada? Check Before You Leave

If you're one of the many US amateurs expecting to visit Expo 86 and other such attractions in Canada this year, you'll probably bring some radio gear along. Sure, FCC licenses are automatically valid in Canada, so you don't have to apply to the DOC for an operating permit.

But there are some things you should check out before departing the US. The Information Services desk at ARRL can fill you in on the applicable regulations and even give you some ideas on how to make your operation in Canada a very enjoyable experience.



The Radio Society of Sri Lanka (RSSL), an IARU member-society, got some well-deserved public attention last December when its members conducted a successful Amateur Radio demonstration at a major exhibition in the country's capital, Colombo. Pictured (l-r) are 4S7JN, Suresh Kagoo (waiting for his own call) operating 4S7RS, 4S7GF and RSSL President 4S7EP.

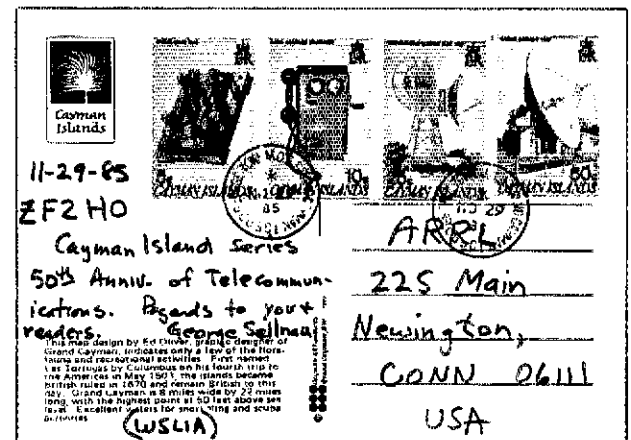


Willard D. Andrews, WB2LCF (left), has plenty of friends in Mexico. The Franklin, New Jersey ham recently received Mexico's highest noncitizen honor, the Order of the Aztec Eagle, for 30 years of service toward bettering cultural and business ties between Mexico and the US. Ambassador Joaquin Bernal, Mexico's consul general in New York, presented Willard with the decoration in January at the World Trade Center. In light of the earthquake in Mexico City, Willard is working with Mexican government officials toward finalizing an emergency-communications network of Amateur Radio operators in Mexico and the US.

ITHE Spells Goodwill

Traveling to another country this summer? Perhaps you'd like to spend a day or two in the home of a licensed operator there, or visit with local amateurs. Or, maybe you're willing to welcome a visiting amateur into your home. Since the creation of the International Travel Host Exchange (ITHE) program,

ARRL has registered more than 150 amateurs in 28 states and in 20 countries who are interested in visiting or hosting a foreign amateur. The list is available from ARRL for a business-sized SASE. If you wish to register for the program, please request an ITHE registration form.



Aside from a host of natural and historical attractions, the Cayman Islands can also boast a long history of telecommunications, as evidenced by this series of commemorative stamps. (trix WSLIA)

League Lines

FCC drops auxiliary link proposal . . . Industry Ad Hoc Committee produces first voluntary standards for RFI immunity in TV sets and VCRs . . . FCC presents a number of legislative requests affecting Amateur Radio to Congress—all this and much more news in this month's Happenings column.

Call for papers: The 1986 ARRL National Convention requests authors to submit abstracts for technical topics to be published for the Technical sessions held at the convention. For further information contact Rick Olsen, N6NR, PO Box 2472, La Jolla, CA 92038.

The On Line column, scheduled to appear this month, will appear in June *QST*. Also, the Washington Mailbox column will resume its bimonthly schedule in June.

WIAW Field Day bulletin schedule: To give Field Day groups extra opportunities to copy the WIAW Field Day Message, four additional bulletins will be transmitted. An extra CW bulletin will be run at about 1400 UTC (10 AM EDT), and an extra phone bulletin at 1500 UTC (11 AM EDT) on *both Saturday and Sunday mornings*. See April *QST*, page 73, for a detailed bulletin schedule.

Attention Certificate Hunters and Awards Chasers! Please note that Minute 50 of the January ARRL Board meeting now permits ARRL awards credit, other than for five-band awards, on 24 MHz and on 18 MHz for those countries who have authorized it for amateur use. (No awards credit is allowed on the 10-MHz band.) Now, who will be the first to work WAS on 24 MHz? *Field Day* ops should also note that Minute 67 now allows Field Day Credit on 24 MHz.

Canceling a License of a Silent Key: The FCC *no longer deletes calls of Silent Keys* unless its cancellation is specifically requested. Since the term of an amateur license is now 10 years, the family of the deceased amateur could continue to receive correspondence, which is sent based upon FCC records, for that period. In order to avoid this correspondence, families of deceased amateurs are urged to send the license, or a letter if a license cannot be found, to FCC, Consumer Affairs Office, Gettysburg, PA 17325, requesting cancellation of the license.

Open House: The ARRL HQ building and WIAW, the Hiram Percy Maxim Memorial Station, will be open on Sunday, June 8, from 10 AM to 5 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 WIAW.

The new Fifth Edition (green cover) of *The FCC Rule Book* is now available from Headquarters and bookstores. If you've never purchased one of these editions, then you're in for a real treat. *The FCC Rule Book* is not just a dry rehash of the FCC Rules. This (and past) editions contain many hundreds of commonly asked questions which are answered in a style that is easy to read and understand. Every US amateur or prospective amateur should have handy a copy of the current FCC Rules governing Amateur Radio. This ARRL publication is designed to meet that need in a compact, inexpensive volume. Its cost from HQ is \$4 plus \$2.50 for delivery.

The ARRL Ad Hoc Committee on Amateur Radio Digital Communication has been concentrating on packet-radio standards and network development. The Committee now invites input on planning for other digital modes such as, but not limited to, digitized speech and images. Comments may address applications, technology, frequency utilization and regulatory issues. Write to Chairman, Digital Committee, ARRL HQ, preferably prior to the next meeting, scheduled for June 14.

Wanted: 4000 volunteer hams to coordinate a transcontinental human chain with 6 million links! Details on page 74.

Attention young people: Here's your chance to tell us what's on your mind. This month's Making Waves column (page 61) asks your opinions on a wide range of issues. Please fill it out and send it, or a copy, to Contributing Editor Scott Springate, N7DDM.

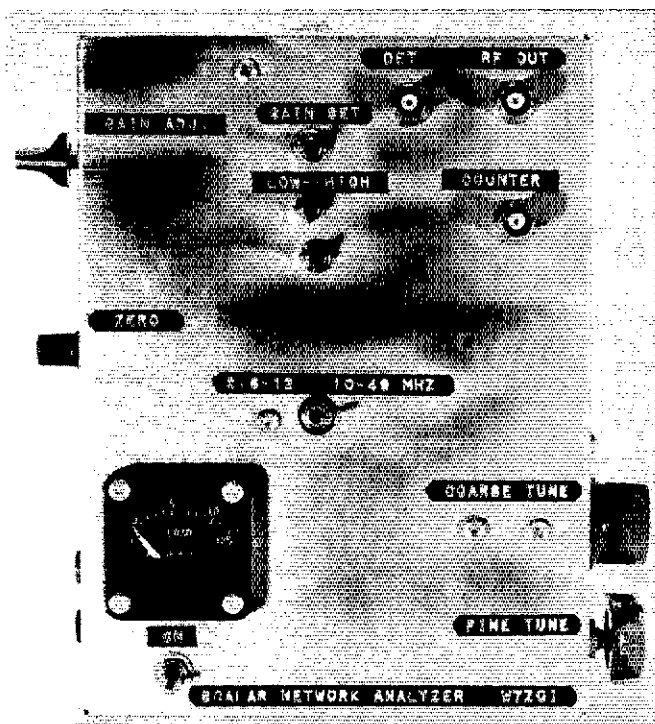
The Department of Communications in Ireland will *authorize temporary licenses to approximately 20 amateurs to operate in the 50-51 MHz band*. The Department said that a general opening to Irish amateurs of the 6-meter band is not favored at this time, but it is willing to allow a few amateurs to experiment on this band.

A job opening exists at Headquarters for an Assistant Technical Editor. We are looking for an amateur with experience in writing, along with formal training in electronics. Annual salary range is \$21,476 to \$30,056. Contact Chuck Hutchinson, K8CH, at ARRL HQ.

Beyond the Dipper

Here is a new RF-measurement system. Although the unit resembles the familiar grid-dip meter, it does much more than its ancestor.

By Wes Hayward, W7ZOI
ARRL Technical Advisor
7700 SW Danielle Ave,
Beaverton, OR 97005



There was a time when the radio amateur was able to build all of the equipment in his or her station using modest test equipment. A grid-dip meter (known also as a grid- or gate-dip oscillator, GDO, dip meter or dipper) and a VTVM were the only "required" items. But today's modern communications equipment is more complicated, demanding numerous and exacting measurements during construction.

Commercial equipment available for RF measurements has improved to follow evolving requirements. Unfortunately, the equipment available to the amateur experimenter has not done so.

The unit described here performs all of the measurements that we usually associate with a dipper—and more. It does so with none of the traditional shortcomings of the dipper. With this unit, you can measure resonant frequency, amplifier gain, filter response, impedance match, and the value of unknown inductors and capacitors and their Q, all with digital accuracy. The oscillator frequency is not pulled by an external load. Frequency accuracy is excellent owing to the use of a digital counter. The meter indication is essentially constant with frequency and sensitivity is better than that of any dipper I have ever used. Also, the unit is battery powered and is just as at home in the backyard "antenna farm" as it is in the shack.

A key word in the description of this instrument is "measurement." The traditional dipper measures many parameters, but with questionable accuracy. This unit is capable of accurate measurements.

Some Basic Measurement Concepts

An experimenter with the goal of designing an improved dipper might start by

examining the functions of that equipment. The design then evolves as performance deficiencies are addressed. I took a different approach. I started by examining the measurement needs of the modern RF experimenter. Dipper functions were integrated at a later development stage.

The most common RF measurements we make are for gain and impedance matching. We might, for example, wish to characterize an amplifier. Amplifier gain can be determined with the equipment shown in Fig 1A: a signal generator with a 50-ohm output im-

pedance, a step attenuator, the circuit under test (CUT) and a sensitive power meter.¹ First, remove the CUT from the circuit (as shown by the dotted line) and adjust the attenuator for an arbitrary power level indication on the power meter; accurate power calibration is not required. Note the power-meter indication and the attenuator setting. Then, insert the CUT and repeat the experiment. Adjust the attenuator until the meter

¹Notes appear on page 20.

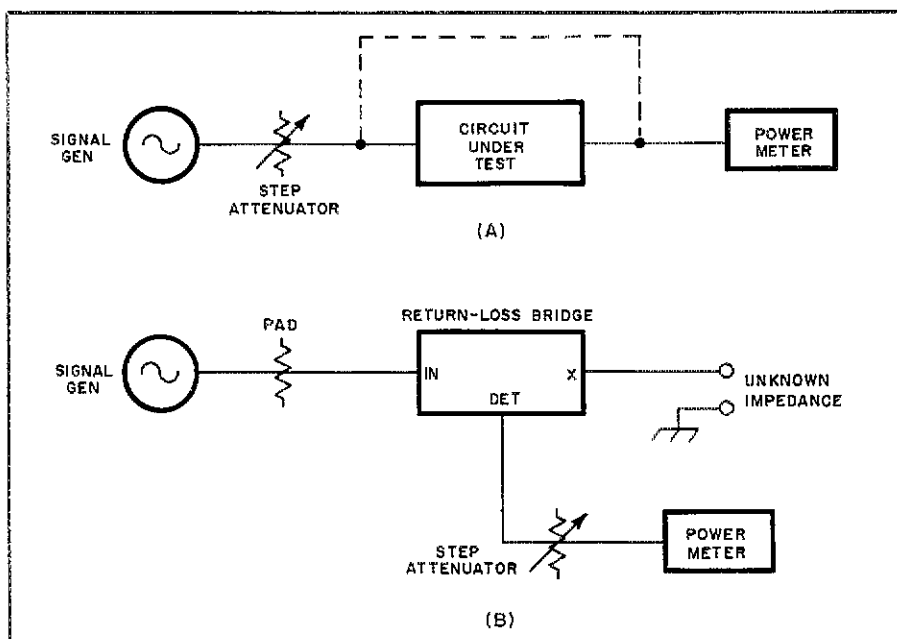


Fig 1—Basic measurements for RF circuits. At A, the dotted line indicates that the CUT is bypassed for calibration prior to a gain measurement. At B, the same test equipment is used to measure an impedance match.

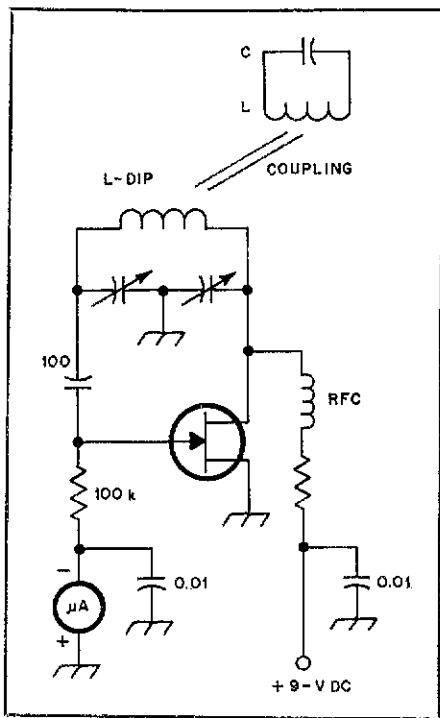


Fig 2—A traditional dipper circuit using a JFET. The dipper inductor is magnetically coupled to a tuned circuit.

response is exactly the same as it was originally. The circuit gain is the difference, in decibels, between the original and final attenuator settings.

Using the setup of Fig 1B, the same equipment can be used to determine an impedance match. Three items are added to the equipment collection: a return-loss bridge (RLB), a fixed attenuator (optional) and a 50-ohm termination (load).

Apply the output of the signal generator to the RF-input port of the RLB. A fixed pad may be used to attenuate the generator output if required. (This might be desired, for example, to prevent overloading an amplifier under test.) Connect the bridge DETECTOR port to the power meter through the step attenuator and leave the UNKNOWN port of the bridge open-circuited. Set the step attenuator for a relatively high level of attenuation and note the power-meter indication. Connect the unknown impedance, Z_u , to the bridge. The power-meter response will decrease. Adjust the step attenuator to produce a response identical to that observed when the bridge was open-circuited. The difference between the initial and final settings of the step attenuator is the return loss in decibels.

You may (and should) use the apparatus to measure the return loss of the 50-ohm

load. Assuming the load is a "perfect" reference, the result of this measurement is a determination of the quality of the RLB and is termed the *bridge directivity*. A typical value for a "homebrew" RLB is 30 to 40 dB. The 50-ohm load may be used to terminate the "unused" port of an amplifier or filter during impedance-matching evaluations.

Return loss (RL) is no different from any other measurement you may make that would indicate an impedance match. Return loss is simply related to voltage standing wave ratio (VSWR) by

$$\text{Return loss} = -20 \log |\Gamma| \quad (\text{Eq 1})$$

$$|\Gamma| = 10^{-(\text{RL}/20)} \quad (\text{Eq 2})$$

$$\text{VSWR} = \frac{1 + |\Gamma|}{1 - |\Gamma|} \quad (\text{Eq 3})$$

where Γ represents the voltage reflection coefficient. These expressions are evaluated easily with a hand-held calculator.

The unknown impedance need not be an amplifier input. It could be the end of a piece of coaxial cable attached to an antenna. Or, it could be the *output* of an amplifier. The test setup of Fig 1 can be used to characterize or adjust virtually any network, be it one with one port (terminal pair) such as an antenna, or an amplifier or filter

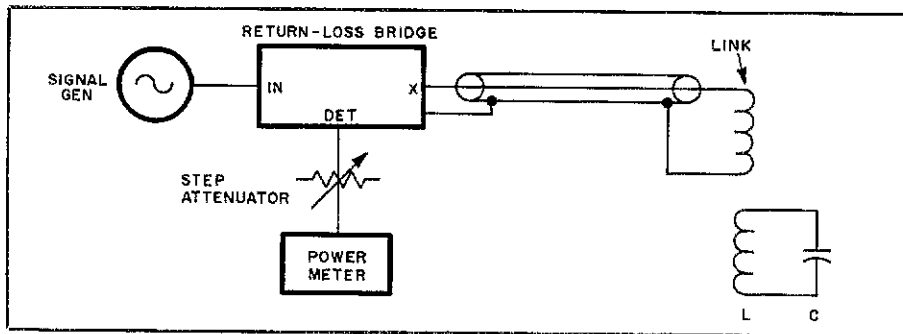


Fig 3—A signal source and power meter may be used for dipping applications by using a small link attached through a return-loss bridge.

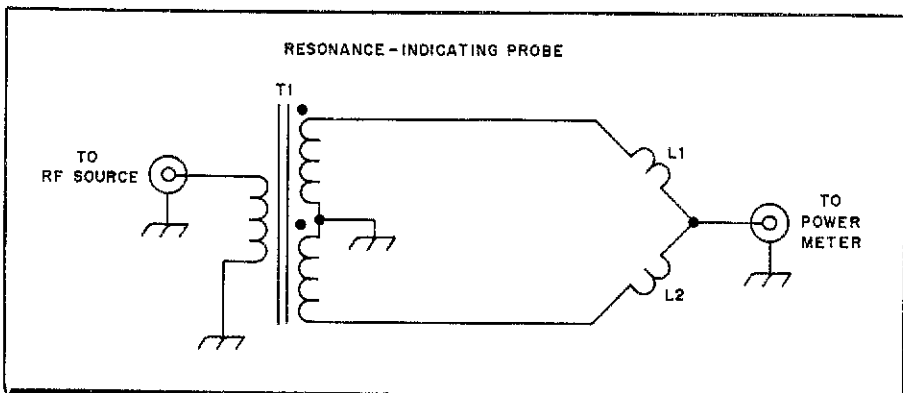


Fig 4—Schematic diagram for a special resonance-indicating probe for very sensitive dipping with the scalar network analyzer.

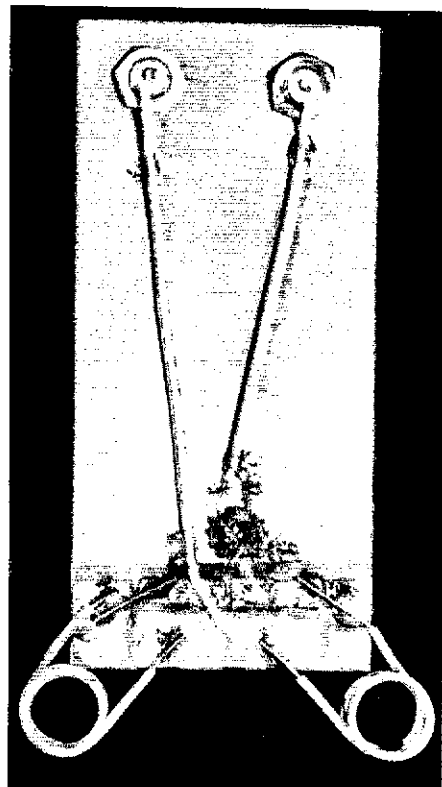


Fig 5—A close-up view of the resonance-indicating probe. Each inductor is made of three turns of wire wound with an ID of $\frac{3}{4}$ inch. The coil turns may be spread slightly to balance the circuit. The transformer is composed of a trifilar winding on a high-permeability ferrite core.

with two ports. This instrument is a very simple scalar network analyzer. (This differs from a more elaborate vector network analyzer, which provides phase as well as amplitude information.)

Resonance-Indicating Instrumentation

The most common dipper application is determining the resonant frequency of a tuned circuit. A simple dipper using a JFET is shown in Fig 2.² The sensitive meter

measures the dc gate current, which is a measure of the RF voltages present in the circuit. The dipper inductor, L-DIP, is magnetically coupled to an external tuned circuit, LC. When the dipper is tuned to the resonant frequency of the tuned circuit, energy is absorbed, decreasing the level of oscillation in the dipper. The result is a dip (decrease) in the dipper-meter reading.

Even the best dipper is complicated by problems. Oscillation level varies as the

dipper is tuned, causing a gradual change in the meter indication. The oscillation frequency is altered by the coupling to an external load, with severe changes occurring when coupling is tight. These deficiencies limit dipper applications to those where an approximate resonance indication is all that is required.

The equipment described earlier (Fig 1B) can be adapted to indicate resonance. One experiment of this type is shown in Fig 3.

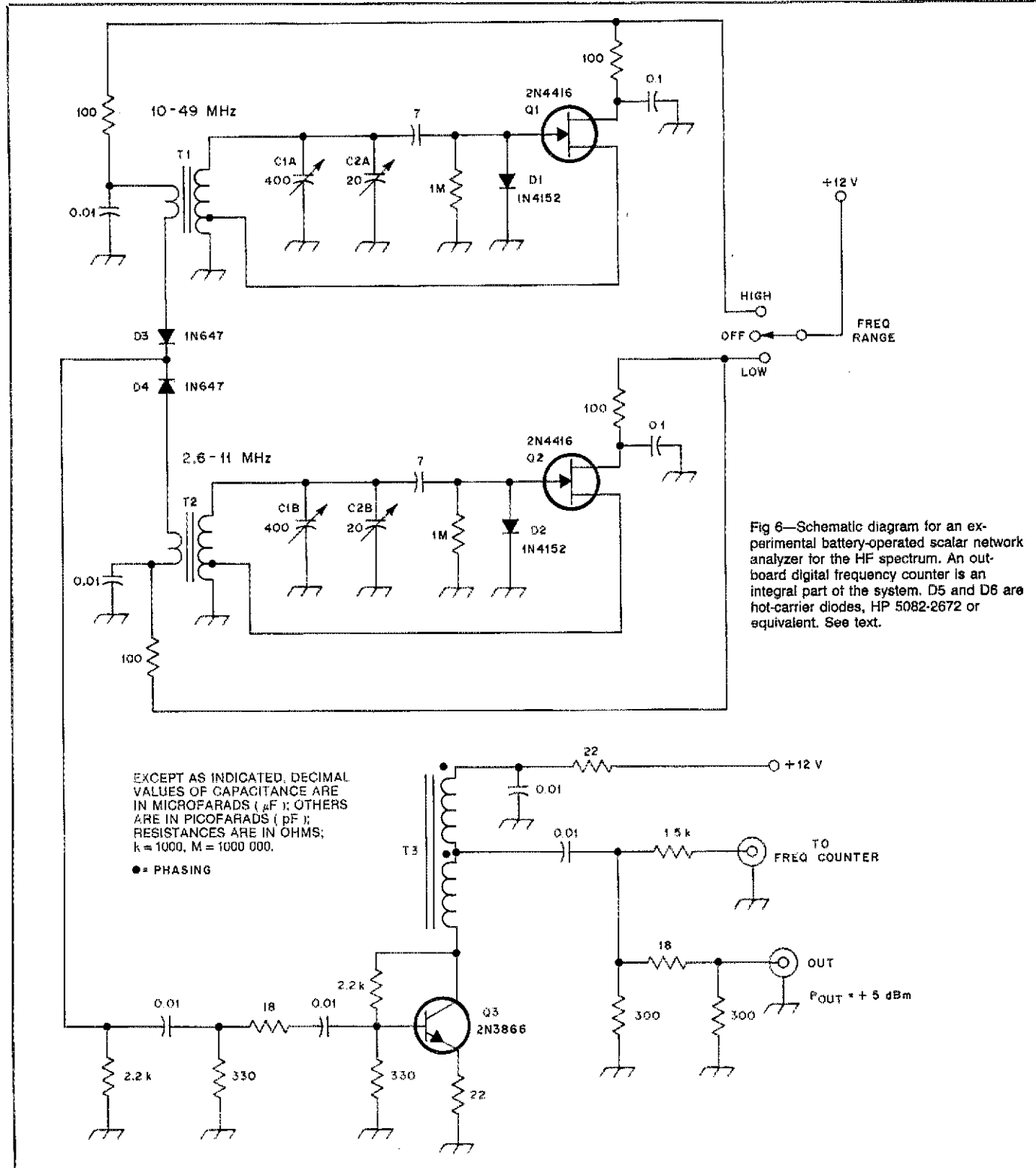
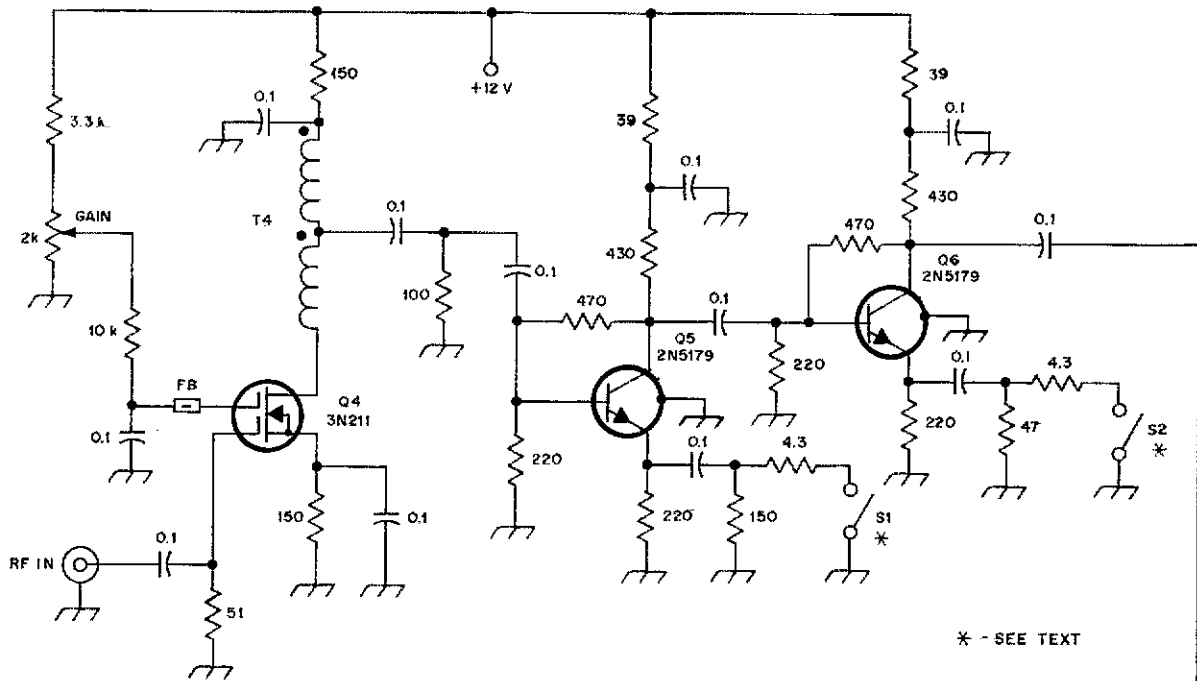
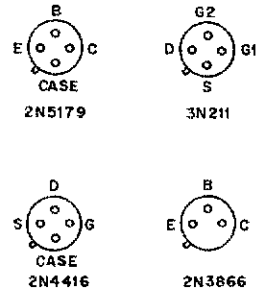
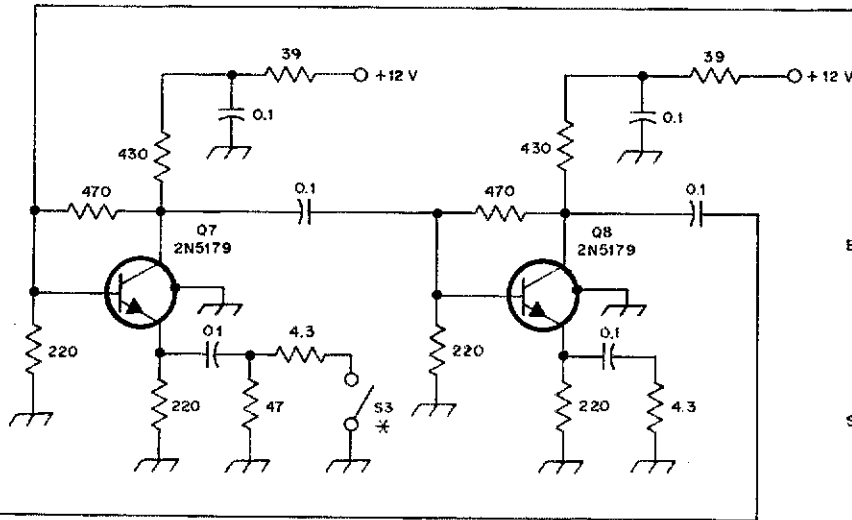


Fig 6—Schematic diagram for an experimental battery-operated scalar network analyzer for the HF spectrum. An out-board digital frequency counter is an integral part of the system. D5 and D6 are hot-carrier diodes, HP 5082-2672 or equivalent. See text.

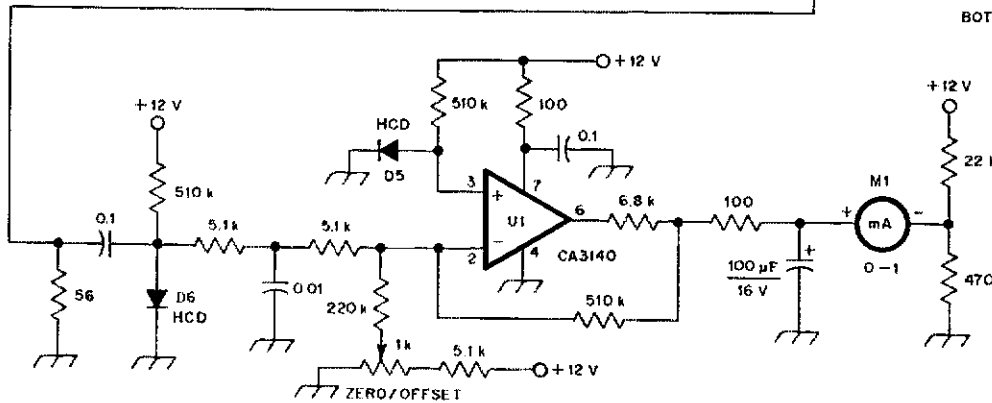
Fig 6 continued



* - SEE TEXT



BOTTOM VIEWS



The "network analyzer" is set up to determine an unknown impedance. A short length of coaxial cable is attached to the UNKNOWN port (X) of the RLB, with the far end attached to a small, 3-turn inductor about one inch in diameter. This inductor is placed in close proximity to a tuned circuit. A dip will be seen as the signal source is tuned to the resonant frequency of the external circuit. The dip is not as pronounced as that of a good dipper, but the measurement is very accurate; the signal-generator frequency is not altered by the effect of the external load. Meter indication is constant with tuning when external resonator coupling is eliminated. The use of a frequency counter provides a degree of measurement accuracy well beyond anything experienced with a traditional dipper.

What used to be a nearly impossible dipping job—determining the resonant frequency of a tuned circuit containing a toroidal inductor—becomes very easy. This is done by replacing the link of Fig 3 with a single piece of wire that is passed through the center of the toroid; a pronounced dip results at the resonant frequency.

Dipping sensitivity with the RLB (Fig 3) is less than desirable. The solution to the problem lies in the use of a special *resonance-indicating probe*. This circuit is a special-purpose bridge, shown in Figs 4 and 5. A trifilar-wound ferrite transformer, T1, converts the signal-generator energy to a balanced form. Voltages V1 and V2 are of equal magnitude, but differ in phase by 180 degrees. The two voltages are applied to two *identical* series-connected inductors, L1 and L2. At the junction of the inductors, the voltage is zero, a result of circuit balance. The junction is connected to a coaxial cable that is routed to a detector.

When used for resonance detection, the probe of Fig 4 is placed close to a tuned circuit. The coupling from *one* of the coils will be stronger than that from the other. The impedance in the coupled probe coil is then changed near resonance, destroying the bridge balance. This results in a strong *peak* in detector output when the signal generator is tuned through the resonant frequency of the external tuned circuit. Sensitivity with this circuit is excellent. Using a resonance-indicating *peak* rather than the more familiar *dip* presents no problem.

The exceptional sensitivity of the circuit of Fig 4 results from careful application of circuit balance. This balance virtually eliminates detector signals when there is no coupling to a resonant circuit. Only when resonance is encountered does the balance degrade. This is in contrast to both the traditional dipper and the version of Fig 3 using an RLB; the response with both is a difference between a normal large response and a slightly altered one.

A Practical Instrument

The methods outlined are easily applied with inexpensive, readily available components. The amateur experimenter will often have most of the needed equipment. I'll outline methods for using existing equip-

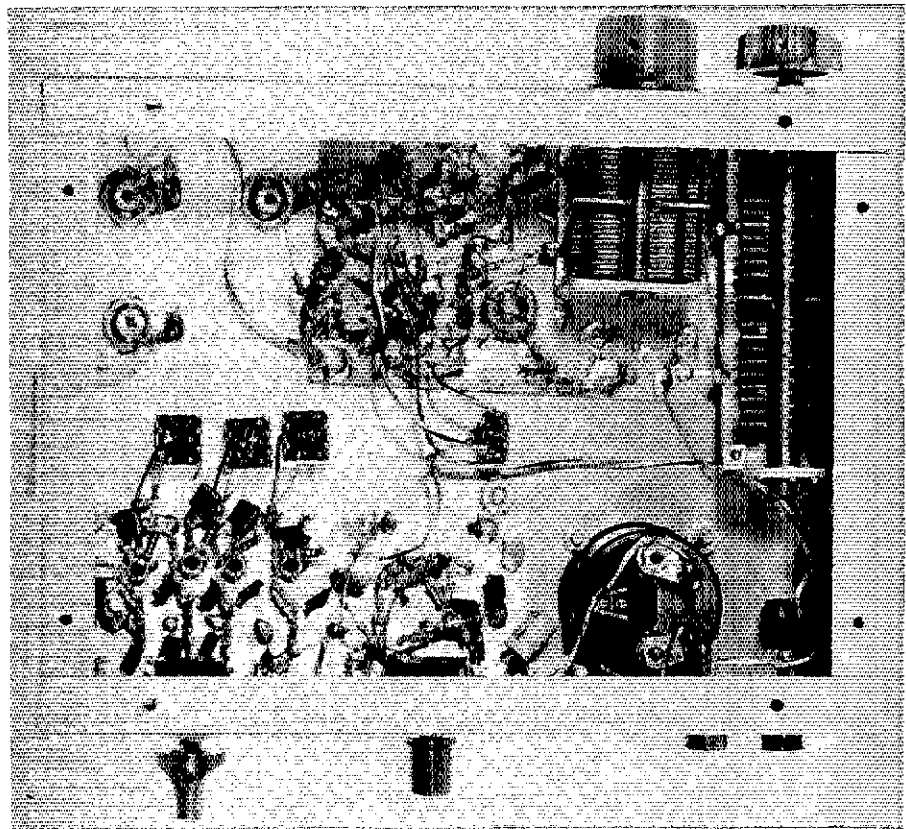


Fig 7—The "action side" of the network analyzer. "Ugly construction" is used extensively, allowing circuit changes and experiments to be performed with ease. The broadband detector amplifier is above the meter, with the generator circuits mounted near the two variable capacitors.

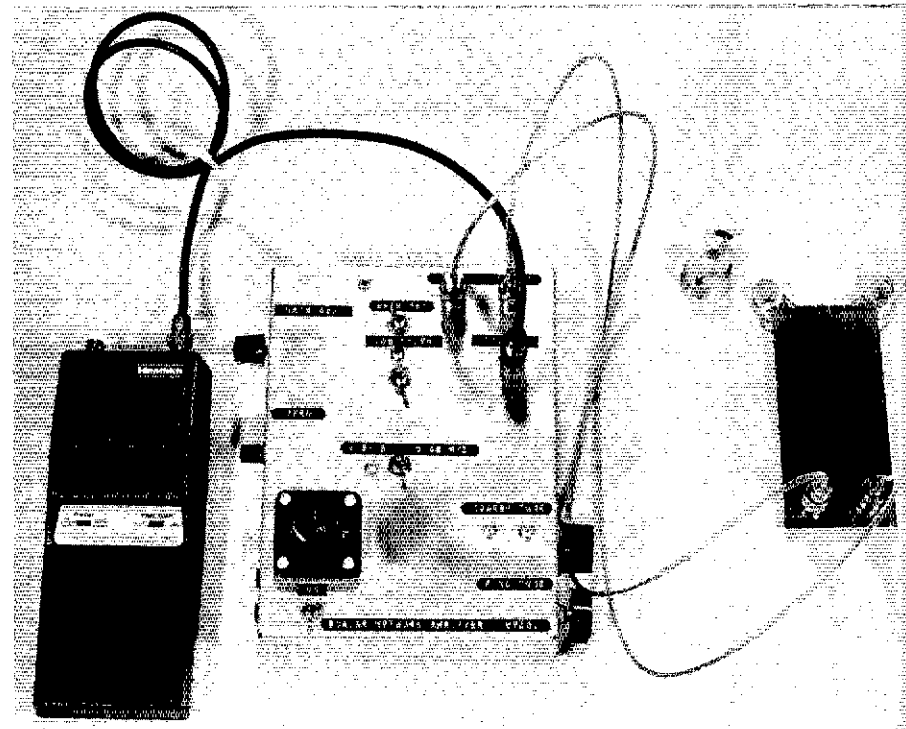


Fig 8—The test setup ready for "dipping" a tuned circuit. The probe is properly positioned with only one of the probe inductors tightly coupled to the tuned circuit.

ment and describe a prototype instrument.

Any signal generator capable of an output of 1 mW or more can be used as an RF source. The generator should have a 50-ohm

output impedance. Suitable generator circuits were presented in Chapter 7 of the reference in note 1.

A frequency counter is a vital system

element. This may well be the most expensive part of the system, but most amateur experimenters have one available. A battery-operated unit is desirable for field use.

Detection can be done using numerous pieces of equipment available to the experimenter. An oscilloscope, perhaps aided by a broadband amplifier, will work well. The detector should be capable of seeing signals that are 50 or 60 dB weaker than the signal-generator output. A biased diode detector functions well when preceded by a broadband amplifier.

A step attenuator is easy to build using inexpensive slide switches and 1/4-W resistors.³ Recall the earlier discussion of gain and return-loss measurements. Accuracy is almost completely determined by the step attenuator. The attenuator becomes the "standard" for a complete home RF laboratory.

Figs 6, 7 and 8 show a simple prototype scalar network analyzer I built. Two Hartley oscillators cover the frequency range from 2.6 to 49 MHz. No vernier dial is needed since two variable capacitors are used: One functions as a bandspread, or fine-tuning control. A frequency counter is always used, so oscillator frequency calibration is not required. Power is applied to the desired oscillator by means of a switch, which also activates diode switches in the oscillator outputs.

The available output power is increased, and the oscillators are buffered, by a broadband output amplifier (Q3) using a 2N3866 with negative feedback. Output from the buffer is taken through a 3-dB, 50-ohm pad. The available output power is about 3 mW (+5 dBm). An auxiliary output provides a low-level signal for the frequency counter.

The detector chain consists of three blocks. The first uses a dual-gate MOSFET operating at low gain. This input circuit ensures a clean 50-ohm input impedance and provides a convenient method for continuously changing detector gain. It also offers excellent reverse isolation from the rest of the system. The FET gate-2 bias control provides a gain range of about 15 dB.

The next system block consists of four

cascaded amplifier stages, each with negative feedback. Amplifier gain control is accomplished by changing the emitter degeneration in three of the four stages. Maximum gain occurs with S1, S2 and S3 all closed. Gain should be reduced by opening S1, then S2 and finally S3. Using a different order could lead to gain compression. Long leads should be avoided in this part of the circuit. This circuit has a restricted bandwidth, under 100 MHz. (You might want to try another type of amplifier circuit. You could use broadband, cascaded amplifier ICs. Three cascaded Motorola MWA-120 hybrid amplifiers, or two cascaded NEC MM76515 silicon monolithic ICs, would work well and function into the UHF region.)

The amplifiers are followed by a detector circuit. Two hot-carrier diodes (D5, D6) are used, each biased on with a current of about 25 μ A. Using two diodes provides temperature compensation. The op amp (U1) is one with a MOSFET input stage. The exceptionally low bias current for this op amp aids temperature stability. A ZERO/OFFSET control allows the meter to be adjusted to zero when no RF is present. This circuit provides a full-scale reading with an input of -15 dBm to the 56-ohm resistor. The circuit functions well (without the pre-

ceding amplifiers) to frequencies in excess of 1 GHz. Using 1N4152 diodes (similar to the 1N914) only degrades sensitivity by about 3 dB, but compromises frequency response.

The meter movement can be an inexpensive 0- to 1-mA unit. It makes little sense to invest in a more sensitive movement when excellent performance is economically provided by a cheaper meter and the CA3140 op amp. The 6.8-k Ω resistor at the output of U1 provides current limiting. Current limiting is vital for meter protection because peaks of 30 or 40 dB may occur when checking a tuned circuit.

The network analyzer of Fig 6 is normally used with an external step attenuator for measurements in the lab. When the unit is taken into the field or onto the roof, the attenuator is eliminated. An external RLB is attached to the unit when required.

An RLB is shown in Fig 9. The circuit is built in a small box with short leads to the coaxial connectors. Either 49.9-ohm, 1% metal-film or 51-ohm 1/4-W carbon resistors may be used. The transformer should be wound on a high-permeability ferrite core such as an Amidon FT-37-43 or similar core.⁴

While the RLB is probably the simplest bridge that you can build, other forms are also suitable. An especially useful one would be a directional coupler built on a two-hole balun core.⁵

Some Applications

Antenna Measurements

One of the most useful and common amateur applications for this instrument is in the evaluation and adjustment of antennas. The beginner may not appreciate the virtues of this system. It is essentially an SWR indicator with a built-in transmitter that may be taken to the roof, allowing the instrument to be with the person doing the adjustments!

The network analyzer is used with an RLB and, if required, fixed attenuator pads. The variable gain elements in the instrument usually eliminate the need for taking a step attenuator to the roof. I find it useful to attach a low-pass filter to the detector port.

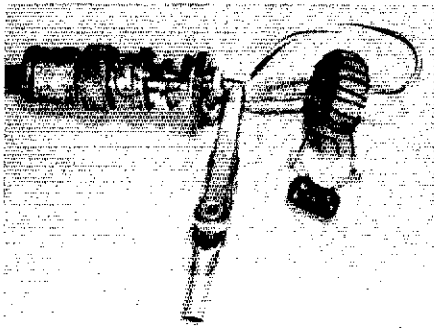


Fig 10—A close-up view of the method used to measure the resonant frequency of a toroid. The other end of the coaxial cable is attached to the UNKNOWN Z port of a return-loss bridge.

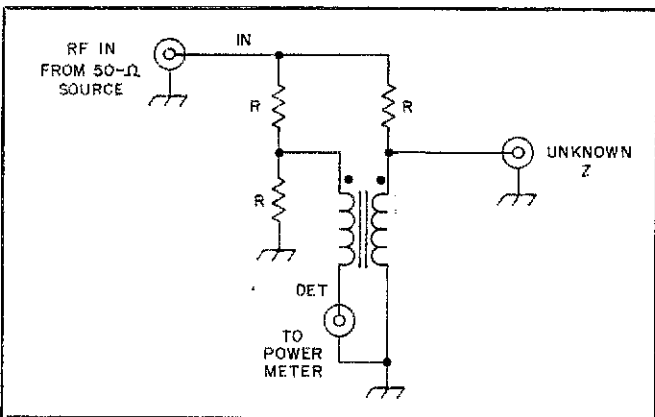


Fig 9—Schematic diagram of a return-loss bridge. Lead lengths should be short. The transformer is wound on a high-permeability ferrite core. Resistors are 51-ohm carbon or 49.9-ohm, 1% metal-film types.

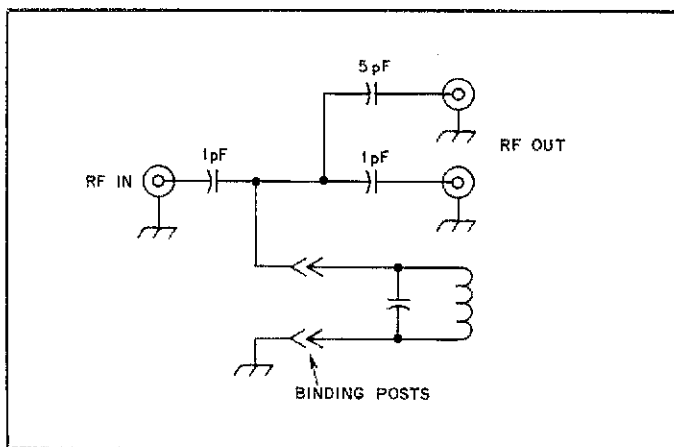


Fig 11—A simple test fixture may be added to the scalar network analyzer to allow accurate measurements of L, C and Q.

This prevents overloading the detector with signals from local TV and FM broadcast stations. The full output of the signal generator is always used when doing antenna work.

This instrument is especially convenient for antenna experiments, allowing adjustments to be made without repeated trips up and down a ladder. Connect the antenna through a short section of coaxial cable to the UNKNOWN Z port of the RLB. Tune the generator to the resonant frequency, showing a dip in the return loss. Note the frequency and make the proper adjustments. Using this procedure, I adjusted and evaluated a Butternut vertical for operation on six bands in only 10 minutes.

When accurate measurement of return loss is desired, the step attenuator is used. Usually, the attenuator is not required during antenna adjustment; rather, the system is "tweaked" for the best match. All of the antenna measurements can, of course, be done in the shack as well as on the roof. The equipment can be used to adjust a Transmatch and offers the ability to do the adjustments while placing very low signal levels on the air.

Dipping Tuned Circuits

This function has already been partially described. The resonance indicating probe (RIP) is attached to the network analyzer with two pieces of coaxial cable. Don't worry about mixing the cables, for operation is not altered if the "wrong" terminal is used. Either probe coil is placed close to the circuit to be checked, and the network analyzer is tuned. The peaks will be very strong with solenoidal coils. If tight coupling is used, it is even possible to dip a toroid. The self-resonant frequencies of RF chokes or pieces of coil stock are measured easily.

Further experiments are planned, aimed at the construction of special forms of the RIP suitable for coupling into antenna elements. The special-purpose dip meter described by Moxon should provide some guidance in this pursuit.⁶

Dipping Toroids

The most effective way to dip a toroid with this instrument is with the RLB. The RLB is coupled to a piece of cable, with the end driving a single-turn link of wire that passes through the toroid core. A simple fixture is shown in Fig 10.

L, C and Q Measurement

The network analyzer is used with the special test fixture of Fig 11 for determination of unknown L, C and Q. This fixture, shown in Fig 12, is nothing more than a box with coaxial connectors and small-value capacitors that can connect to a parallel-tuned circuit by means of binding posts. A tuned circuit is attached, and the fixture is connected to the network analyzer with short lengths of coaxial cable. Include the step attenuator in this setup. Determine the resonant frequency of the circuit by tuning for a peak response. Initially, the system should be set up for high gain as the fix-

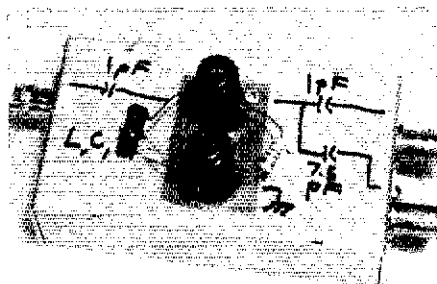


Fig 12—Inductance, capacitance and tuned-circuit Q are easily measured with the network analyzer and the test fixture shown here.

ture will typically show a high insertion loss.

If you start with a known value of capacitance, the inductance can be calculated. The inductor can then become a standard for use in measuring other capacitors. Small capacitors, including variables, are measured easily by placing them in parallel with a previously measured tuned circuit. The value of the added capacitance is then related to the difference in resonant frequency produced.

Tuned-circuit Q is also determined readily. Once resonance is found, the attenuator is adjusted for a meter indication near full scale. Use either the ZERO or the GAIN control to place the meter needle directly on a meter marking. Then, remove 3 dB of attenuation causing the meter to deflect upward, often off scale. With the frequency counter in the circuit, tune the generator to both sides of resonance to frequencies that bring the meter needle to the previously established reference point. The difference between the two frequencies is the 3-dB bandwidth, B. The loaded Q in the test fixture is then

$$Q = f/B \quad (\text{Eq 4})$$

where

Q = figure of merit
f = resonant frequency
B = bandwidth

If the insertion loss is high, the Q value obtained in Eq 4 will be quite close to the unloaded Q of the tuned circuit. Corrections can be made to the results if the insertion loss is less than about 30 dB. Insertion loss is determined by measuring the gain of the fixture (with the step attenuator) as outlined earlier in Fig 1A.

The results of these measurements are not the casual, relative indications that we formerly obtained with a dipper. Rather, Q is determined using the same concepts often employed with laboratory equipment. The results obtained with this instrument when measuring L, C and Q have been compared with those obtained using an H-P 4342A Q meter; a better than 5% correspondence for all parameters existed.

The test fixture of Fig 7 was used to evaluate the accuracy of the RIP measure-

ments. A tuned circuit was first measured in the test fixture. The coaxial terminals of the test fixture were then shorted, and the resonator was dipped. The two frequencies differed by less than 0.1%.

Numerous other measurements are possible with the network analyzer. I have used the detector chain along with a wide-tuning-range preselector filter for field-strength measurements and even casual spectrum analysis.⁷ The network analyzer has been used with numerous experimental bridges for impedance measurements. The RF source is used when making other measurements, ranging from receiver alignment to experiments with other homemade instrumentation.

Concluding Remarks

In this article, I've described a rudimentary scalar network analyzer. Although the term "network analyzer" may sound foreboding, the equipment itself is really simple and fundamental. The key element in the system is a resonance-indicating probe that allows a more exacting instrument to perform the measurements of a traditional dipper.

The concepts presented here are not frequency limited. I routinely use the same methods for home measurements at VHF. The RIP has even been used with a spectrum analyzer and a matching tracking generator, producing perhaps the world's most expensive, exotic and exacting dipper!

Acknowledgments

This work has been presented to many friends and colleagues; their comments and criticisms are gratefully noted. I would especially like to acknowledge discussions with Bob Culter, N7FK1, Larry Lockwood, W7JBY, and Denton Bramwell, K7OWJ. Grattan English, KA6HGY, took the photographs. Finally, I would like to thank the Patents and Trademarks Department at Tektronix, Inc, Frequency Domain Instrumentation Division, for granting a limited release to allow disclosure of this work.

Notes

- ¹W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977). See Ch 7 for a discussion of the measurement of low power levels. (Temporarily out of print.)
- ²F. Brown, "A 1980 Dipper," *QST*, Mar 1980, p 11. (This is an excellent example of a well-done traditional dipper.)
- ³R. Shriner and P. Pagel, "A Step Attenuator You Can Build," *QST*, Sep 1982, p 11.
- ⁴Amidon Associates, 12033 Otsego St, North Hollywood, CA 91607.
- ⁵W. Hayward, *Introduction to Radio Frequency Design* (Englewood Cliffs, NJ: Prentice-Hall, Inc, 1982), Ch 4.
- ⁶L. Moxon, *HF Antennas for All Locations* (RSGB, 1982), p 231.
- ⁷W. Hayward, "The Peaked Lowpass: A Look at the Ultraspherical Filter," *Ham Radio*, Jun 1984, p 96.

Learning to Work with Preamplifiers

Part 6: Preamplifiers can aid or ruin receiver performance. Knowing when to use them, regardless of the amateur frequency, is part of “understanding Amateur Radio.”

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



Does your receiver need a “preamp”? Probably not, if it is one of the modern manufactured units. Most of them have ample sensitivity and a low NF (noise figure). But, some older receivers can be revitalized by placing a preamplifier between the antenna and receiver input jack. This may be especially germane to the subject when we consider the 6, 10 and 15-meter bands, where a low noise figure is important during weak-signal reception. Some of the older equipment was never spectacular for receiving high-band signals, owing to low front-end gain, along with too much tube or transistor noise. The excessive noise can mask a weak signal, thereby making it impossible to copy. Too little front-end gain in a receiver often requires the operator to turn the audio gain fully open in order to have ample volume for weak signals. Now that we have mentioned the cause and effect of inferior weak-signal reception, let’s look into the matter of preamplifiers and discuss when and where to apply them.

Preamplifier Criteria

For a preamplifier to be useful (assuming we need one), it must have a lower noise figure than the existing first stage of the receiver. Also, it needs to provide ample gain (usually 10 to 20 dB) to override the noise figure of the first stage in the receiver (an RF amplifier or mixer, depending on the design). That may seem like a simple order, but many things must be considered: The correct RF amplifying device must be

selected, it needs to be adjusted electrically (biasing and impedance matching) for low noise, and it should be capable of providing the desired gain. Another requirement for good preamplifier performance is unconditional stability. This means that it should not self-oscillate, even when the antenna does not present the proper load impedance—usually 50 ohms. Some preamps are very stable when connected to a 50-ohm load, but may break into oscillation at HF, VHF or UHF when the input SWR becomes high. This causes poor performance and generates “birdies” in the receiver tuning range. These birdies appear as unmodulated carriers of great strength.

The optimum preamplifier NF may not occur when the input circuit is matched to the load (antenna). In fact, it is sometimes necessary to cause an intentional mismatch to obtain the best NF. In other words, tuning the preamplifier for maximum signal output is not necessarily the correct procedure. Few of us are equipped with accurate NF-measuring apparatus, but we can adjust our preamps “by ear,” so to speak. This is done by tuning in a very weak signal, then adjusting the preamp to bring the signal up from the noise for the best SNR (signal-to-noise ratio). Another method is to connect a VTVM (ac range) across the receiver speaker terminals (or replace the speaker with an 8-ohm, 2-W resistor). Then, without any signal being fed to the preamp/receiver combination, adjust the receiver audio gain for a one-third scale meter reading on the VTVM. Use a signal

generator to provide a weak signal at the input port of the preamp. Vary the signal level and adjust the preamp for the weakest signal that will reduce the receiver-noise meter reading. Continue to lower the input-signal amount (microvolts) while readjusting the preamplifier, until no further reduction in indicated receiver noise can be obtained. This method can be applied in a less effective manner by using a weak on-the-air signal during the adjustment of the preamp.

Too great a preamp gain, depending upon the characteristics of the mating receiver, can cause receiver overloading and IMD (intermodulation distortion). Although an uninitiated operator might rejoice at the greatly increased S-meter readings brought about by the use of a preamplifier, it may be only an illusion: The noise floor may have increased proportionally, which would mean that there was no improvement in the overall NF!

When Do We Want High Gain?

As the saying goes, “There is a time and place for everything.” This certainly applies to preamplifiers and their gain. We will find specific applications where very high gain is required. Two examples are when we need to amplify the output from small receiving loop antennas, or when we build an “active antenna.” The latter device is a gadget intended solely for reception. It consists of a short whip or pickup wire connected to a high-gain RF amplifier. Active antennas are broadband devices for

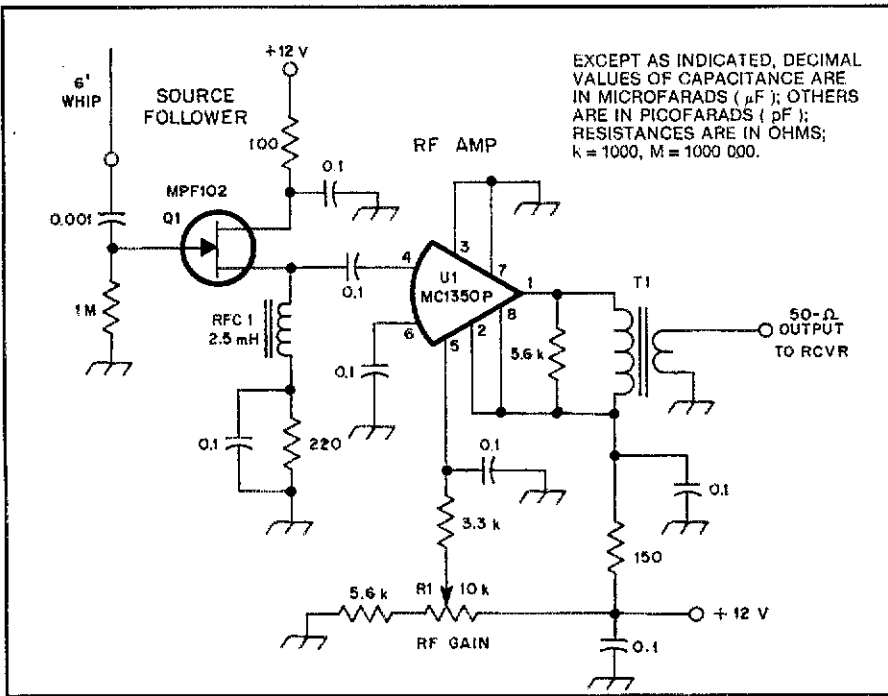


Fig 1—Circuit example of an active antenna. All capacitors are disc ceramic. Fixed-value resistors are ¼- or ½-W carbon composition. R1 controls the gain of U1. RFC1 is a miniature 2.5-mH RF choke. T1 has 30 primary turns of no. 28 enam wire on an Amidon FT50-43 ferrite toroid core. Secondary has four turns of no. 28 wire.

covering, say, 1.8 through 29 MHz. The term “active” means that an amplifier must be used with the system, and the amplifier requires an *operating voltage*. Normal antennas, such as the half-wave-length dipole, are *passive* antennas (not requiring an operating voltage). A circuit

example for an active antenna is provided in Fig 1.

This is a circuit I developed some years ago to satisfy my curiosity about active antennas. It offered no special advantages over my regular outside station antenna, except that it was very nice for portable

work (motels, etc) when I was interested only in monitoring the ham bands. I had some problems with overloading by a local AM broadcast station. Addition of a simple high-pass filter between Q1 and U1 cured the malady. One of the interesting aspects of the antenna in Fig 1 is that on some occasions it provided less QSB and improved SNR over the triband Yagi on 15 and 20 meters. I noticed also that by using the whip antenna horizontally or vertically positioned there would be a difference in signal levels and QSB at a given instant. U1 is capable of providing up to 40 dB (approximate) of gain. Q1, being a source follower, provides an output roughly equal to 90% of the input-signal amount.

Another time when considerable pre-amplifier gain is mandatory is when we employ a small receiving loop antenna for 160- or 80-meter operation. The efficiency of small loops is very poor, and the ideal arrangement when using one is to provide enough preamplifier gain to have the loop system yield the same signal levels that are obtained from the transmitting antenna. Fig 2 shows a circuit I use for 160-meter low-noise DX reception. L1 is a ferrite loop wound for 1.8 to 2.0 MHz, when tuned by C1. A small frame type of wire loop may be used in place of L1. It would be connected to T1 in the same manner as shown for the ferrite loop. Q1 ensures a low NF, and its gain overrides the NF of U1. The overall active circuit can yield up to 45 dB of gain, which is usually in excess of the amount needed with a small loop antenna. R1 can be used to set the preamplifier gain when matching the signal levels of the loop

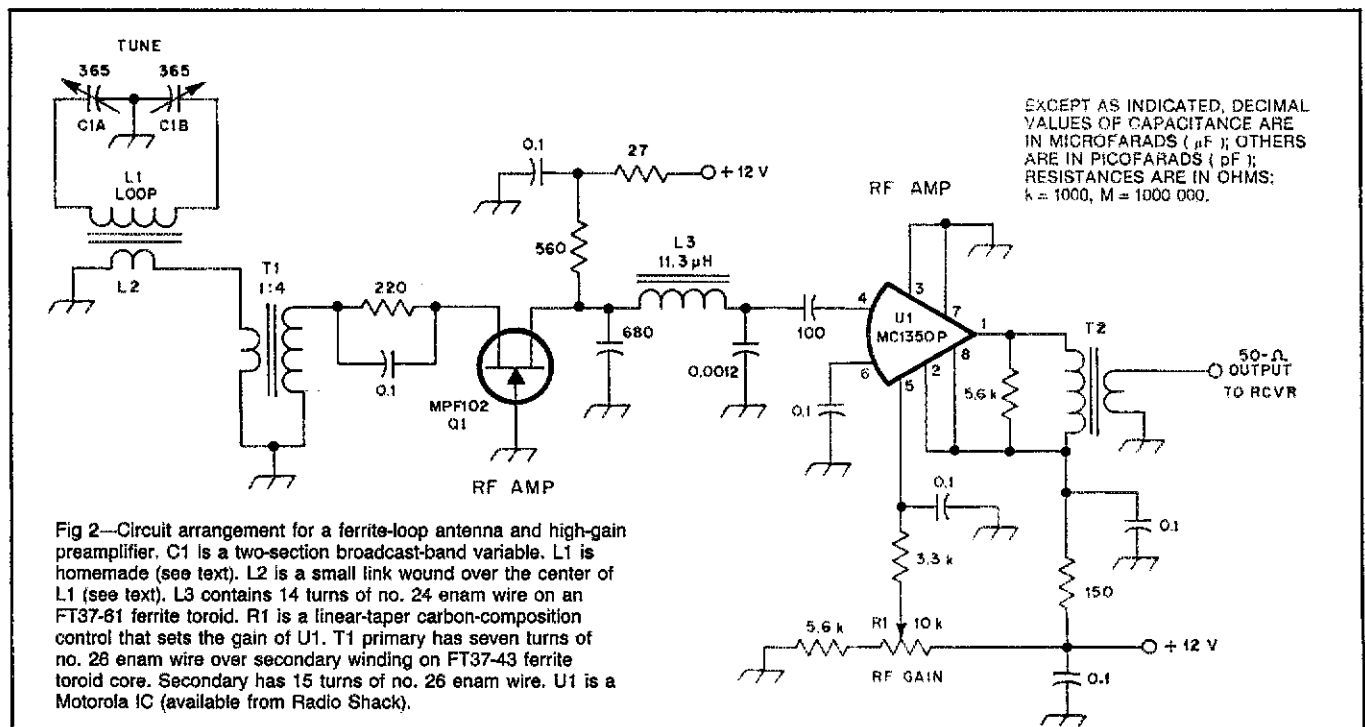


Fig 2—Circuit arrangement for a ferrite-loop antenna and high-gain preamplifier. C1 is a two-section broadcast-band variable. L1 is homemade (see text). L2 is a small link wound over the center of L1 (see text). L3 contains 14 turns of no. 24 enam wire on an FT37-81 ferrite toroid. R1 is a linear-taper carbon composition control that sets the gain of U1. T1 primary has seven turns of no. 28 enam wire over secondary winding on FT37-43 ferrite toroid core. Secondary has 15 turns of no. 26 enam wire. U1 is a Motorola IC (available from Radio Shack).

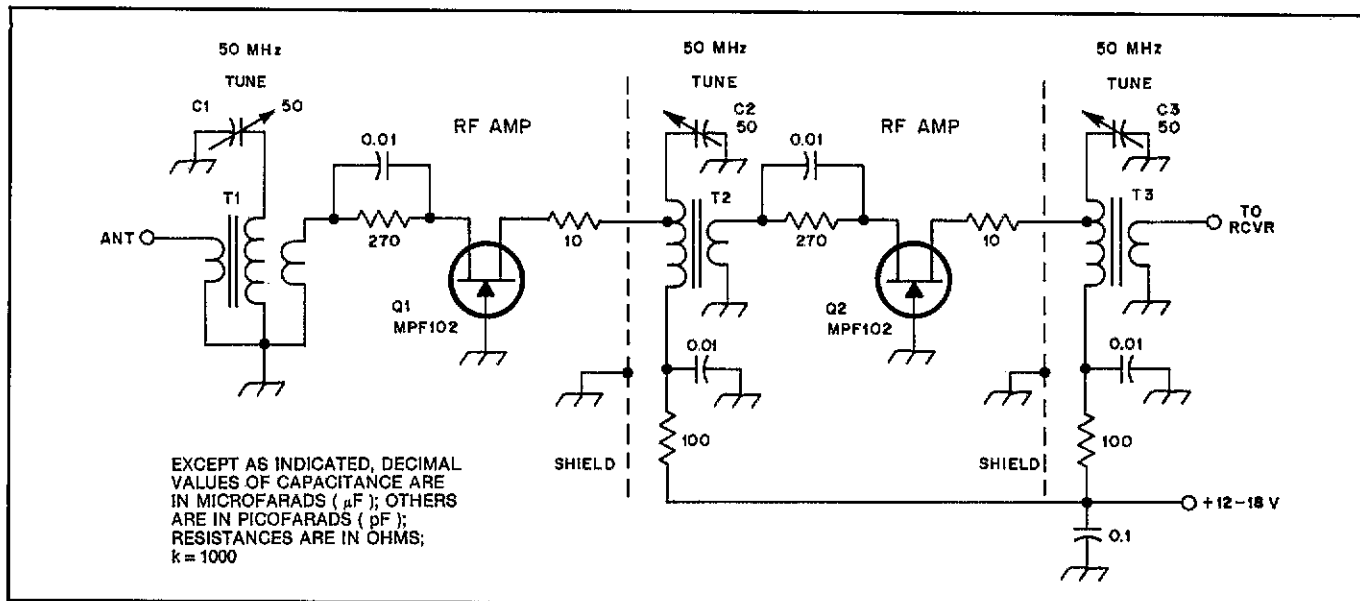


Fig 3—Example of a 6-meter preamplifier that provides 20 dB of gain and a low NF. C1, C2 and C3 are miniature ceramic or plastic trimmers. T1 (main winding) is 0.34 μH . Use 11 turns of no. 24 enam wire on a T37-10 toroid core. Antenna winding has one turn, and Q1 source winding has three turns. T2 primary consists of 11 turns of no. 24 enam wire on a T37-10 toroid. Tap Q1 drain three turns from C2 end of winding. Secondary has three turns. T3 is same as T2, except secondary has one turn.

and transmitting antennas. It is feasible to tune L1 with varicap diodes if the antenna were to be used remotely. Similarly, a TV rotator could be utilized for rotating the loop at its remote site.

Ferrite rods are available for making homemade loops.¹ Many ferrite loops found in discarded AM transistor radios can be used on 160 meters by removing some of the turns of wire. A dip meter may be used to assure that C1 of Fig 2 will tune the homemade loop from 1.8 to 2.0 MHz. L2 is a small link (6 to 10 turns) wound over the exact center of L1.

A Conventional Preamplifier

It is not necessary to have more than 20 dB of gain in a preamp when the regular station antenna is used. A single 40673 or 3N211 narrow-band preamplifier will suffice for most applications from 1.8 through 50 MHz. These MOSFETs have a low NF, and they can provide up to 20 dB of gain. However, at the higher gain amounts, we may encounter problems with instability; Careful layout is essential if we are to prevent self-oscillation.

Good luck has always accompanied my use of common-gate (grounded gate) JFETs, if the gate lead is kept very short between the transistor body and ground. The trade-off in using the common-gate format is reduced stage gain—generally 10 to 12 dB maximum gain for this configuration.

Fig 3 shows the circuit I have used for

HF and VHF a number of times. It has always performed stably, with a low NF and approximately 20 dB of gain. The 10-ohm resistors in the drain leads of Q1 and Q2 suppress VHF parasitic oscillations. The shields (shown in dashed lines) help prevent self-oscillation at or near the operating frequency. They isolate the input and output tuned circuits of each stage, thereby preventing unwanted stray coupling. The transistor drains are tapped down slightly on the primary windings of the tuned transformers, T2 and T3. This raises the tuned-circuit Q by reducing the

loading that would result if the Q1 and Q2 drains were connected to the tops of the T2 and T3 primaries.

It is customary to stagger-tune the amplifiers. That is, we may tune T1 to 50 MHz, T2 for 51 MHz and T3 for 52 MHz. This increases the effective converter bandwidth, but results in reduced converter gain: We must always accept a

(continued on page 27)

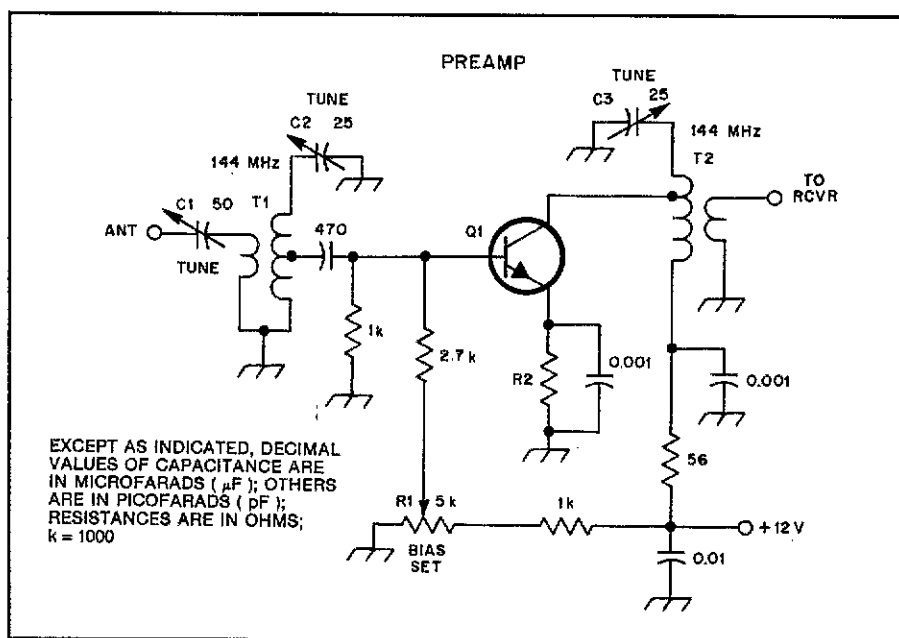
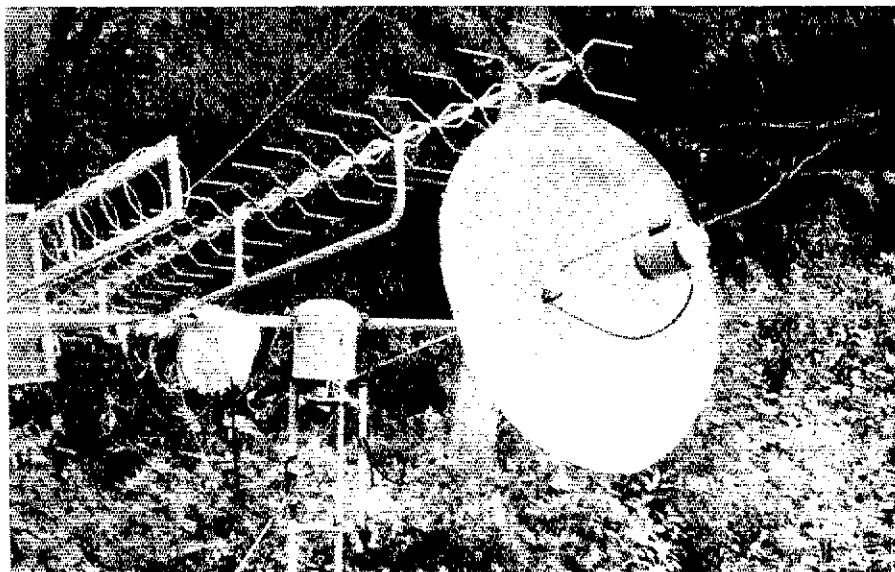


Fig 4—Example of methods for adjusting a preamplifier for low NF. R1 varies the forward bias of Q1, and C1 adjusts the impedance match to the antenna (see text). Assigned values are appropriate.

¹Assortment of flat and round loops available from State Street Sales, PO Box 249, Luther, MI 49656. Rods available also from Amidon Assoc Inc, 12033 Otsego St, N Hollywood, CA 91607.

A Mode-L Parabolic Antenna and Feedhorn for OSCAR 10



Get away from the crowded HF bands. Open new doors with this easily built Mode-L dish.

By Eugene F. Ruperto, W3KH
RD 1 Box 366
West Alexander, PA 15376

OSCAR 10 is the space-age answer to poor or crowded conditions encountered on the lower amateur bands. Sitting here at or near the bottom of the sunspot cycle has really put a crimp in my DXing habits lately, so I decided to put some effort into my OSCAR station. It seems like only yesterday that I listened to the weak CW "HI-HI" from one of the earlier OSCARs and marveled at the technology behind the effort. Later I taped and compared the analog audio telemetry from another OSCAR and wondered where it would end. Throughout the years, I have worked through all of the amateur satellites and mourned the death of AO-7 where I cut my teeth on Mode B.

Now I can sit at the OSCAR station for hours and work at my leisure. No more hurry-up, 10-minute passes. No more frantic antenna positioning. OSCAR 10, with its high elliptical orbit, is "a set it and forget it" type of satellite, for all practical purposes. Being a chronic AO-10 user, I have a tendency to become complacent and take AO-10 for granted. I have access to it nearly every day of the week, and have my choice of ragchewing, working DX, slow- or high-speed CW, certificate chasing, RTTY or just some old-fashioned antenna experimenting. This "bird" gets

my vote for being the best so far. In mid-1986, another Phase III satellite with Mode-B and Mode-L transponders will be placed in orbit.

Each satellite poses a new challenge for users and contributes something new to the amateur space program as we know it today. Satellite experiments involving preamplifiers, antenna configurations, polarity or power changes provide instantaneous feedback for analysis. In this respect, AO-10 represents a test bed for the amateur. Now is the time to get the bugs out of your present satellite system and, if possible, explore the world of Mode L. For future launches, the trend is toward UHF, and the amateur with only Mode-A or -B equipment will not be able to take advantage of all that is available.

Since discovering the Mode-L beacon, I've been interested in getting something going. I monitored the frequency when the bird switched from Mode B and found stations on Mode L that are using modest power levels and simple antennas on the downlink. This gave me the incentive to design an uplink antenna for Mode L. Despite the fact that the Mode-L transponder was not performing as planned, what I heard and read confirmed that with a modest addition to the Mode-B station,

Mode L could be used. With a 2-m/23-cm transverter at hand, only a small amplifier and a suitable antenna were needed to use Mode L.

Design Strategy

I decided that because of the small antenna sizes required at this frequency (1269.5 MHz) a parabolic dish antenna would be best. Some of the stations on Mode L are using commercially built TV dishes. But, considering the work needed to put them together, cover them with screen, build a feed antenna and supports, add a mount, and live with a deep f/D (usually 0.375), the buyer basically gets only a preformed wire grid for his money. I decided to build my own dish from readily available materials. This custom-design approach offers the builder some measure of control over the finished product. By using this method, one can design and construct parabolic reflectors of any reasonable size for any phase of amateur endeavor.

I used a three-step approach to the design. First, the dish should be effective, which means that a study of size vs power must be considered. My calculations indicated that a gain between 21 dBi and 27 dBi would be sufficient to hear my signal through the 436-MHz downlink, provided

Table 1
Design Considerations for Parabolic Dish Antennas

Dish Size	4†	5†	6†
Beamwidth (Deg)	13.2	10.5	8.7
Gain (dBi)	21.8	23.7	25.3
Output			
Power (W)	EIRP	EIRP	EIRP
100 W	16.2 kW	25.4 kW	36 kW
50 W	8 kW	12.75 kW	18.3 kW
30 W	4.8 kW	7.65 kW	11 kW
15 W	2.4 kW	3.75 kW	5.4 kW
10 W	1.6 kW	2.5 kW	3.6 kW
5 W	800 W	1.25 kW	1.8 kW
2.5 W	400 W	625 W	900 W

†Based upon 50% reflection efficiency and 10-dB taper feedhorn for 0.4 f/D dish

that the combination of RF output power and dish gain would allow me to reach the target value of 3 kW of EIRP (see Table 1). Second, the dish should be light so that it can be mounted at the mast with my other satellite antennas. This prevents an aiming discrepancy later on (such as my downlink antenna pointing at the bird and my uplink antenna pointing toward some meaningless position in space). This becomes more apparent as dish size increases, which brings up the third requirement—beamwidth. A wide-beamwidth dish is nice to have for a moving satellite, but it means a sacrifice in gain. On the other hand, too large a dish will narrow the beamwidth sufficiently to make tracking a chore. Although the Phase III satellites don't require much beam pointing near apogee, the Mode-L operating period is sometimes changed to a lower mean anomaly for operational reasons, and the ground track can cover a considerable angle in terms of antenna movement. It's a nice feeling to not have to aim the antenna more than once every 10 or 15 minutes during the Mode-L period. I decided that a 5-foot dish, with 12 watts of power at the feedhorn, should do the job for me.

Materials

I used 1/4-inch-diameter steel pencil rod (a mild steel) for the rib construction. With a weight of 0.167 pounds per foot, it would allow the antenna to be light enough to rotate with the other antennas. This pencil stock is usually sold in 20-foot lengths, called "joints," and at this length they are extremely flexible. To get them home, plan to cut them in half with a hacksaw or carry them, as I did, on an extension ladder on top of the pickup. Keeping the original length will minimize waste when making your cuts. At this writing, the cost of a 20-foot joint was \$1.30. Roughly figured, five joints will be needed for a 5-foot dish. Excluding the price of a piece of pipe and three hose clamps, the steel needed for the 5-foot dish will set you back about \$6.50, which is a lot less than the cost of your

Table 2
Detail Design for Three Parabolic Dish Antenna Sizes

Dish Size (Feet)	Y, X Coord (In)	Focal Length (In)	Depth of Dish (In)	Gain (dBi)	Beamwidth (Degrees)
4	0, 0	19.2	7.5	21.8	13.8
	3 0.117				
	6 0.468				
	9 1.054				
	12 1.875				
	15 2.929				
	18 4.218				
	21 5.742				
	24 7.5				
	30 9.375				
5	0, 0	24	9.375	23.76	10.54
	3 0.039				
	6 0.375				
	9 0.843				
	12 1.5				
	15 2.343				
	18 3.375				
	21 4.594				
	24 6.0				
	27 7.60				
30 9.375					
6	0, 0	28.8	11.25	25.35	8.78
	3 0.078				
	6 0.312				
	9 0.703				
	12 1.25				
	15 1.953				
	18 2.812				
	21 3.828				
	24 5.0				
	27 6.328				
30 7.812					
33 9.453					
36 11.250					

†Cartesian coordinates derived from $y^2 = 4FX$.
 y = radius of dish, x = axis of focus, 0, 0 = dish center.

average catalog TV dish. Previous experience using 1/4-inch hardware cloth and wire ties for dish coverings led me to abandon that approach in favor of a suggestion by Richard Dolenc, WB3CRF, to use common aluminum screen-door material instead. An added bonus is the lack of bandages required for the inevitable cuts that result from using hardware cloth. The door screen material mesh size is much smaller than the one-tenth wavelength required to be a perfect reflector at this frequency, but it also presents greater wind loading, with the probability of ice and snow accumulation. The fact that the dish can be pointed to a "stored" position when not in use, however, minimizes these effects. A 16-foot-long by 3-foot-wide piece of aluminum screen, obtained at the local hardware store for \$6, was more than ample for the 5-foot dish.

A very neat, taut covering can be accomplished by using Liquid Nail™ or similar material to glue the screen to the ribs. Use a caulking tube (price less than \$2) to apply the glue. Make sure the glue is waterproof since it will be exposed to the weather. A question arises concerning possible galvanic action between the steel rod and the aluminum screen. The glue matrix acts as a buffer between the metals and, for the most part, as an insulator between the two. As a consequence, only very small areas will occasionally make

contact. Though these could disintegrate over a period of time, the glued surface area will be much larger and still retain the original strength. The entire screen surface may be removed with a pair of scissors or a sharp knife; after grinding the rib surfaces free of glue, a new screen surface can be applied.

Dish Construction

A 1/4-inch-thick piece of scrap steel plate, 2 feet wide by 4 feet long, is used as a jig to build the ribs. The parabolic X and Y coordinates (see Table 2) are transferred to the plate, spaced roughly every three inches, by tracing the figure on the plate. Short pieces of 1/4-inch steel strap are tack welded along the curve to hold the pencil rod along the front of the curve; then similar pieces are tack welded along the back to hold the pencil rod at the desired shape (see Figs 1 and 2). The process is repeated for the back rib member as well as the piece of pencil rod that forms the hub portion of the rib. The hub pieces extend about 2 inches beyond the rib dimensions so that when completed, a hose clamp can be fitted on both front and back of the rib to clamp around a slightly longer piece of 1/2-inch pipe, threaded at both ends, that forms the central hub.

Once the jig is completed, and the first rib welded and checked, the remaining five ribs can be constructed in a short time. The

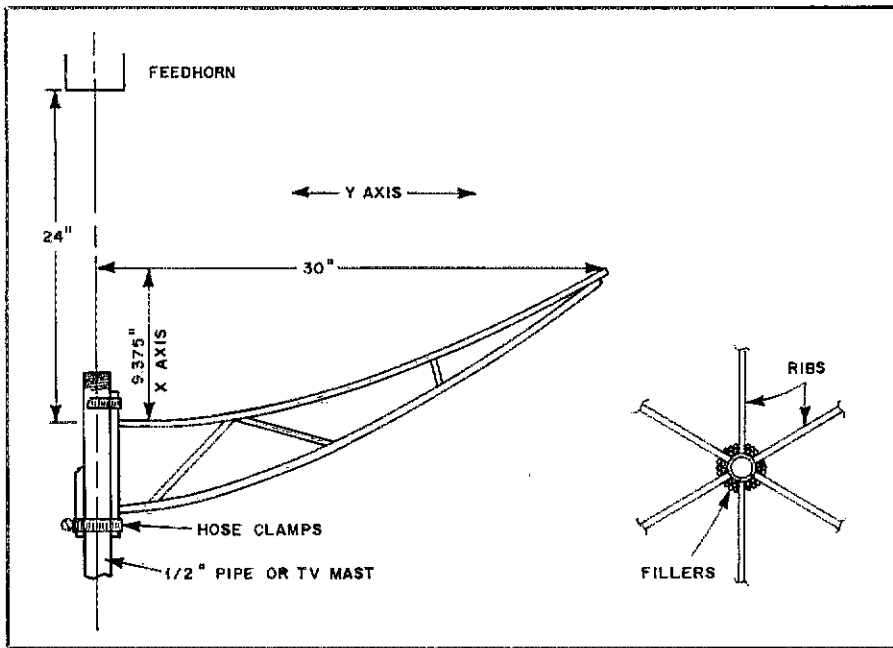


Fig 1—Rib construction details. Dimensions are as specified in Table 2.

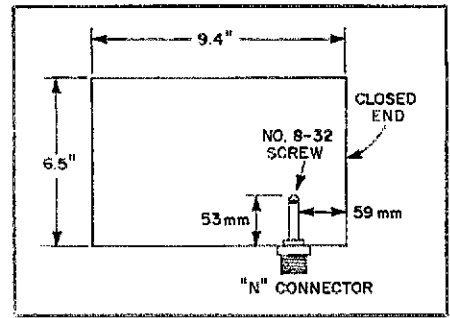


Fig 3—Feedhorn construction dimensions. See text for details.

soldered to an "N" connector (see Fig 3). The "N" connector is then soldered with a propane torch into a 5/8-inch hole, located as shown in Fig 3. Apply two coats of paint to the outside of the horn for protection.

I use a linear-polarized feed for several reasons. Most of the stations heard on Mode L are using linear polarization, and the downlink signals sound okay. Circular polarization complicates construction, especially when you're in a hurry. Feedhorns can be easily replaced, so we can try a switchable left- or right-hand circularly polarized feed at a later date. It might be worthwhile to mention that most feedhorn designs use a full guide wavelength in their construction. At the risk of drawing flack from the experts, I believe that the feed acts better if designed at half the guide wavelength, and it reduces the amount of tin in the construction and the weight by half. H. J. Griem, DJ1SL, reported experiments on a tubular horn for the 13-cm band.¹ He discovered that by using a full guide wavelength for the horn, a resonance lower in frequency exists outside the amateur band that corresponds to one-half of the guide length, which is, of course, one full guide wavelength at 13 cm. This effectively narrows the bandwidth of the 13-cm horn, making probe tuning more critical. By using half of the calculated guide length, the bandwidth is increased and probe tuning is less critical. Using this method, several successful feeds have been constructed for a variety of microwave frequencies. The design described here has an SWR of 1.15:1 at 1269.5 MHz, measured at the feedhorn.

The feedhorn is mounted on a small plywood saddle attached to a length of 1/4-inch pipe by two small U clamps. The 1/4-inch pipe is offset at the center of the dish with a 3/4-inch, 90° elbow, a short nipple, another 90° elbow, another short nipple, and a reducer from 3/4 to 1/2 inch (see Fig 4). I prefer a tripod method of mounting to this method because the 1/4-inch pipe passes close to the mouth of the horn.

¹H. J. Griem, DJ1SL, "Tubular Radiator for Parabolic Antennas on the 13-cm Band," *VHF Communications*, Apr 1976.

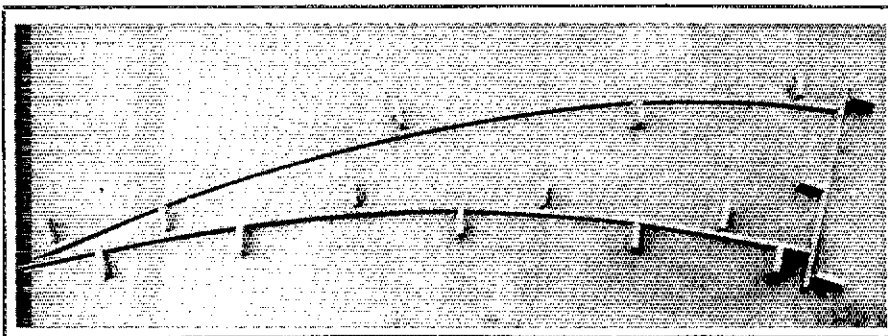


Fig 2—Rib assembly jig.

rib accuracy is checked using a plywood curve gauge cut out on a bandsaw. Because of the 6-rib design, a sloppy fit results when the ribs are clamped to the hub piece. Insert additional 9-inch pieces of pencil rod as fillers to make a tighter fit when attaching the ribs to the 1/2-inch pipe hub. Place the ribs and pipe "face down" to space the ribs evenly. I used a joint of pencil rod, bent to a diameter of 5 feet around a tractor tire, and welded it to the outer tip of each rib before tightening the hose clamps. Alternatively, single pieces of rod may be cut to fit between the ribs at the edge of the dish to form the rim. The completed dish, with center pipe hub, weighs approximately 12 pounds. More ribs could be added, at the expense of additional weight.

Cut sectors of aluminum screen that are slightly larger than the rib spacing so that the sectors will overlap. Run a bead of Liquid Nail, or other glue, on the front side of two ribs and the included part of the external ring and press the screen sector in place. The glue dries fairly rapidly at room

temperature. Run a strip of thin wood over the screen surface to tighten it and allow the glue to penetrate and hold the screen surface. By the time this operation is complete, the next sector can be applied in the same manner.

Feedhorn Construction

There is a plethora of tin-can feedhorn designs described in other articles. I prefer to steer away from using motor oil and coffee cans. They seem to work well enough, but require some modification, usually in the length, to perform optimally at the design frequency. In addition, they also have a tendency to disintegrate after a short stay in the elements, even when painted. The feedhorn used here was constructed to my specifications by Dick Dolenc, WB3CRF, using approximately 26-gauge galvanized steel capped and soldered at one end. It has only one seam running longitudinally along the feed axis. A piece of copper tubing, threaded to accommodate a no. 8-32 bolt for tuning, is

Strays

I would like to get in touch with...

anyone with a manual or circuit diagram for a Johnson Viking 1. Heinz Broweleit, W5UIP, 4624 S Quaker, Tulsa, OK 74105.

anyone with manual or information on modifying a Dentron GLA 1000 B amplifier for 10- and 160-m bands. Al Bingham, KC8UP, 2395 E Beaver Rd, Kawkawlin, MI, 48631.

anyone with a manual or schematic for the Micronta multi-meter no. 22-049. Ray Greenwood, W4NOS, 428 Ann St, Cary, NC 27511.

anyone with information on logging and duping programs for the Apple IIe. Dick Jenkins, N0DZU, 8 Maplewood, RR 1, Humboldt, IA 50548.

anyone with manuals for the Hallicrafters SX-111 and Heathkit Apache TX-1. Bill Geller, N2FHK, RD 3, Box 169, Mayslanding, NJ 08330.

any hams formerly stationed at Millington, TN Navy radio schools 1942-1945. Samuel Stephens, W5HZD, Box 550, El Reno, OK 73036.

anyone with a service manual for a Weston Instruments ac-voltage standard, Model ACS-176. J. F. Picard, F6ERK, 5, Place de l'Etoile, 91330 Yerres, France.

anyone with a manual or schematic for a PACO vacuum-tube voltmeter, Model V-70. Nick Libertino, W1PBO, 1765 State St, Hamden, CT 06511.

Next Month in QST

In June, QST offers a short tour of recent amateur activity in China and Japan. You'll travel behind the Great Wall for a peek at ham radio in BY-land, and you'll learn what to expect from Japan's first Amateur Radio satellite, JAS-1.

Among the technical offerings are an evaluation and suggested applications of a highly useful impedance-matching network and a look at the astronomical aspects of VHF meteor-shower communications. Contesters will want to check out the rules for the new 10-GHz contest, and the results of the January VHF Sweepstakes, the Novice Roundup and the Midnight Special.

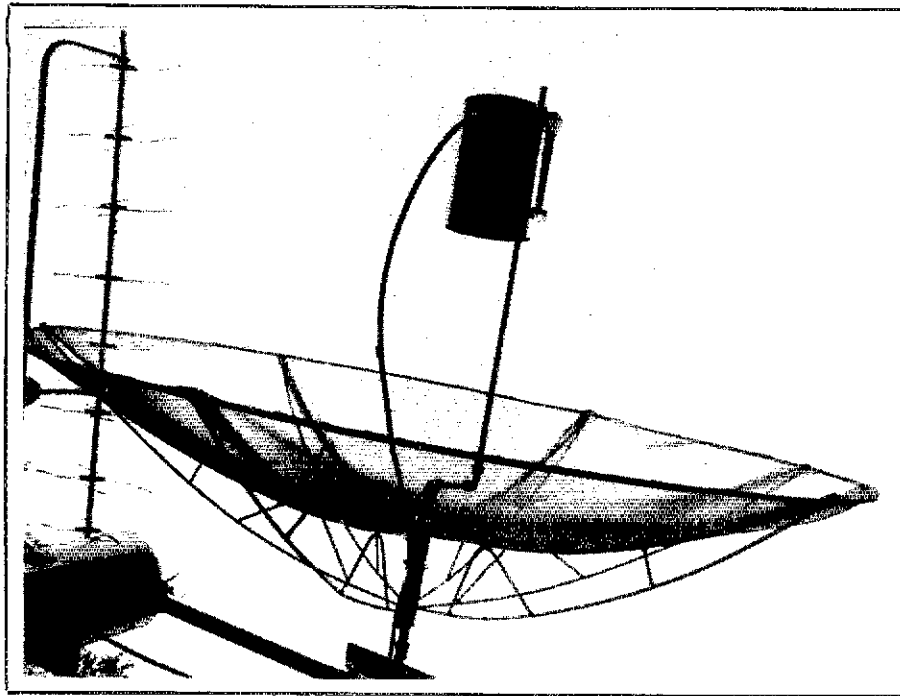


Fig 4—Completed dish assembly. Note the feedhorn mounting scheme.

Conclusion

The rib design is very strong. During initial testing, the dish took an unscheduled trip across the backyard during a severe windstorm. It suffered only one small deformation on the outer ring and a bent feedhorn mount, both of which were easily repaired. I surprised myself by listening to my signals on the Mode-L downlink the first time. Running only 12 W at the feed and pointing the dish approximately at the bird, I worked almost everybody I heard.

The antenna is now tower mounted, and I have increased the power to 40 W at the feedhorn. Performance is very satisfactory, and the pointing angles for tracking are reasonable. I found out another thing, though—you need a better receiving system on Mode L than on Mode B. This may be because the Mode-L transponder is not up to performance standards because of component failure.

Build a dish and try Mode L. It sure is lonesome up there now, but that will change!

amplifier NF. This is because man-made and atmospheric noises are usually higher than the receiver or preamplifier NF, so we are concerned more with the preamplifier gain. NF *does* become a noteworthy matter when using loop antennas or active antennas. The first RF amplifier receives minute signals from the antenna, so a noisy preamp can spoil the weak-signal reception. A low NF is as important in these low-band applications as it is at VHF and UHF.

Fig 4 illustrates the mechanisms we may employ to twiddle the NF of a converter. Q1 may be one of the many low-noise VHF/UHF transistors available today. R1 is adjusted to provide the bias that results in the lowest NF. Alternatively, some amateurs adjust the value of R2 to achieve the same result. C1 may be adjusted also to aid the NF. For the most part, these measures would result in an exercise in futility at MF and the lower end of the HF spectrum, since NF is established by "antenna noise," as some call it (man-made and atmospheric noises).

Summary

It has been my purpose to explain the benefits and shortcomings attendant to the use of preamplifiers. You may wish to build some of the examples shown here, purely to experiment with the optimization of NF. On the other hand, you may elect to build a model for some special application in your ham shack. A preamplifier will often boost the performance of a D-C (direct-conversion) receiver if it has no RF amplifier stage ahead of the product detector. It may also improve the performance of receivers that route the antenna directly to a mixer.

Preamplifiers

(continued from page 23)

trade-off between bandwidth and gain when broadbanding a circuit.

Optimizing the NF

If the proper transistors are selected for MF or HF preamplifiers, there will be little need to worry about optimizing the pre-

Adventures in Satellite DXing

Part 2: In this installment, we'll take a look at some of the equipment you'll need to launch your OSCAR career.[†]

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

Last time we looked briefly at OSCAR 10's history and learned some basic terminology. Now it's time to get down to the specifics of the equipment you'll need to work stations through the bird. This month we will examine your options as you choose a receiver, transmitter and antenna system for OSCAR 10 operation.

The basic requirements for OSCAR 10 Mode-B operation are a sensitive 145-MHz receiver, a 435-MHz transmitter that can supply about .50 W of RF output and a high-gain antenna for each band. The antennas must be able to rotate in azimuth (side to side) and elevation (up and down).

In earlier times, the satellite communicator had to work hard to assemble a usable station. These days, however, amateur equipment manufacturers provide some nifty boxes that make the job easier.

Full-Duplex Operation

Perhaps the biggest difference from terrestrial work is that satellite work requires full-duplex operation. This means that you transmit and receive simultaneously. You can hear your own downlink signal while you're transmitting, as well as that of the station you're working. Full duplex provides the opportunity for a fully interactive conversation, as if the other station is in the very same room! Gone are the endless monologues, and in come new communications methods.

The ability to hear your own signal on the downlink offers several advantages. You are assured that you and the station you want to work will be able to get on the same frequency. If you're responding to a CQ, you'll hear your signal and know that you're tuned to the right part of the passband. In addition, if you can hear yourself, others can copy you as well. There is no question about whether or not your signals

are getting through. Moreover, you will know if you're running too much power and being a "satellite hog." It's possible

to have too strong an uplink signal, as we'll see in a later installment.

Successful satellite operation demands that you can locate and hear your own signal from the spacecraft. You should choose equipment with this goal in mind. Equipping your station for full duplex operation is easier than you might think because the transmitter is on a different band than the receiver. Fig 1 shows several different satellite ground-station equipment configurations. Each of these options is discussed in the following pages.

Receivers

Receiving requirements for OSCAR 10 are stiff, but you can achieve pleasurable results with the right kind of equipment. Do not expect to find 60-dB-over-S9 signals on the downlink. OSCAR operation is a weak-signal situation where contacts can be made with signals that are 4 dB stronger than the noise. Conversational quality can be assured with signals that are 6-9 dB or greater out of the noise.

The old adage "You can't work 'em if you can't hear 'em" especially applies to satellite work. The first step you should take toward gearing up for OSCAR 10 is to assemble the best receiving setup you can. There's no point in getting transmitting capability until you can hear signals, and hear them well.

There are a number of options open to you if you are starting from scratch. You may wish to try your hand at building receiving equipment, or you may wish to purchase everything. All of the necessary components for the 145-MHz downlink are readily available from QST advertisers.

If you're active on 2 meters with a multimode transceiver, you already have the basic building block of your receiving setup. If you don't have any equipment but think you would like to try terrestrial SSB operation on 2 meters, you should consider purchasing one of these all-mode radios. The basic requirements are that the rig includes SSB and CW modes and that it covers the entire 2-meter band. A

Table 1

Suppliers of Equipment of Interest to Satellite Operators

Multimode VHF and UHF Transceivers and Specialty Equipment

ICOM America, Inc, 2380-116th Ave NE, Bellevue, WA 98004.

Ten-Tec Inc, Sevierville, TN 37862.

Trlo-Kenwood Communications, 1111 West Walnut St, Compton, CA 90220.

Yaesu Electronics Corp, 6851 Walthall Way, Paramount, CA 90723.

Converters, Transverters and Preamplifiers

Advanced Receiver Research, Box 1242, Burlington, CT 06013.

Angle Linear, PO Box 35, Lomita, CA 90717 (preamps only).

Hamtronics, Inc, 65-E Moul Rd, Hilton, NY 14468.

Henry Radio, 2050 S Bundy Dr, Los Angeles, CA 90025.

The PX Shack, 52 Stonewyck Dr, Belle Mead, NJ 08502.

Radio Kit, Box 411, Greenville, NH 03048.

Spectrum International, PO Box 1084, Concord, MA 01742.

Transverters Unlimited, Box 6286, Station A, Toronto, ON M5W 1P3.

The VHF Shop, 16 S Mountaintop Blvd, Rt 309, Mountaintop, PA 18707.

70-cm Power Amplifiers

Alinco Electronics, PO Box 20009, Reno, NV 89515.

Communications Concepts, Inc, 2648 North Aragon Ave, Dayton, OH 45420.

Encomm, 1506 Capitol Ave, Plano, TX 75074.

Falcon Communications, PO Box 8979, Newport Beach, CA 92658.

Mirage Communications, PO Box 1000, Morgan Hill, CA 95037.

TE Systems, PO Box 25845, Los Angeles, CA 90025.

Antennas

Cushcraft Corp, 48 Perimeter Rd, Manchester, NH 03108.

KLM Electronics, Inc, PO Box 816, Morgan Hill, CA 95037.

Telex/Hy-Gain, 9600 Aldrich Ave South, Minneapolis, MN 55420.

Note: This is a partial list. The ARRL and QST do not endorse specific products.

[†]Part 1 appears in April 1986 QST. Part 3 will appear in a later issue.

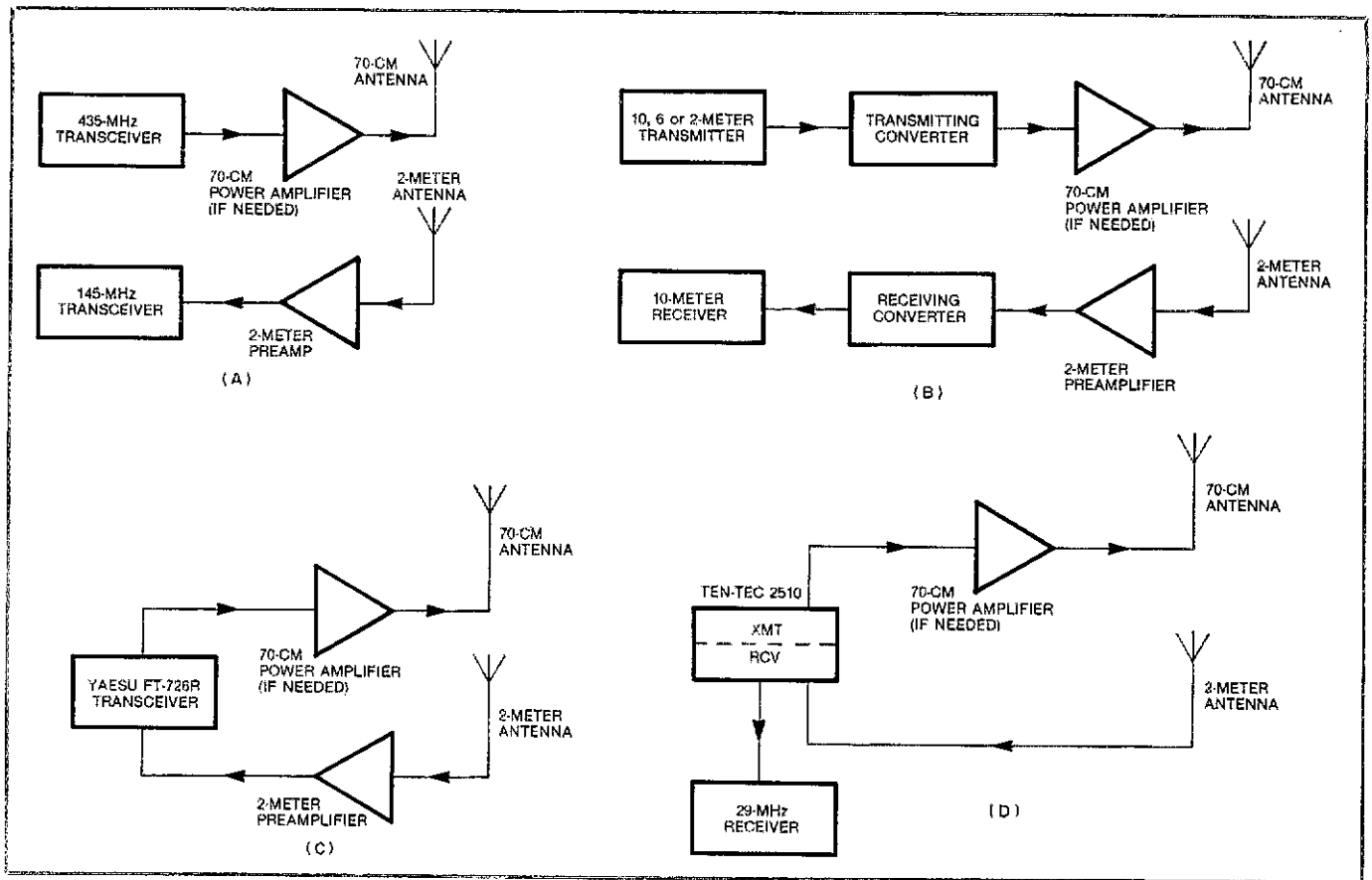
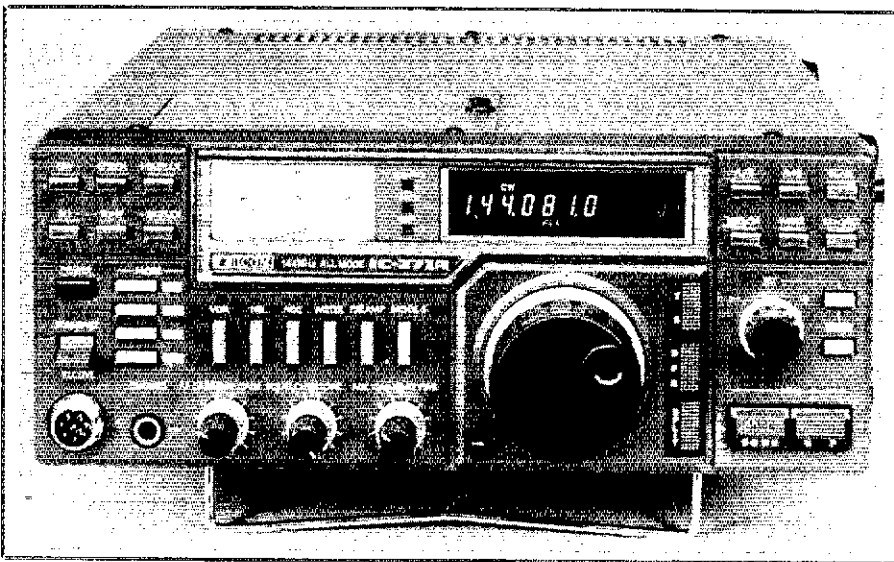


Fig 1—Several different satellite-station configurations are shown here and described in the text. At A, separate VHF/UHF multimode transceivers are used for transmitting and receiving. The configuration shown at B uses transmitting and receiving converters or transverters with HF equipment. At C, the Yaesu FT-726R can perform both transmitting and receiving functions, full duplex, in one package. The Ten-Tec 2510 shown at D contains a 435-MHz transmitter and a 2-meter to 10-meter receiving converter.



The ICOM IC-271A is typical of the 2-meter multimode transceivers on the market today. It can be used for reception on the OSCAR 10 downlink. The IC-471A, virtually identical in appearance, offers a matching 70-cm, 25-W signal for the uplink.

multimode transceiver also makes an excellent replacement for an FM-only 2-meter rig.

The major equipment manufacturers listed in Table 1 all make suitable transceivers. The current crop of base-station rigs includes the Kenwood TS-711A, ICOM

IC-271A and Yaesu FT-726R. There are also several compact multimode radios intended for mobile use that will fill the bill. These include the Yaesu FT-480R, Kenwood TR-9130 and ICOM IC-290H. In addition, there are often good buys on the used market, if you're interested in an older

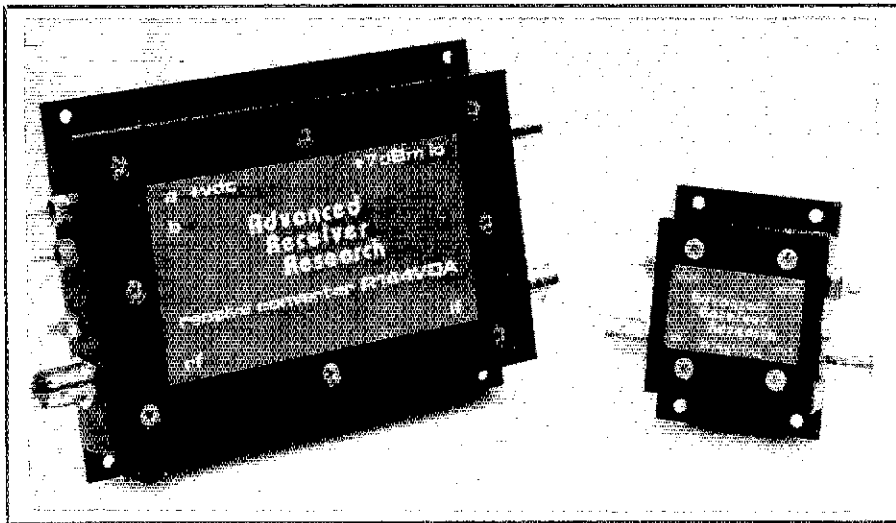
radio. Gear such as the Kenwood TS-700 series, Yaesu FT-225RD and ICOM IC-251 are still popular. Many of these transceivers have been reviewed in *QST*.¹⁻⁵

An excellent solution to receiving OSCAR 10 on 145.9 MHz can be found in the form of receiving converters used with your quality HF transceiver or receiver. The receiving converter consists of a 2-meter preamplifier, a mixer and a local oscillator. The local oscillator frequency is usually chosen so that 2-meter signals will be converted for reception by any receiver that covers the 10-meter band. In addition, a number of manufacturers offer transverters that include a receiving converter and transmitting converter in the same package.

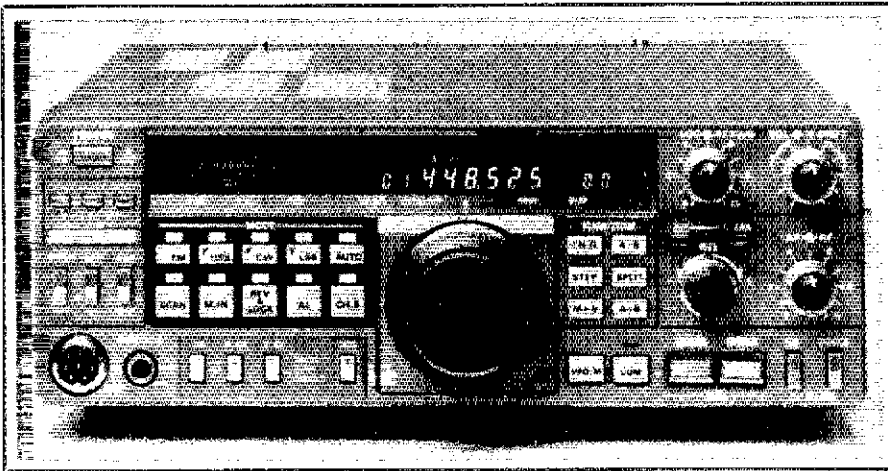
Receiving converters are available commercially from several suppliers listed in Table 1. For those who enjoy building equipment, *The ARRL Handbook* presents several suitable construction projects in Chapter 31.⁶

There are several advantages to using a receiving converter. Your modern HF transceiver or receiver most likely has excellent frequency stability, a frequency readout in 1-kHz or smaller steps, good

¹Notes appear on page 32.



Amateurs who own HF receivers or transceivers and who have no desire for transceive operation on 2 meters may find that a receiving converter such as this Advanced Receiver Research R144VDA will fit their needs. Shown with matching low-noise GaAsFET preamplifier, this unit converts 2-meter OSCAR 10 downlink signals for reception on any receiver that can tune to 29 MHz.



The Kenwood TS-811A is a 70-cm multimode transceiver that can be used to generate a 10-W, 435-MHz signal for the uplink. A similar unit, the TS-711A, may be used for the 2-meter downlink.



A low-noise GaAsFET preamplifier such as this Angle Linear GaAsFET model is essential if you want to maximize your downlink reception. The preamplifier can be mounted at the antenna for best results.

SSB and CW crystal filters, an effective noise blanker and high dynamic range. Chances are good that a multimode VHF transceiver will offer some, but not all, of

these features. Cost is another factor. If you already own an HF rig and are not interested in terrestrial 2-meter SSB operation (that is, don't need a 2-meter transmitter), the cost of building or buying a receiving converter will be significantly less than that of even an older multimode transceiver.

The downlink receiver at WD4FAB had for years been a multimode transceiver. Daytime QRN often raised the practical receiver noise floor by 10 to 20 dB, thus eliminating OSCAR 10 daytime communications. Weak downlink signals were no match for the noise. In addition, local FM repeaters could be heard in the satellite passband because the VHF transceiver offered poor rejection of strong nearby signals. Use of a high-dynamic-range receiving converter with a good HF transceiver has, however, solved both of these problems. The lesson here is that many VHF transceiver noise blankers are

inadequate for AO-10 operation, and that some VHF transceivers do not work well in areas with many strong, nearby signals. If you have QRN problems or live in an area with lots of 2-meter FM repeaters, you may have better luck with a receiving converter than with a VHF transceiver.

Preamplifiers

No discussion of satellite receiving systems would be complete without mentioning preamplifiers. A good, low-noise preamplifier is a great help for receiving those weak downlink signals. Multimode rigs and most transverters will hear much better with the addition of a GaAsFET preamplifier ahead of the receiver front end. While you can add a preamplifier right at the receiver in your station, it may not do you as much good as you think. You'll get much better results if the preamp is mounted at the antenna. Losses in the feed line will degrade the noise figure of even the best preamplifier mounted at the receiver.

Table 1 lists several sources of commercially-built preamplifiers. These are available in several configurations. Some models are designed to be mounted in a receive-only line, for use with a receiving converter or transverter. Others, designed with multimode transceivers in mind, have built-in relays and circuitry that automatically switch the preamplifier out of the antenna line during transmit. Still others are housed, with relays, in weather-proof enclosures that mount right at the antenna. If you like to roll your own, several suitable designs appear in Chapter 31 of *The ARRL Handbook* and in *The Satellite Experimenter's Handbook*, published by the ARRL.⁷

Transmitters

For transmitting to OSCAR 10, you'll need 5-25 W of 435.1-MHz RF at the antenna. This assumes a good antenna, which we'll discuss later. Feed-line losses at 435 MHz are much greater than at HF, so they must be taken into account here. Feed-line losses in a typical installation can easily run 3 dB, so you'll need anywhere between 10 and 50 W output from your transmitter.

Since the possible number of combinations of transmitter power and antenna gain needed to give a satisfactory signal through OSCAR 10 is infinite, satellite users generally talk about their uplink capability in terms of effective radiated power (ERP). ERP takes into account antenna gain, feed-line loss and RF output power. For example, if you run 10 W into a 3-dB-gain antenna, your ERP is 20 W (3 dB greater than, or twice as strong as, 10 W). This assumes no loss in the feed line; all 10 W from the transmitter reaches the antenna. If you use 10 W into a 10-dB-gain antenna, your ERP is 100 W. You could achieve the same 100-W ERP with a 50-W transmitter and a 3-dB-gain antenna.

Stations with an uplink ERP as low as 10 W can be copied through OSCAR 10, but ERP levels of 100 to 400 W are the norm. No matter what your ERP, your signal on the downlink should never be stronger than the AO-10 general beacon at 145.81 MHz. You must have a way to adjust your uplink signal so that it is as strong or weaker than the beacon. We'll return to this point in detail in the operating installment of this series.

If you have a 10-W transmitter, a short run of low-loss feed line and good antenna gain, you're probably all set. Worry no more about added amplifiers. If losses and gains do not add up to enough ERP for you, a 30- to 40-W amplifier may be needed. Some operators have 100-W amplifiers, but with the antennas available today, use of that much power is guaranteed to create an uplink signal that far exceeds the beacon. This is considered by good operators to be an antisocial action. Considerate operators with the 100-W amplifiers quickly reduce drive power to lower the ERP to acceptable levels. Again, use only the RF power that will make your signal no stronger than the OSCAR 10 beacon.

Most satellite operators use UHF multimode transceivers to generate an uplink signal. The manufacturers listed in Table 1 all make 70-cm multimode transceivers that are similar to the 2-meter units described earlier. Although most of these transceivers provide 10-W output, some can deliver 25 W or more.⁸

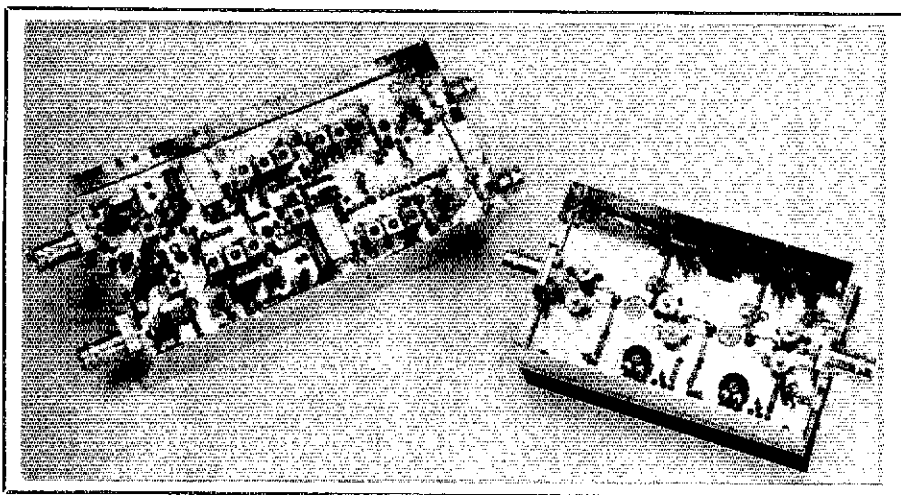
Unless you are into 70-cm terrestrial communications (and that can be fun, too), there is no need for a complete transceiver. Transmitting converters for use with HF transceivers are available from suppliers listed in Table 1. In addition, some of those manufacturers make transverters that are suitable for satellite work. If you want to try to build your own equipment, *QST* recently presented a 70-cm transmitter construction project.⁹

If you find that you need more 435-MHz power, there are a number of solid-state amplifiers on the market. See Table 1. Choose carefully; you don't need a rock crusher.

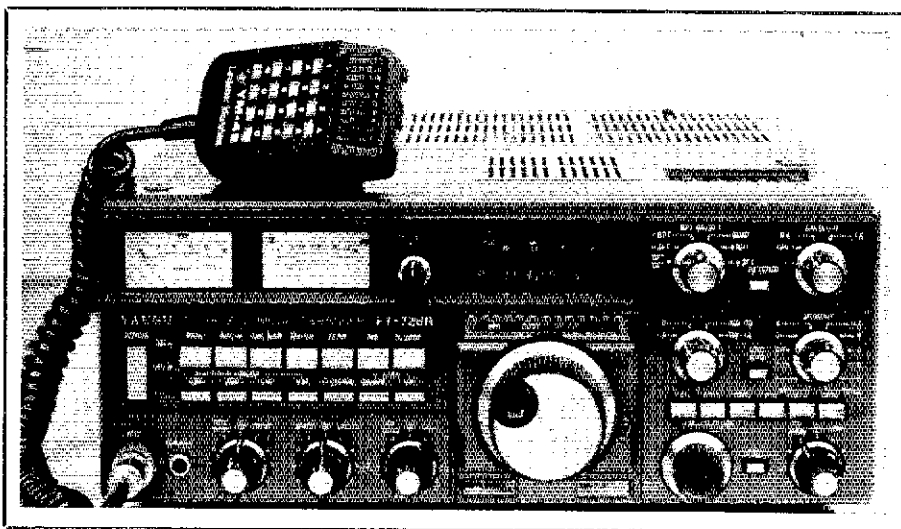
Specialty Equipment

Separate transceivers or transmitting and receiving converters are no longer the only way to go. Modern equipment offerings by Yaesu and Ten-Tec, tailored for the satellite user, do it all in one package.

The Yaesu FT-726R starts out as a 2-meter multimode transceiver (see note 2). It is, however, expandable to work on other bands with the addition of optional modules. The Mode-B satellite operator would most likely be interested in an FT-726R with the stock 144-MHz and optional 430-MHz modules. To tie it all together, Yaesu offers an optional satellite module to allow you to transmit on the 435-MHz uplink while receiving on the



Another means of generating a 435-MHz uplink signal is with an HF transceiver and a 10-meter to 70-cm transverter such as this SSB Electronics TV28-432.



Yaesu's FT-726R is a favorite among satellite users because it can work on both 2 meters and 70 cm. With the optional satellite module that allows full-duplex operation, the effect is practically the same as having two separate transceivers in one box.

145-MHz downlink. This is full duplex operation; the effect is the same as having two separate radios in one box.

Ten-Tec's 2510 is tailored specifically for Mode-B satellite operation.^{10,11} This unusual piece of equipment includes a hot receiving converter that converts 145-MHz signals to 10 meters for reception on any HF receiver or transceiver. A low-noise GaAsFET preamplifier is built in, so no external preamp is required. For the uplink, the 2510 has a complete 10-W, 435-MHz SSB and CW transmitter. The 2510 has only one frequency tuning control for the receiver and the transmitter. The receiver automatically tracks the transmitter, an exceptionally useful feature as we'll see when we discuss operating procedures in a later installment.

Antennas

This is probably one of the most controversial areas, as most amateurs are experts and the authors are no exception. The

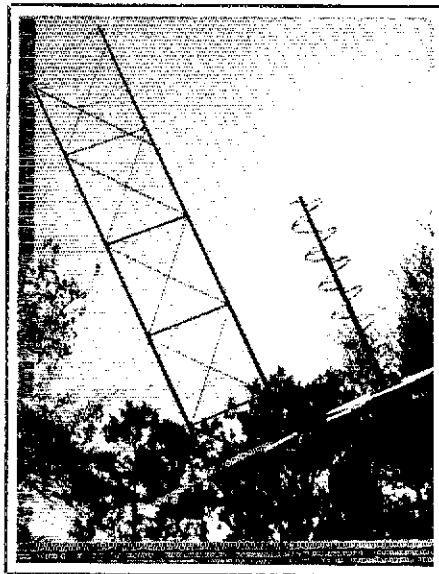


Fig 2—These helical antennas were used for years at WD4FAB.

Glossary

circular polarization (CP)—describes an electromagnetic wave in which the electric and magnetic fields are rotating. If the electric field vector is rotating in a clockwise sense, as viewed along the path of radiation, then it is called right-hand circular polarization (RHCP). If the electric field vector is rotating in a counterclockwise sense, as viewed along the path of radiation, then it is called left-hand circular polarization (LHCP).

effective radiated power (ERP)—a measure of the power radiated from an antenna system. ERP takes into account transmitter output power, feed-line losses and other system losses, and antenna gain as compared to a dipole.

GaAsFET preamplifier—a low-noise receiving preamplifier that uses a gallium arsenide field-effect transistor as the active device.

information presented here is based on years of experimentation at WD4FAB, but it should not be considered the final word.

The best antennas for OSCAR 10 have circular polarization (CP), rather than horizontal or vertical. For years, helical antennas like the one shown in Fig 2 were the way to go for satellite work.¹²⁻¹⁴ An eight-turn helical for 70 cm and a huge six-turn helical for 2 meters provided excellent results for OSCAR 8 operation at WD4FAB.¹⁵ For OSCAR 10, however, more gain was needed.

The present satellite array at WD4FAB uses a different method to achieve circular polarization. These antennas, shown in Fig 3, are essentially two complete Yagis mounted perpendicular to each other on the same boom. One set of elements is mounted $\frac{1}{4}$ wavelength ahead of the other, and the antennas are fed in phase. These particular antennas, manufactured by KLM, have proved to be excellent performers.¹⁶ Cushcraft and Telex/Hy-Gain also manufacture crossed-Yagi satellite antennas.

Perhaps the most significant factor of the KLM "crossed Yagi" antennas is that they are switchable from right-hand circularly polarized (RHCP) to left-hand circularly polarized (LHCP). With AO-10, switchability is important. The side lobes of the AO-10 antenna patterns are LHCP, even though the main lobes are RHCP, and there are substantial side lobe operating periods for any OSCAR 10 orbit. Successful AO-10 operation requires not only antennas with circular polarization, but antennas that have switchable circularity as well.

Satellite antennas should be mounted as close to the station as possible. Height



The Ten-Tec 2510 Mode-B satellite station is designed specifically for Mode-B operation. The box contains a 435-MHz SSB and CW transmitter, as well as a 145- to 28-MHz receiving converter with a low-noise front end.

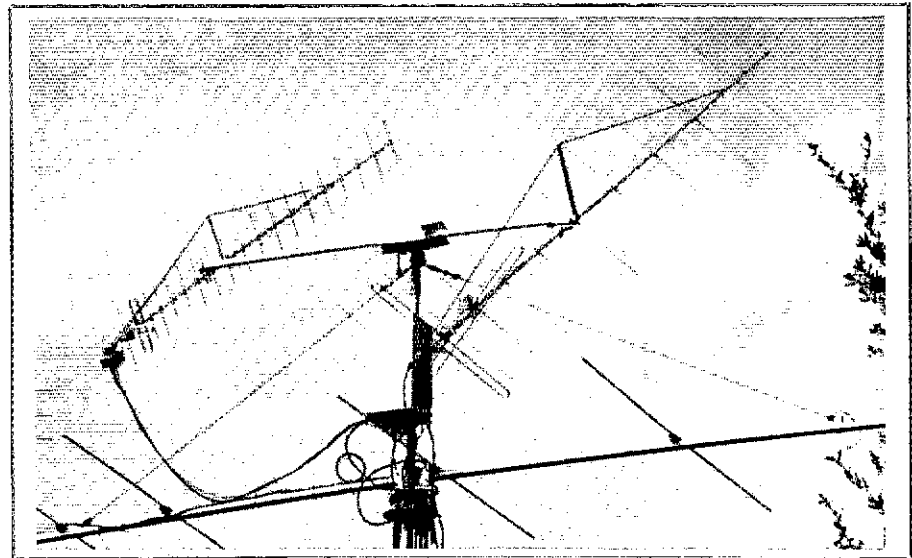
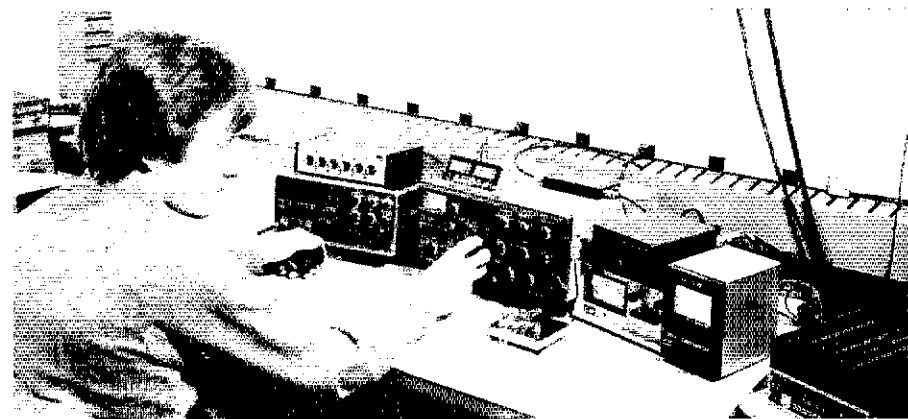
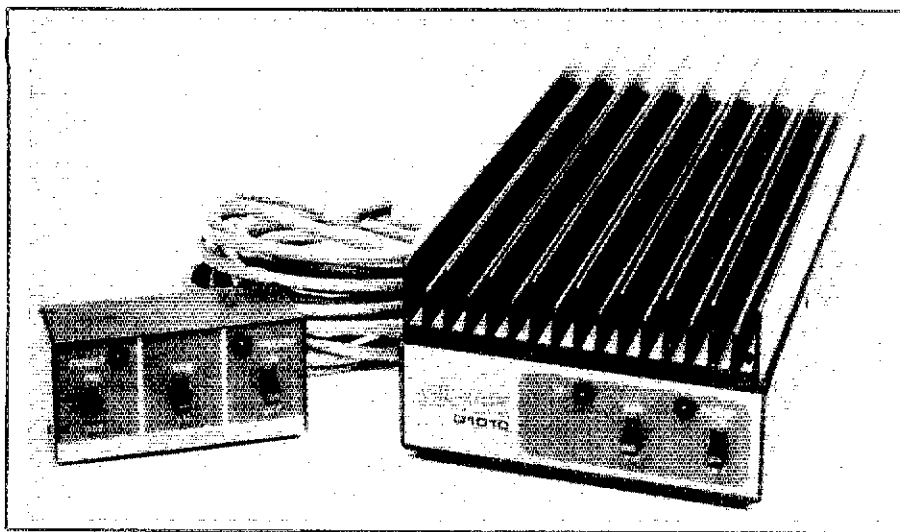


Fig 3—The present satellite array at WD4FAB uses KLM Yagis for 2 meters and 70 cm. The large box on the mast contains a 2-meter preamplifier and a 70-cm power amplifier, as well as power-supply circuitry.



W1INF, the ARRL Laboratory station, has OSCAR 10 Mode-B capability. The uplink is a 2-meter multimode transceiver driving a 2-meter to 70-cm transverter, while the downlink is a receiving converter and 10-meter receiver. A GaAsFET preamplifier is mounted at the antenna.



Usually, a little more than 10-W uplink power is required for a good downlink signal. Solid-state "brick" amplifiers such as this Mirage D1010 provide the extra power needed. Care must be taken, however, to use only the minimum power necessary to maintain reliable communications.

above ground makes no difference for satellite work, except that the antennas must be mounted high enough that trees and other obstructions do not block the view of the satellite at low elevations. A low mount allows use of shorter feed lines (lower losses) and often reduces QRN pickup by the antennas. Many operators are able to set up their antennas on a 10- to 15-foot mast right next to the shack and have only 20 feet of feed line. The antennas at WD4FAB are mounted 63 feet above the ground to clear trees, and they require 80 feet of feed line. For feed lines, plan to use good-quality, low-loss coaxial cable from the start, such as Belden 9913. Even better is a run of Hardline with Belden 9913 for the flexible pieces at each end.

We've given you plenty to think about for now. If you need more information, see "A Survey of OSCAR 10 Station Equipment" in a past issue of AMSAT's *Orbit* magazine.¹⁷ Next month, we'll look at useful accessories and antenna rotators, and show you how to assemble all of the pieces into a working OSCAR 10, Mode-B satellite station.

Notes

- ¹M. Wilson, "ICOM IC-271A 2-Meter Multimode Transceiver," *QST*, May 1985, pp 40-41.
- ²M. Wilson, "Yaesu Electronics Corp. FT-728R VHF/UHF Transceiver," *QST*, May 1984, pp 40-42.
- ³M. Wilson, "Yaesu FT-480R 2-Meter Multimode Transceiver," *QST*, Oct 1981, pp 46-47.
- ⁴J. Kleinman, "ICOM IC-290H All-Mode 2-Meter Transceiver," *QST*, May 1983, pp 36-37.
- ⁵D. DeMaw, "Trio-Kenwood TS-700S 2-Meter Transceiver," *QST*, Feb 1978, pp 31-32.
- ⁶M. Wilson, ed., *The 1986 ARRL Handbook* (Newington: ARRL, 1985). Available from your local radio store or from ARRL for \$18 (\$19 outside US). Add \$2.50 (\$3.50 UPS) per order for shipping and handling.
- ⁷M. Davidoff, *The Satellite Experimenter's Handbook* (Newington: ARRL, 1985). Available from your local radio store or from ARRL for \$10 (\$11 outside US). Add \$2.50 (\$3.50 UPS) per order for shipping and handling.
- ⁸J. Lindholm, "ICOM IC-471A 70-cm Transceiver," *QST*, Aug 1985, pp 38-39.
- ⁹J. Reed, "A Simple 435-MHz Transmitter," *QST*, May 1985, pp 14-18.

- ¹⁰C. Hutchinson, "TEN-TEC 2510 Mode B Satellite Station," *QST*, Oct 1985, pp 41-43.
- ¹¹D. Ingram, "The Ten-Tec 2510 OSCAR Satellite Station/Converter," *CQ Magazine*, Feb 1985, pp 44-46.
- ¹²R. Jansson, "70-Cm Satellite Antenna Techniques," *Orbit*, Mar 1980, pp 24-26.
- ¹³B. Glassmeyer, "Circular Polarization and OSCAR Communications," *QST*, May 1980, pp 11-15.
- ¹⁴C. Richards, "The Chopstick Helical," *Orbit*, Jan/Feb 1981, pp 8-9.
- ¹⁵R. Jansson, "Helical Antenna Construction for 146 MHz," *Orbit*, May/June 1981, pp 12-15.
- ¹⁶R. Jansson, "KLM 2M-22C and KLM 435-40CX Yagi Antennas," *QST*, Oct 1985, pp 43-44.
- ¹⁷H. Winard and R. Soderman, "A Survey of OSCAR Station Equipment," *Orbit*, Nov/Dec 1983, pp 13, 16 and Mar/Apr 1984, pp 12-16. (Continued)

Strays



CALL FOR QST TECHNICAL ARTICLES

With so many Amateur Radio stations now equipped with personal computers, some amateurs have found ways to use the computer to do some of the chores that normally require an operator with three or four hands and two heads. What tasks have you assigned to your computer? Share the details of your application with other *QST* readers. Send your manuscript or outline to Paul K. Pagel, N1FB, Senior Assistant Technical Editor, ARRL, 225 Main St, Newington, CT 06111.

QST CONGRATULATES THE 1985 WINNERS OF THE ARRL COVER PLAQUE AWARD:

- Richard Miller, VE3CIE, January
- Fred Williams, February
- E. R. "Chip" Angle, N6CA, March
- Albert Haberstick, WB5FXX, April
- John C. Reed, W6IOJ, May
- Ki Negoro, WA6QJP, June

- Douglas, WB5IRI and Linda Rowlett, NSFST, July
- Grant Zehr, WA9TFB, August
- George Allison, K51J, September
- Donald L. Hilliard, W0PW, October
- Robert E. Cowan, K5QIN and Thomas A. Beery, WD5CAW, November
- Norwood J. "Pat" Patterson, W6RYX, December

I would like to get in touch with...

anyone who has successfully interfaced a Drake Theta-550 RTTY communications terminal with a printer for hard copy. Louis Bean, KV4JC, PO Box 4103, St Croix, USVI 00820.

anyone with a schematic for a tube-type SSB or DSB 160-m transmitter, or for modification of a HT-37 for 160. Bruce Palmer, N1CNM, 18 Oakland St, Saco, ME 04072.

anyone with a manual for 5-element beam made by TET, Model HB35T. George Mateyko, N1BEX, 2027B Hibiscus La, APO San Francisco 96334.

anyone with a schematic or manual for a Swan 508 External VFO that plugs into the back of the Swan 270B Cygnet transceiver. Steve McCallum, K4URX, 3209 Tudor Dr, Lexington, KY 40503.

anyone with schematics for CPI and Fire Bird watt meters. Lester Elliott, KE8BH, 16888 E State Rte 119, Anna, OH 45302.

anyone with a service manual for Galaxy V, serial no. 6602V2288. Chris Jorgensen, W6ILE, 41778 Fremont Blvd, Fremont, CA 94538.

anyone with a schematic for a Mattco Communications frequency counter, Model 745, and a source for the DL748 used in the frequency display. Steve Lutz, KA8TIA, 50467 Baytown, New Baltimore, MI 48047.

anyone with information and construction details for a Swan Hornet TB-3H antenna, especially information about trap assemblies. Charles Chandler, W4HFO, PO Box 442, Ashland, MS 38603.

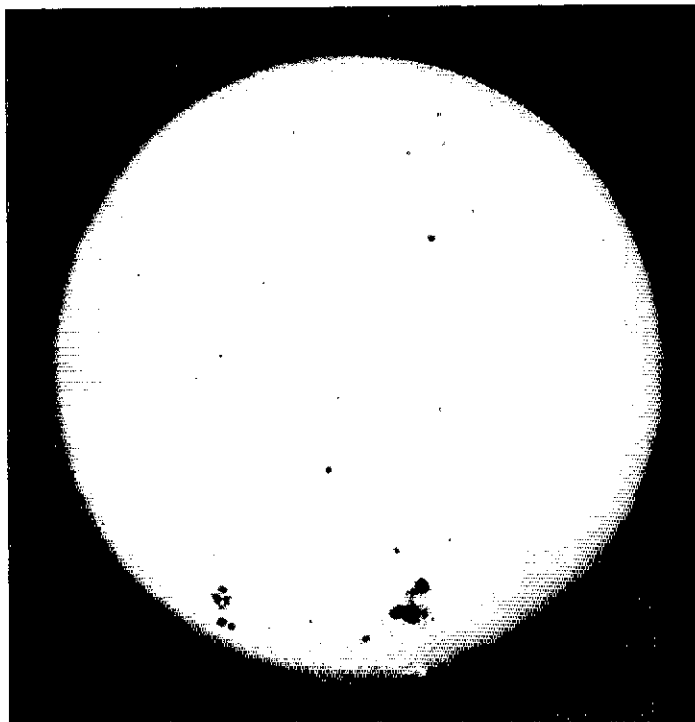
W2GND, SILENT KEY

Harry Harchar, W2GND, a life-long advocate of Scouting and Amateur Radio, has become a Silent Key. A retired editor of *Boys Life*, Harry was deeply involved in international Scouting and a prime mover in the Scouts on Stamps effort. For years he was the trustee of the BSA Headquarters Amateur Radio station, K2BSA, when their national HQ was located in New Jersey. Over the years, Harry also served on or managed the Amateur Radio staffs of countless national Scout Jamborees, and was the US Coordinator of Scouting's annual Jamboree on the Air.

Spots Before Your Eyes

Where are we in the sunspot cycle? Will HF propagation conditions get worse before they get better?

By Jerry Hall, K1TD
Associate Technical Editor, ARRL



On 75 meters not long ago, I overheard a brief discussion about the present condition of our high frequency (HF) amateur bands. One of the fellows, obviously a relative newcomer to Amateur Radio, was lamenting that his radio might as well not have 10- and 15-meter bandswitch positions. There were never any good signals on those bands, he complained. The second fellow then explained that propagation conditions on those bands go from good to bad and back to good, in 11-year cycles. The conditions follow the 11-year sunspot cycle, he was saying. The first fellow then asked the obvious question, "When will conditions get good again?" The answer he received was, "Sometime in the 1990s." He replied, "Not 'til then, huh?" and changed the topic of conversation.

It is true that radio propagation via the ionosphere is related to solar activity. And since telescopic observations were begun in 1750, our traditional measure of solar activity has been based on a count of sunspots. Over these 236 years, we have learned that the average number of spots does go up and down in a cycle very roughly approximating a sine wave. The duration of a period in this cycle varies from 7.3 to 17.1 years, but averages approximately 10.7 years—the reason we tend to refer to the "11-year" cycle.¹ The shaded portion of Fig 1 is a plot of the yearly averages of sunspot numbers in the 20th Century.

We have also learned that during years of high sunspot activity, the ionosphere becomes more intensely ionized during daylight hours. This lets us make use of

radio frequencies in the upper end of the HF spectrum. Twenty meters is open to *somewhere* 24 hours a day. The 15-meter band is open from before sunrise to after sunset, and sometimes remains open throughout the night. The 10-meter band opens almost every day, just like clockwork, and usually remains open until well after sunset. During the day on 10 meters, it is relatively easy to work someone thousands of miles away with only 5 or 10 watts of transmitter power and a simple antenna—that is, if you can find a frequency free of QRM! And, on occasion, during periods of high sunspot numbers, there may be 6-meter ionospheric openings, making communication possible over distances in excess of 2000 miles at 50 MHz. Indeed, these are exciting times for working the world.

By contrast, in periods of low sunspot numbers, you'll have to move your bandswitch down in frequency by at least one band position to find conditions similar to those of high solar activity.² But even the best of conditions during solar minima are seldom as good as propagation during peak years. The 20-meter band *doesn't* usually stay open all night. Openings on 15 meters occur occasionally, while 10-meter openings are rare, very rare. Signals that do propagate over long distances in the upper HF bands are usually none too strong and are accompanied with noise conditions discouraging to the casual DXer. "Pileup-cracking" generally requires high power and a good antenna. Periods like these sometimes make you wonder if your equipment or your antenna is working as it should. You may

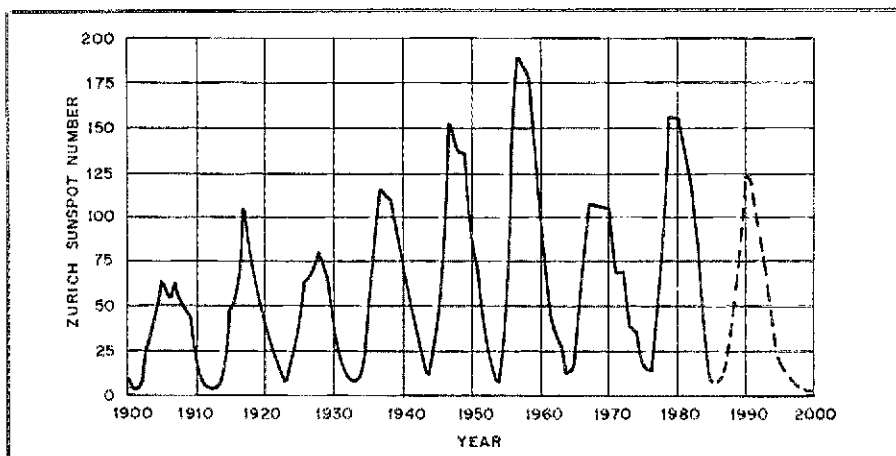


Fig 1—Sunspot numbers during the 20th Century. The shaded curve shows yearly averages, while the broken curve shows where we could be going for the coming Cycle 22.

¹Notes appear on page 35.

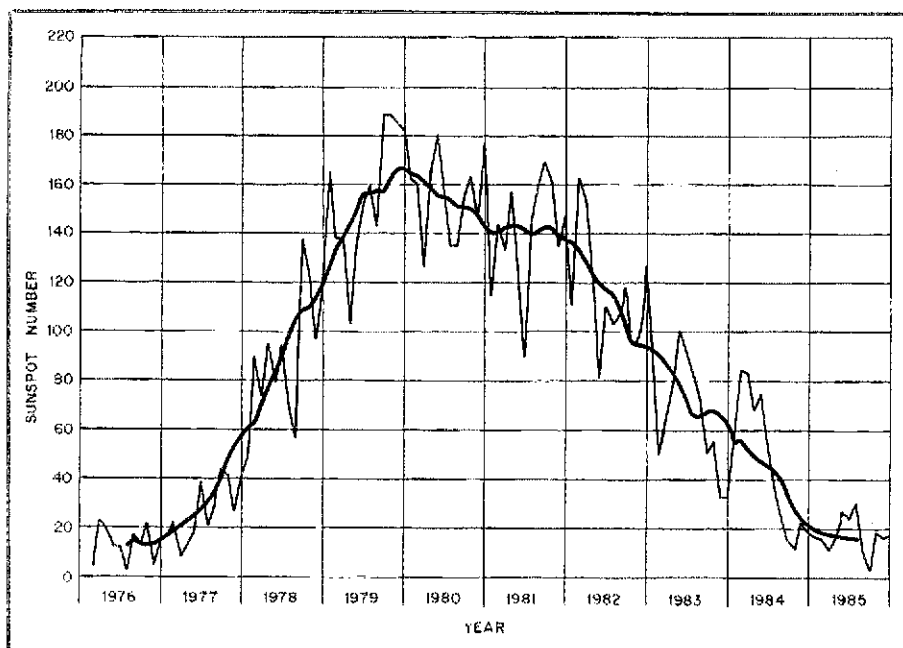


Fig 2—Detail of Cycle 21. The bold line is a plot of 12-month running averages, while the thin line is a plot of monthly averages.

even consider dropping ham radio and taking up stamp collecting. But take heart; things will certainly get better!

Where Are We Going?

I probably don't need to tell you that right now, in mid-1986, we are in a period of low sunspot activity. A look at Fig 1 confirms this statement. The year 1986 and early 1987 are in the low-activity period between Cycle 21 and Cycle 22.³ Where will we go from here? Well, as the gent on 75 meters mentioned, we'll probably be enjoying the next peak in solar activity in the 1990s, perhaps as early as the year 1990. The broken line in Fig 1 shows where we could be headed. If Old Sol follows his typical pattern, we should begin to see an increase in average sunspot numbers about mid-1987, with a peak in late 1990 or early 1991. But we have no precise method of predicting solar activity far in advance. The peak may arrive several months sooner, or two or three years later, than this estimate. How high will the peak be? I can't say—I don't have access to a crystal ball!

Does this mean that we may as well fold up our HF stations until mid-1987 because of the lull in sunspot activity? No. *Emphatically* no! Let's examine the pattern of sunspot numbers a bit more closely. In Fig 2, the bold line gives us a magnified look at Cycle 21, the cycle presently drawing to a close. This is a plot of 12-month running-average data. In other words, the smoothed sunspot number for a given month is an average of data for 6 months each side of the month under consideration.

Most often, plots we see of sunspot numbers are averaged data. Smoothed

numbers make it easier to observe trends and see patterns, but sometimes such data may mislead us. We tend to infer that solar activity varies smoothly—that, for instance, at the onset of a new cycle, the activity just gradually increases. Not so! If you have the equipment to observe sunspots visually, you know that there can be drastic changes from week to week and from month to month. Other methods of observation, such as measurement of the solar flux, indicate that there may be drastic changes over a period of just a few hours.⁴

To illustrate this point, I've added a plot of monthly sunspot-number averages to Fig 2 (the thin line). Each plot point represents an average of data for one month. Just look at all those month-to-month excursions above and below the bold line! Records show the *smoothed* sunspot maximum for Cycle 21 to be in December 1979, with a value of 164.5. But take a look at Fig 2. For three months in succession, the average each month was much higher than 164.5—*above 182* for October, November and December 1979. On some days of these months, the activity level exceeded the equivalent sunspot number of 200. May and December 1980 also exceeded the smoothed maximum, as did September 1981—21 months after the smoothed peak had passed. So, you see, the averaged curve doesn't tell the whole story.

Fig 2 shows similar excursions—perhaps not quite so drastic—during periods of low solar activity. So, while it may be true that the next peak of activity won't occur until the 1990s, keep your HF station ready to go. Quite possibly, sudden brief openings will occur on 10 meters in 1986 and 1987.

Or 15 meters may really come alive for several days in succession, out of the blue. Yes, this *can* happen while we're waiting out this period of "no sunspot activity."

Notes

¹T. J. Cohen and P. R. Lintz, "The Sunspot Cycle, Analysis and Prediction," *CQ*, Mar 1974, pp 24-28.

²The WARC bands are excluded in this broad statement.

³A sunspot cycle is the interval from one period of low activity to the next. Cycle 1, the first complete cycle to be observed, began in 1755.

⁴See E. P. Tilton, "Propagation—Past and Prospects," *QST*, Aug 1979, pp 24-27.

Strays



I would like to get in touch with...

anyone with a manual or schematic for a Drake 2-B communications receiver. Robert Register, WD4CMJ, 46 Ripley St, Newport News, VA 23603.

anyone with information on connecting an Apple IIe and an MFJ interface, Model 1229. Weston Strauch, W7VBX, 2238 Lake Oaks Pkwy, New Orleans, LA 70122.



QEX: The ARRL Experimenters' Exchange

Calling all experimenters! Do you want the latest on high-level technical developments taking place in Amateur Radio? *QEX* will bridge this gap if you are interested in playing a role to extend the technical frontiers of Amateur Radio.

The April issue includes articles on:

- "ACSSB in Amateur Radio," by Paul Rinaldo, W4RI

- "A Coax/Trap TI-99/4A Program in BASIC," by John S. Davis, WB4KOH

- "The CAD Experience," by Courtney Duncan, N5BF

- "No-Modification HF Packet with the TAPR TNC 1 or Heath HD-4040," by John W. Gregory, W4QF

Other features include: a look at transistor packaging; the law regarding patents and trademarks; new products and club-sponsored projects.

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

A HOME-BUILT SPEAKER MICROPHONE FOR YOUR HAND-HELD TRANSCEIVER

□ When operating a hand-held transceiver in a vehicle continuously for an extended time, I found its weight a bit burdensome. An attempt to buy an accessory speaker microphone for my Kenwood TR-2400 failed (they are evidently no longer available). So tin snips, soldering gun and hacksaw were taken in hand and a unit was "homebrewed" at a cost of about \$5 (see Figs 1 and 2). The case, plug housing and bale are made of scrap metal that I found in my shack. While my speaker microphone was made specifically for the TR-2400, slight changes (connectors, placement and wiring) would adapt it to other hand-held transceivers.

Begin by cutting a metal strip (about 0.022 inches thick; a piece of rain gutter is about right) that will form the sides of the speaker microphone (see Fig 3A). Cut a 3/4-inch-thick wooden pattern for the case (a full-scale case outline appears in Fig 3). Position the center of the metal strip at the top of the pattern and form the metal side piece around the block. After bending the strip, locate the center of the bottom and trim both ends so that they meet squarely in the center. Remove the pattern and close the joint by sweat soldering an 11/16-inch by 1-inch-long piece of lightweight tin (that used for fruit cans will do) across the inside. Place one edge of this piece even with one edge of the side piece. This edge will be placed against the case front so that the case back can fit inside the side piece and flush with it.

Trace around the outside face of the side piece onto a piece of sheet metal (the same thickness, or a bit heavier than the side piece) that will become the case front. Cut the case front just a bit larger (about 1/64 inch all around) than the side piece. Mark a vertical centerline on the case front. Make a 1-11/16-inch-diameter hole in the case front (to accommodate a 2-inch speaker). Locate the hole on the centerline, with the top edge of the opening 1/4 inch from the top of the case. Make a 3/8-inch hole for the microphone on the case centerline with its top edge 3/8 inch below the speaker opening.

Bore three clearance holes for no. 4-40 machine screws around the speaker opening (as shown in the photos). The hole between the speaker and microphone serves two purposes: It holds the speaker in place and supports the circuit board (Fig 3B).

Lay the case front on top of the wood block previously used for forming the side piece, place the side piece on top of the case front and a wood strip across the side piece. Clamp the assembly together and solder a bead around the inside of the front/side joint. Grind or file away the protruding 1/64 inch of the case front to make a smooth front/side joint.

Cut four 1/2-inch-long pieces of 1/4-inch brass or steel rod and solder them in the corners of the case (see Fig 2). The rods should be recessed from the back edge of the side piece by an amount equal to the thickness of the case back. Lay the case on a piece of

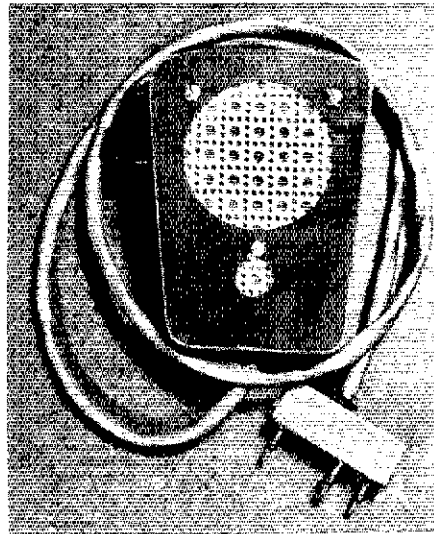


Fig 1—A front view of W7KLE's speaker microphone.

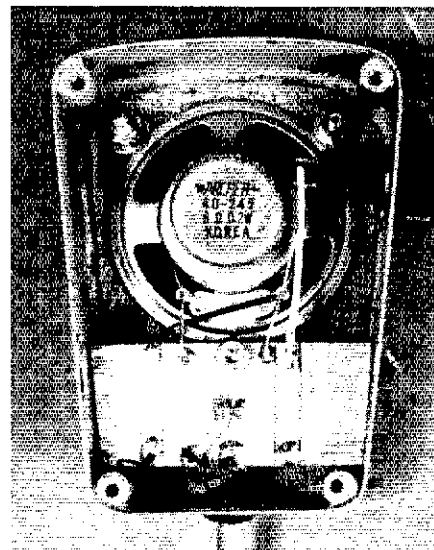


Fig 2—A rear view of the speaker microphone with the case back removed. Notice the 1/4-inch metal rods in the corners and the screw at the bottom of the speaker that secures both the speaker and circuit board.

metal, face upward, and trace around the inside using the speaker opening for access; carefully mark around the rods. Cut out the case back and trim it to fit inside the case with the four corners resting on the rods. Mark the center of the rods on the case back. Drill through the case back and into the rods with a no. 43 or no. 44 bit. Remove the case back and tap the holes in the rods for no. 4-40 machine screws. Enlarge the holes in the case back to clear the screws. Drill a 5/16-inch-diameter hole in the bottom of the case for a rubber grommet. Make a 3/8-inch-diameter hole for the PTT switch one inch from the top of the case, on the centerline of the side piece.

A piece of perforated sheet metal or wire screen provides physical protection for the speaker and microphone. Cut the screen to fit inside the case and glue a piece of thin cloth over it (to provide dust protection; see Fig 3B). Keep the glue away from the speaker and microphone openings.

Three no. 4-40 nuts are used as spacers to mount the speaker. Enlarge the holes to clear the bolts, and file down one side to clear the speaker cone. Mount the speaker with no. 4-40 x 3/4-inch panhead machine screws, spacers (filed side toward the speaker), flat washers and nuts (see Fig 3B).

Cut a 7/8-inch-wide piece of single-sided circuit board to fit into the bottom end of the case (see Fig 2). Prepare the board by removing the foil as shown in Fig 3C. The design is so simple that foil can be removed with a penknife or hand tool rather than etching. Make a clearance hole for a no. 4-40 screw at the top center of the board.

The outline of a hanging bale, which may be useful in some vehicles, is shown in Fig 3. The holes at the bale tips are clearance holes for the no. 4-40 screws that secure the top of the case back. Use the case back as a template when drilling the bale.

The most critical part of the speaker microphone is the plug box, which must mate accurately with the hand-held transceiver connectors. Begin by making a pattern of the holes: Cut a strip of paper to fit over the SPKR, PTT and MIC jacks of the hand-held transceiver and carefully puncture it with a wooden pencil at the center of each opening; be forceful enough to clearly define the edges of the holes. Make a small sheet-metal box in which to mount the plugs (Fig 3D). Cut the paper strip to fit inside the box, with the holes centered.

Carefully mark the center of each hole with a punch. The axis of the plugs must be perpendicular to the bottom of the box; use a drill press or drill guide if possible. First, drill a small pilot hole through each mark in the plug box and into a block of wood. (The block will be used as a jig to hold the plugs securely while soldering them to the box.) Remove the wood block and enlarge the holes in the plug box to fit the connectors (Fig 3E). The finished size of the holes in my plug box was large enough to position the SPKR and PTT plugs flush with the plug-box face, but to pass only the ring of the MIC plug. [Alternatively, you could drill and tap each hole to accept the appropriate plug.—Ed.]

Enlarge the pilot holes in the wooden block to snugly fit the three plug shafts. Place the large MIC plug through the appropriate hole in the bottom of the plug box and into its hole in the wood block. Do the same with the SPKR and PTT connectors; run a bead of solder between the plug box and each of the three plugs (see Fig 3E). Clip the ground terminals from the plugs; the shield of the audio cable will be soldered to the box.

Make a plug-cover box (1/2 inch deep) that fits snugly over the plug box and make a bead of solder on the four inside corners. (The plug-cover dimensions are not shown because they will change with the thickness of metal

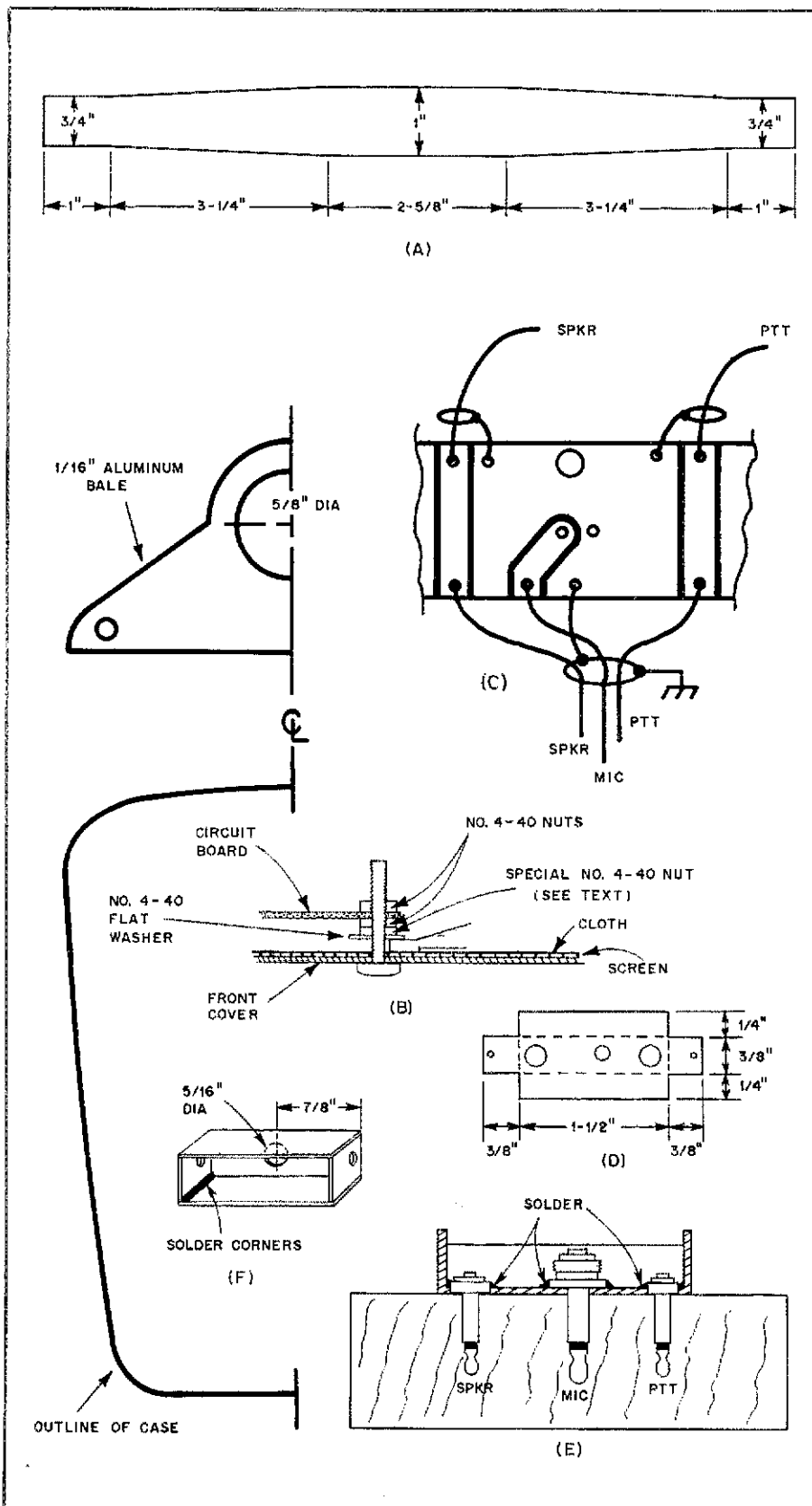


Fig 3—Mechanical details of W7KLE's speaker microphone. To make templates for the bale and case, trace the outlines near the left edge of a sheet of paper, fold the paper along the center line and cut along the traced outlines. The dimensions of the speaker-microphone side piece are shown at A. B shows the hardware used to mount the circuit board, speaker, grill and cloth to the case. A full-scale drawing of the circuit board is shown at C; heavy lines indicate areas where the copper plating is removed. D is a pattern for the plug box; it is not full size. Size the holes to mount the connectors as shown in the plug-box cross section at E. The small holes in the box ends are for no. 2 screws; position the holes to prevent the screws from contacting the connectors inside the box. F shows the completed plug-cover box with clearance holes for the screws that attach it to the plug box. A parts list is shown in Table 1.

Table 1
Parts List

- 1—8-ohm speaker (Radio Shack 40-245)
- 2—2.5-mm phone plugs (Radio Shack 274-289)
- 1—1/8-in phone plug (Radio Shack 274-286)
- 1—SPST momentary-contact switch (Radio Shack 275-1566)
- 1—Electret microphone element (Radio Shack 270-090)

used for the plug box.) Chamfer the outside corners of the plug box to clear the solder beads in the plug cover. Drill a 5/16-inch-diameter hole in the top of the plug cover, 7/8 inch from one end (see Fig 3F), to receive a rubber grommet. (This placement assures that the cable is not immediately opposite a plug.) Fasten the cover to the plug box with no. 2 screws.

Finish the speaker microphone as you wish. I used a shade of gray spray paint that is common on electronic equipment. The metal for the case front and back, however, was already covered with a brown wood-grain material that makes a nice trim.

After finishing the case and plug assembly, install grommets at the case bottom and plug cover. Mount the microphone element on the unplated side of the circuit board (over the hole in the face of the box), with one lead to the MIC trace and one to the circuit-board ground area. Fig 3C shows details of the circuit board and connections.

Here are a few final tips: Thoroughly clean all metal parts before soldering; a little work with fine sandpaper ensures good solder flow and neat joints. Skin oil and cutting oil leave a residue that can ruin a paint job. Clean metal parts by wiping them with lacquer thinner or paint thinner before painting.

Operation with the speaker microphone is quite satisfactory.—*Floyd Passmore, W7KLE, Beaverton, Oregon*

RADIAL TIPS

□ Some time ago, I forgot the exact location of my 160-meter radials (there are only seven). They were buried only a couple of inches deep, but after hours of probing, I decided there must be a better way to find them. Here is how I did it

Lay a small, battery-operated broadcast radio on the ground. Tune in a broadcast station and then rotate the radio to find the orientation that provides minimum signal strength. Maintain that orientation and slide the radio back and forth across the approximate location of a buried wire. When the radio crosses the wire, the pattern of the radio antenna is disturbed and the broadcast station can be heard more loudly.

This technique also works to locate other shallowly buried conductors, such as metal chunks and pipe. Try the technique with different broadcast stations to see which station provides the best indication. The procedure is less effective when you are near a break in the metal.

Incidentally, I used aluminum wire for four of the radials, and all four failed. Although most of the wire was in good condition, areas of the aluminum were badly corroded. The wires had been buried only one year.—*C. H. "Robby" Robbins, W4UOW, Charlotte, North Carolina*

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

MHO, MHO, TELL US MHO!

□ I've just read Bob Schetgen's article, "Simple Conversion of Complex Networks." After digesting the article, I finally came to the realization that all one needs to know in order to be able to solve the problem discussed in the article is how to take reciprocals of complex numbers. The use of trigonometry is unnecessary, as are all the other terms in the article's glossary, except j (which, incidentally, is used in engineering, not mathematical, notation; mathematicians use i).

To solve the series-to-parallel conversion problem, you have to know that you should "reverse" the typical parallel-resistor reciprocal-of-the-sum-of-reciprocals calculation. To convert Bob's example, proceed as follows.

$$\text{Given } X_C = \frac{1}{2\pi fC} \quad (\text{Eq 1})$$

write the series circuit as $2000 - j636.9$. Then take the reciprocal of this complex number and simplify it by multiplying it by 1, disguised as a conveniently chosen fraction.

$$\begin{aligned} \frac{1}{2000 - j636.9} &\times \frac{2000 + j636.9}{2000 + j636.9} \\ &= \frac{2000 + j636.9}{(2000)^2 + j(636.9)^2} \\ &= \frac{2000}{4,405,642} + j \frac{636.9}{4,405,642} \quad (\text{Eq 2}) \\ &= 0.000454 + j0.000145 \end{aligned}$$

The convenient fraction is chosen by changing the sign preceding the j in the denominator of the first fraction. The multiplication in the denominator uses the basic algebraic relationship

$$(a + b)(a - b) = (a^2 - b^2) \quad (\text{Eq 3})$$

and the definition $j^2 = -1$.

Now, take separate reciprocals of each of the two components of this intermediate calculation to get the final answers.

$$R_p = \frac{1}{0.000454} = 2202.8 \quad (\text{Eq 4})$$

$$\begin{aligned} X_p &= \frac{1}{j0.000145} \\ &= \frac{1}{j0.000145} \times \frac{-j0.000145}{-j0.000145} \\ &= \frac{-j0.000145}{(0.000145)^2} = \frac{-j}{0.000145} \\ &= -j6917.3 \end{aligned}$$

X_p can then be converted to C_p via this basic relation, just as Bob does in his article.

The simple algebraic manipulation used here is called "rationalizing the denominator." Why bother with trigonometry? Bring back the mho!—Paul Kirley, W8TM, 8 Candlelight Dr, Apt 6, Springfield, IL 62704

REMOTE CONTROLLERS REVISITED

□ The following information might be of value to anyone contemplating use of the BSR X-10 system.^{2,3} I have been using such a system for several years and although I know that neighborhood interference problems are possible, I have not experienced any. I have, however, observed several instances of spontaneous operation resulting from fleeting power-line interruptions and strong electrical storms. The problem created by the electrical storms was eliminated after installing a lightning protector/surge arrester (GE TLP175) at the power-line entrance box. I haven't tried it yet, but I believe that one could use a battery back-up and/or larger filter capacitor as I have done with older electronic clocks, to counteract the power interruptions.

Another problem did arise initially, one related to using the "wrong" half of the 234-V line. I found that the switch modules would work in some rooms of the house and not in others. This turned out to be a result of the house wiring being split between the two hot sides of the line, and without any 234-V appliances being in operation, there is apparently inadequate coupling for the control signal at the pole transformer. The solution to this problem was to install a 0.1- μ F, 1400-V capacitor across the two hot wires at the circuit-breaker box. [Caution! Before installing such a device, make sure the power to the circuit-breaker box is disconnected.] The voltage rating of the capacitor should not be less than 1400 V. [Aerovox AC-7, Centralab CI-103 and Sprague 125L-S10 capacitors or equivalents are recommended—Ed.]

For those wishing to purchase BSR X-10 components, I suggest trying Advance Electronics, 26 West 46th St, New York, NY 10036, tel 800-223-0474. They carry the complete line at attractive prices.—Marty Kleinfeld, K1FHR, 26 Evergreen Dr, Woodbridge, CT 06525

T FOR TAU

□ It seems to me that something that has been missing in electronics is an easy method for a circuit designer to calculate the voltage across a capacitor in a simple RC charging

or discharging circuit. We know that for a capacitor being charged through a resistor the time required for the capacitor to acquire 63% of its final voltage—the voltage of the charging source—is equal to the product of the resistance (in ohms) and the capacitance (in farads). That's fine if you want to charge to 63% of the source voltage; but what if you want to charge only to 25% of the source voltage? Likewise, if you are discharging a capacitor through a resistor or resistive load and want to know the voltage remaining on the capacitor after 10 seconds, if the RC product is not equal to 10, you can only guess what the value will be.

Of course, you can go through the equations and derive the correct answer. For most of us, though, the calculation of natural logarithms and powers of epsilon is something with which we either cannot, or would rather not, deal.

Several years ago, my frustration with the tedium of calculating the exponential charging and discharging time constants of simple RC networks led me to develop a simpler method of determining the voltage on the capacitor. The result is the accompanying graph (see Fig 1), which has saved me a considerable amount of time and pencil points. I refer to this creation as the t/τ chart (tee over tau). This graph is a plot of the percentage of charge and discharge of an RC circuit as a function of the ratio of time to the time constant, $R \times C$, or τ (tau).

For example, let's suppose that we have a simple timer using a comparator that is biased to switch when the voltage across a capacitor connected to its input reaches 3 V. The capacitor initially has 0 V across it, and it is to be charged through a resistor connected to a 10-V source. The requirement is to choose values for the resistor and capacitor combination so that the comparator switches at the desired time, t .

The time constant formula we use would provide us with those values that will charge the capacitor to 63% of the charging voltage at time t ; for our application, this would be 6.7 V. To find the value of time constant needed to reach 3 V in t seconds, we would have to play with junk box parts until the right combination is selected or else "hit the math" as follows:

$$V = \frac{V_c}{V_s} = 1 - e^{-\frac{t}{\tau}} \quad (\text{Eq 5})$$

where $\tau = R \times C$

$$1 - \frac{V_c}{V_s} = e^{-\frac{t}{\tau}}$$

$$1 - \frac{3}{10} = e^{-\frac{t}{\tau}} = 0.7$$

$$\ln 0.7 = -\frac{t}{\tau}$$

$$t = 0.35 \tau$$

¹B. Schetgen, "Simple Conversion of Complex Networks," QST, Nov 1985, p 41.

²D. J. Cristel, "Remote Controllers," Technical Correspondence, QST, Feb 1986, p 53.

³R. K. Ewing, "Remote Control of Digital Communications," QST, Sep 1985, p 20.

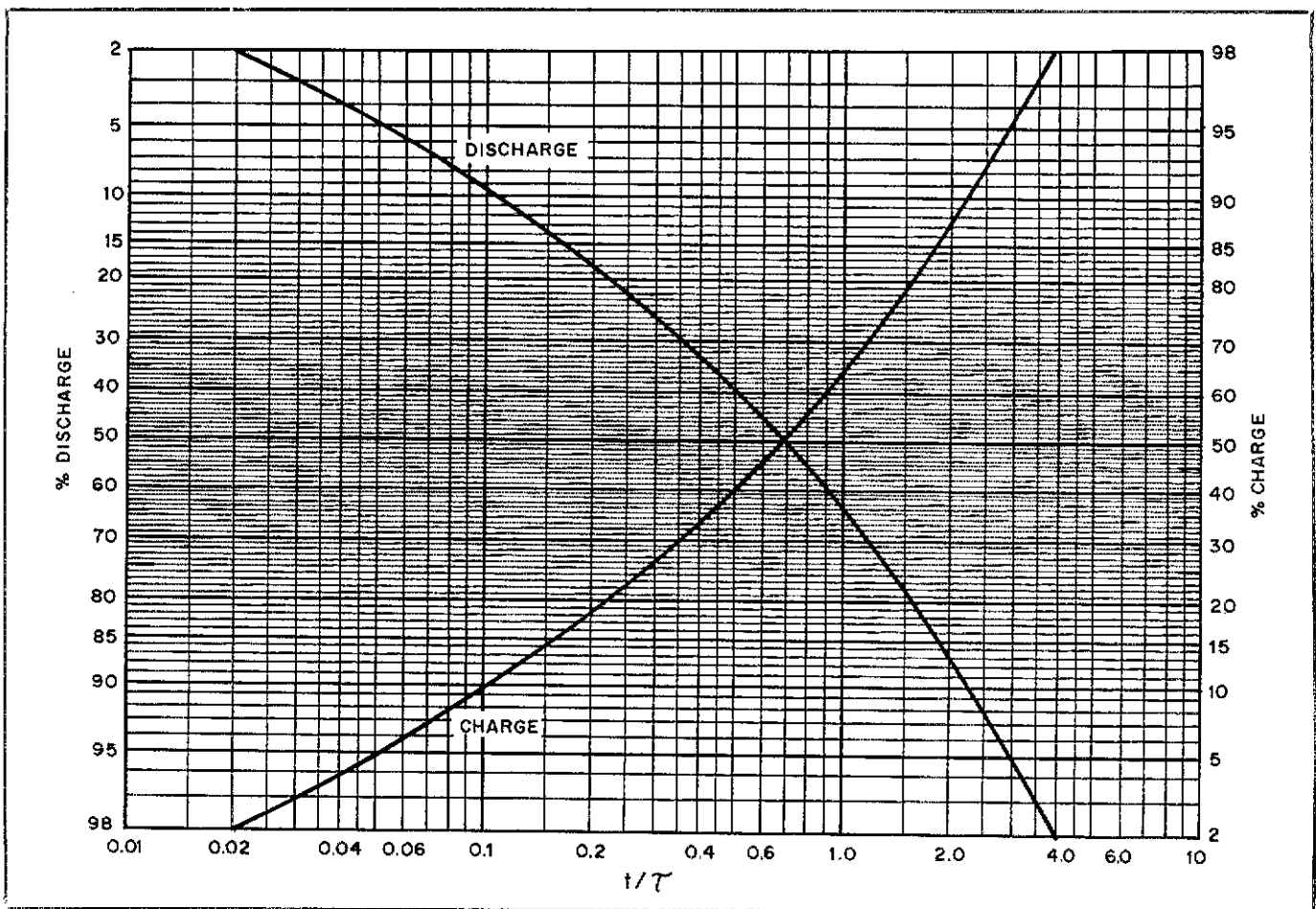


Fig 1—Charge/discharge time-constant chart.

Obviously, this would be a real pain to do repeatedly!

The problem can be solved easily by using the chart, so let's see how the chart works. Two curves are given: one for charging, and one for discharging capacitors. The ordinate (Y axis) is the percent of charge attained during charging, or the percent of charge of voltage remaining during discharge. The abscissa (X axis) is the ratio of expired time to the time constant of the RC combination. To see how the chart works, let's follow the CHARGE curve.

At some time ($t = 0$), voltage is applied through a resistor (R) to charge a capacitor (C). If we follow the X axis to the point where the time is equal to one-tenth of the time constant of the RC pair, and follow the 0.1 line up to the CHARGE curve, we find that the percent of charge is about 9.5% of the charging source voltage. When $t = 1$, the CHARGE curve indicates that the charge on the capacitor is 63% of the source voltage. A voltage of 98% of the source will exist on the capacitor when a time equal to four times the RC product has elapsed, and so on.

The DISCHARGE curve works in the same way, except that the capacitor is initially charged and at time = 0, the capacitor begins to discharge through resistor R. At a time equal to four time constants, only 2% of the initial voltage remains on the capacitor.

To see how this chart can simplify our timer

problem, we first calculate the percentage of final charge voltage on the capacitor. Since we want 3 V, and the charging voltage is 10 V, this gives a value of 30%. If we follow the Y axis up to the 30% value and follow the 30% line over to the CHARGE curve, we find that it intersects at a value of t equal to about 0.35. This means that we will reach 3 V at a time of 0.35 times any time constant we choose for our RC combination. Since we know that we want our timer to trip at time t , the time constant that we must use is going to be $t/0.35$ or $2.85 \times t$. For example, if t equals 10 seconds, the RC product is 28.5.

With practice, use of the chart will become almost second nature. Users of the popular 555 timers will benefit especially by using it to design circuits such as one-shots and pulse generators.—Ken Stuart, W3VFN, ARRL TA, 48 Johnson Rd, Pasadena, MD 21122

CABLE TVI

□ Our amateur group took a much simpler approach to the problem of CATVI measurements than those outlined in QST.⁴ The Chautauqua County-wide Repeater

Association maintains a repeater with an output frequency of 145.29 MHz, which is 40 kHz above the video carrier of cable Channel 18 (Channel E). As a result of complaints from the Chautauqua County-wide Repeater Association, located in Western New York state, two cable-television operators voluntarily eliminated RF signal egress. A third company, however, was forced by the New York State Commission on Cable Television to take appropriate steps to resolve the complaint. Leakage from this CATV plant was so severe that the only alternative, short of discontinuance of service, was to begin a massive rebuild of the entire distribution system.

Included with the complaints lodged by the amateur group were maps pinpointing portions of the leaky plant. The worst system leakage resulted in measurements ranging from $24 \mu\text{V}/\text{m}$ to over $4575 \mu\text{V}/\text{m}$! A total of 113 illegal leaks were located within a small part of that system. The cable operator denied any leaks and informed the repeater group, "... we have no signal leakage that would exceed the FCC regulations."

For copies of the complaint letters and information on how leakage-level measurements were made, send \$1 to cover postage to the Chautauqua County-wide Repeater Association, PO Box 186, Westfield, NY 14787-0816.—Charles L. Kelsey, WB2EDV, 15 Blanchard St, Mayville, NY 14757 [57]

⁴G. Bonaguidé, "CATVI Field-Strength Measurements Made Easy," QST, Feb 1986, p 42.

Getting into Field Day Form

Working your plans into shape for FD 1986? This Kansas City, Missouri club may have just the fitness program you need to make the winner's circle this June 28-29.

By Mike Bellinger, KØJAA
224 East 74th St
Kansas City, MO 64114

At high noon June 21, 1985, Bill, KØVBU, returns to an empty field south of Kansas City prepared to face his annual showdown. Bill, the Field Day chairman for the Heart of America Radio Club, will soon supervise a dozen or so HARC members at the Longview College campus constructing a self-contained Amateur Radio community. During the upcoming weekend, thousands of amateurs in Canada and throughout the US and its territories will join HARC members in the enjoyment of the most popular operating event in Amateur Radio: ARRL Field Day.

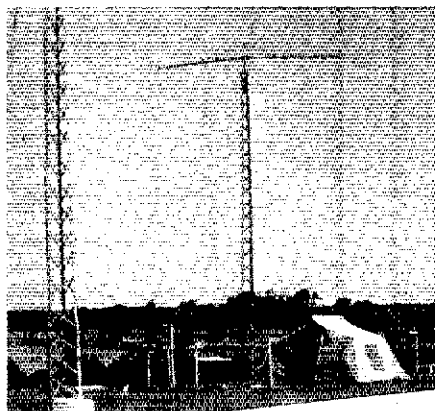
Bill, who wears the same lucky shirt every Field Day, knows no stroke of luck has put the HARC near the top of 2A entries the past six years. This fact hasn't escaped others who have contacted us for our FD secrets. Over the years, HARC has learned from mistakes—our own and those of other FD groups. We wish to share those lessons.

Field Day—Scoring or Social?

Developing your Field Day philosophy is the first step in building a successful FD operation. This ensures that all FD team members know the purpose of their efforts: whether it's "go-for-score" or a social gathering. Iron out disagreements early. Don't lose your ace CW operator to another FD team because they have Dr. Pepper instead of Michelob.

Is Field Day an emergency simulation or a contest? Field Day does have a contest element, and it's really not an emergency simulation exercise in the same sense as the ARRL Simulated Emergency Test. But taken in total, FD is an operating event utilizing the same skills and knowledge required for a successful emergency-communications operation. Organization, planning and execution are key elements in a high-scoring Field Day operation. This article touches on these three elements.

The HARC Field Day philosophy might distinguish it from other FD groups. HARC has a winning spirit. We set a goal of attaining the top score in Class 2A. Though we took many years to get there, we held on to our dreams. Each FD group should formulate its own goal. That may be a certain score, earning a higher score than some



Members of the Heart of America Radio Club chose a spot on the Longview Community College campus as its Field Day '85 site. Two deciding factors were its easy access and public-relations potential. (NØCLV photo)

other club, or earning bonus points in a new category. By building year upon year, your team will eventually earn FD scores once thought unattainable.

Field Day offers exciting opportunities for every ham, regardless of interest. Novice and Technician licensees can manage and operate their own Novice station. Contest operators who normally operate by themselves can collectively scratch their contesting itch. Computer hobbyists now have their very own FD mode—packet radio. You could also have a blind date with your next Amateur Radio love: RTTY or satellite communications, for instance.

In addition to providing operating opportunities, Field Day is a social occasion. Some sort of bonding occurs between hams who spend 24 hours together. It may be because of being united for a time in a common effort or the friendliness of the camping and cookout atmosphere. Whatever it is, the same social environment doesn't exist at any other ham gathering. Many hams have made good friends as a result of their FD participation.

Organize from the Top

The organization, planning and execution necessary for a high-scoring Field Day effort depends on an understanding of the FD

scoring scheme. The summation of bonus points and QSO points yields total FD score. Collecting bonus points is much like participating in a scavenger hunt. Earning QSO points is similar to racing in the 24-hour LeMans race and having the option of starting from a parked position (set up after 1800 UTC) or a flying start (set up before 1800 UTC).

Your first organizational task is to select a Field Day chairperson. This person sees that all the work gets done, but doesn't do all the work alone. Since QSO points constitute the bulk of the total FD score, HARC usually selects a contester for FD chairperson. A good chairperson is friendly and respected, and relates well with all team members. A good organizer, he or she heads off problems before they occur and leads by example.

Each HARC Field Day station has a station captain responsible for its operation. Our primary stations are CW, SSB/CW and Novice. The station captains procure the hardware for his or her station, using the entire club as a resource.

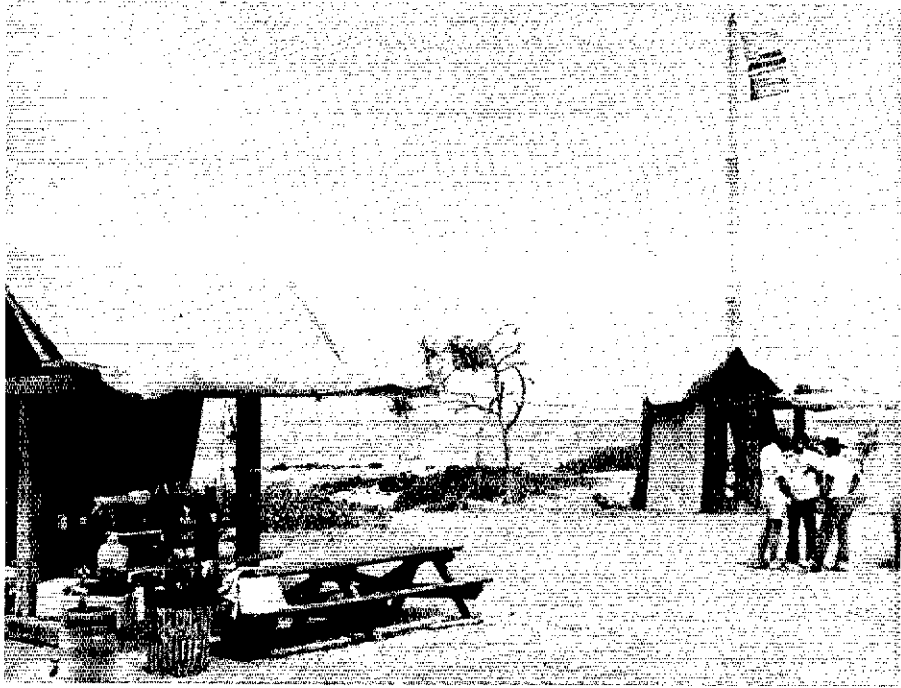
Also, the HARC Field Day chairperson appoints a person responsible for each bonus point category on the basis of the person's interests. A person may be responsible for more than one bonus-point category.

Read the Rules

Before the Field Day committee gets into any detailed planning, each committee member must thoroughly understand the FD rules. Without this understanding, some FD groups tend to comply with restrictions not actually in the FD rules.

For example, some Field Day groups probably think they must copy the WIAW FD bulletin directly from WIAW during the FD period. Rules don't require it. You can copy the message *before* FD starts, during the special bulletin transmission listed with the FD rules. The bulletin can first be copied by another ham and then copied on a relay. The rules don't specifically state the message must be received at the FD site, must be received during the FD period or that an HF station must be taken off the air to copy it.

When reading Field Day rules, look for words such as "shall," "will," "may not"



Anticipating weather conditions is an important factor. During FD '83, at Kauai, Hawaii, KH6LG members wind- and rain-proofed their CW (left) and phone shacks with plywood sheets and tarpaulins. Of course, the location didn't hurt.

and "must." Such words are restrictive and don't allow latitude for interpretation or creative application. Rules with the word "should" contain a strong suggestion to be followed if possible.

Planning Meetings

After the Field Day chairperson appoints a committee of station captains and bonus-point managers, actual planning begins. HARC usually has its first Field Day committee meeting in April and a second in May. At the June HARC meeting, we usually tie loose ends regarding hardware procurement and conduct any necessary training. The more experienced the FD team, the smoother planning progresses.

Choose Your Field Day Site

Selecting the Field Day site is your first logical planning step. Pick a site reasonably close to where your FD participants live. The ease of finding and getting to the site will influence participation and possible on-location media coverage, particularly in bad weather.

Consider proximity of the site to rest-rooms and food, if not provided at the site. Some sites offer usable shelter; others require providing your own. Consider proximity to sources of emergency parts. Also consider space for station separation. Stay away from relatively low locations if using low-angle or line-of-sight dependent antennas. In any case, avoid electrical noise. Prospect for a good radio location by listening to a distant and weak broadcast station on a car radio.

Obtain early permission for use of the Field Day site. If use of the FD site involves

a time restriction, allow ample time to set up and tear down.

Time for Setup

Field Day rules permit setting up before the FD period or after 1800 UTC. Field Day results show that the majority of top teams in 2A set up ahead of time. This allows time for on-site equipment testing and familiarization before FD begins. After 1800 UTC Sunday, activity decreases as stations complete their 24 hours of operation. FD teams setting up ahead do most, if not all, of their operating during "prime time." Consider the local time zone in your setup decision. If a team on Eastern Daylight Time operates until 2100 UTC, they end at 5 PM local time and still have to dismantle.

If your Field Day group decides to set up after 1800 UTC, put all effort into getting your first station on the air. Getting all the stations on the air simultaneously gains nothing. Some groups get their first station on the air with a "quick-and-dirty" antenna and subsequently erect a more elaborate antenna system. Meanwhile, they have a station on the air making contacts. Setting up after 1800 UTC can net extra operating time, but operators must make QSOs fast enough to make up the ground lost in their later start.

Transmitter Class

Whether your Field Day team operates 24 hours or longer, use no more than the maximum number of transmitters that can be fully utilized over the entire Field Day period. The top competitors in class will fully utilize all their transmitters. If a club in the three-transmitter class last year operated

one station 21 hours, operated another 10 hours and another 5 hours for a total of 36 transmitter-hours, then that club should consider being in the one-or two-transmitter class this year. Note, however, that the rules don't allow a Novice station in Class 1A.

The number of operator-hours available usually limits how many transmitters a Field Day team can support. You may have to schedule operators to ensure full utilization of all transmitters over the FD period. Some FD groups intentionally plan for extra transmitters so everyone can operate when they wish. HARC uses a "swing station" (explained later) to fill this objective. Space available at the FD site can limit your number of transmitters. Individual stations and their antennas need sufficient separation to minimize interstation interference.

Choose Your Rigs

HARC has found simple and familiar HF rigs preferable to more complicated state-of-the-art rigs. Most operators can operate a simple rig effectively. A complicated and unfamiliar rig, improperly operated, can result in lost contacts. All station accessories should be simple enough to allow any potential operator to use the station.

Check out all rigs before Field Day to ensure that they operate properly. Have a backup rig available. Command your own FD operation—don't let Murphy take command. When a piece of equipment fails, replace it. Don't spend operating time fixing it.

Some Field Day teams provide a rig for each station. At the other extreme, some clubs require operators to provide their own rigs. Some of these "run what you bring" operations amass so much equipment on one table it looks like a swap table. Changing an operator requires less time than changing both an operator and a rig. The HARC station captains provide or procure one rig for each station plus a backup. Operators may provide their own quickly switched preference items: keyer, key or headphones.

Bands and Modes

The selection of band and mode affects rig and antenna choices. To maximize QSOs, concentrate operation on the most active bands and modes, hence the HF bands, with the exception of 30 meters. Eighty and 40 meters usually carry the bulk of the operating load, with 20 meters doing well for daytime coast-to-coast QSOs. Ten and 15 meters produce the gravy contacts. In mode planning, keep in mind the multiplier for nonvoice contacts. Since the HARC CW station produces the bulk of the QSO points, it gets band preference. The Novice station and the SSB station get second choice. If it doesn't produce interstation interference, the Novice and SSB stations sometimes operate on the same band. Packet and satellite stations offer an advantage worth considering. They earn both bonus and QSO points and don't count

in determining the basic entry classification.

Power Category

Choice of Field Day station power level determines the FD team's power multiplier. You can estimate the effect of various power levels on QSO point production. Multiply your most likely QSO-per-hour rate at a particular power by the power multiplier for that power level to produce a figure representing your expected QSO points per hour.

For example, consider discrete SSB power output levels of 1000 W, 100 W and 10 W producing 100, 60 and 25 QSOs per hour, respectively. At 1000 W, with a power multiplier of 1, operation contributes (100 QSOs \times 1) 100 QSO points per hour. At 100 W, with a multiplier of 2, operation contributes (60 QSOs \times 2) 120 QSO points per hour. At 10 W, with a multiplier of 5, operation contributes (25 QSOs \times 5) 125 QSO points per hour. This example suggests, based on the numbers chosen, that the 10-W level would contribute more QSO points per hour than either of the other two choices.

Operator style can determine the power category of your Field Day entry. A high-power station with a good signal can hold a frequency and productively call CQ. The low-power station generally can't productively call CQ, but must answer the CQs of other stations. If the FD operators' style is to call CQ most of the time, a low-power FD operation wouldn't be productive or enjoyable for those operators.

Available site space could limit the amount of power that can be effectively used. When operating higher power, stations and their antennas must have greater separation to minimize interstation interference.

Also consider resource factors. To operate in the low-power category, stations must be powered by a source other than commercial mains or motor-driven generators. At the other extreme, a 1000-W station would require a power source of at least 2.5 kW. Of course, the QRO operation would need linear amplifiers, while the low-power station might need special power meters or QRP rigs. If a club operates in the high-power category for the first time this year, remember not to apply a kilowatt to the club's trusty TH-3 Jr fed with RG 58.

Note: The power of the highest-power transmitter in use determines the power multiplier. For example, a two-transmitter entry consisting of a kilowatt and QRP transmitter would have a power multiplier of 1. A two-transmitter entry using kilowatt transmitters would also have a power multiplier of 1. Mixing transmitters of different power categories gains nothing multiplier-wise.

Novice Stations

A Novice station can benefit a Field Day operation if the FD team has the equipment and interested Novices/Technicians to operate it. By operating a Novice station,



Z-Z-Z-Z. Don't let operator fatigue get the best of your FD group. Having enough rested operators can keep your operation running continually and effectively.

the Novices/Technicians contribute to the current FD effort while being trained for future FD operations. The Novice station produces QSO points like the rest of the HF stations, but isn't counted in determining basic entry classification. It's a "free station."

Antennas

A winning Field Day operation requires good antennas, although not high or elaborate ones. The relationship between site topography and antenna selection has been mentioned. A relatively high angle of HF radiation is effective for contacting domestic stations. High antennas, therefore, aren't necessary.

Don't plan for antennas more elaborate than you have the willing manpower or time to erect. As with any other piece of FD equipment, check out antennas, towers and rotors before FD. It pays to take time before FD weekend to see if you have all necessary antenna and tower parts, if you don't have a hardware store at the FD site.

Install and test all antennas during daylight, and have backup antennas available. An all-band vertical, constructed and ready to plant, makes a suitable backup. Clubs should consider owning annually used, difficult-to-borrow hardware. Beams, rotors and towers are examples of such items. It's also useful to have items of this sort readily available, in the event of an actual emergency.

Computers

HARC uses a computer for the packet-radio mode during Field Day, but not for AMTOR or RTTY. Relatively low activity on those modes doesn't justify our taking a station off SSB or CW. We also use a computer after Field Day for duping in the preparation of our entry. When operating a computer logging/duping program for the first time during Field Day, use it to parallel a manual system. Rely solely on a computerized system only after comparing it with and finding it superior to the usual

manual system on an actual Field Day.

The Human Factor

Human comfort is an important part of overall Field Day planning. Arrange for shelter and restroom facilities, if not available at the FD site. Decide arrangements for food and drink. Eating isn't only necessary, but a major attraction for some FD participants. Those of us who operate all night really appreciate it. It's an incentive to stay all night at the FD site, as is the bottomless coffee pot. Providing a suitable place to sleep also encourages overnight operators.

Advance Paperwork

Field Day paperwork and documentation require some advanced planning, also. Select a logging-and-duping system simple enough for everyone's use. Some FD groups simplify the system by duping but forgoing logging. Make advance arrangements for bonus point documentation, such as taking photos of your natural-power source and having ARRL message blanks available.

Logistics Support

After you have made all of these fine Field Day plans, what happens if you have forgotten something you need? Rather than dispatch someone from the FD site, we call for help on 2 meters. Standing by are WB0EJJ or W0JZN. Over the years, these gentlemen (who happen to be blind) have saved us countless hours locating items and people, getting messages to our families and handling message traffic. They promote our FD operation on the air and direct ham visitors to our site. Either of these OMs probably spends more hours at the rig than any of our FD operators.

Target QSO Points

Since these provide most of the Field Day points, HARC puts a priority on QSO points. The objective is to contact as many new stations as possible.

The operator is very critical to our success. Experienced contesters operate our stations. Traffic handlers and DXers also have developed operating skills needed to accurately and rapidly make the FD exchanges. We obtain some operators from outside our club. Contest or DX clubs are a possible source of operators.

Use QST as a source of potential Field Day operators, also. Contest results list testers by state or section. The DXCC listing shows DXers by call area. Section News lists active traffic handlers by ARRL Section.

Our operators usually work in teams of two: One operates the rig and keeps the log; the other keeps the dupe sheet. Many of our operators have worked together at Field Day and on contests for years. Prior experience enables the duper to anticipate the operator, and vice versa. This results in tremendous operating efficiency. For instance, if two stations answer our CW CQ, our operator copies the high-pitched signal while the duper copies the lower-pitched signal.

We then work both stations in turn, netting two QSOs on one CQ.

Free operators from unnecessary interruptions. Closely supervise children at the Field Day site. What wouldn't be a safety hazard to an adult may be dangerous to a child. A guide or host should accompany FD visitors. It's good public relations, makes sense as a safety precaution, and prevents operator interruptions.

In some years HARC has provided a "swing station" for the casual operator, thereby allowing high-rate operators uninterrupted use of the main stations. Both the casual operator and the hard-bitten contesters can have their own kind of operating fun at the same FD site. The "swing station" uses a different call from the rest of the FD operation.

Earning Bonus Points

HARC attempts to earn as many Field Day bonus points as possible. We attempt bonus points in every category except message relay. We estimate it consumes at least an hour of SSB operating time to receive, then relay, 100 bonus points (10 messages received and 10 relayed) worth of traffic. To make the same number of points in the medium-power category, the SSB station would have to make 50 QSOs (50 QSOs \times power multiplier of 2 = 100). Since we expect the SSB station would average more than 50 contacts per hour, relaying messages wouldn't use our station's time productively.

During FD, expect different than normal satellite reception. Since transponder power divides among signals using the "bird," the heavier traffic causes received signals to be weaker. One thing that helps us is the ability to switch between right-hand and left-hand circular polarization on both uplink and downlink antennas. Selecting the favored polarization can give a 6-dB improvement over the unfavored sense.

HARC used 2-meter FM packet radio at Field Day 1985. We had some difficulty working the weaker signals, though we were able to digpeat to them. Experiment with weak-signal packet contacts before FD. Make sure to properly adjust your FM rig's deviation and frequency. Our packet-station captain found the beacon mode to be a labor saver. He could leave the station and still monitor its operation on his 2-meter hand-held radio. When he heard our station respond to a call, he would go and make the contact.

The Field Day Publicity kit, available from the ARRL with the FD Entry Package, contains most of the tips needed to earn the PR bonus. FD held at a public place (eg, a shopping center) automatically earns the PR bonus. News/talk-format radio stations have a tremendous appetite for news and will likely air an Amateur Radio item. Don't overlook the hams working for TV and radio stations who can often pull a string to get FD PR. Newspapers (especially the suburban variety), shoppers



Media coverage not only gets your Field Day group some bonus points, it gives Amateur Radio in general some excellent public exposure.



Dave Taylor, KB1B, at FD '84 station K1KKF, paddles his way to extra points on a homemade exerciser with added generators. Dave didn't waste a stroke—he's New England Canoe Champion for 1982-83.

and cable-TV bulletin boards will usually run FD items.

The majority of Field Day stations routinely earn the emergency-power bonus. Motor-driven generators have perennially been the HARC's major power source. Whatever the FD power source, check it out and service it, if necessary, *before* bringing it to the FD site. Have backup power sources (additional generators) in case one fails. Leave the generator operation to the knowledgeable.

For several years HARC has used a small solar panel for natural-power bonus. A \$15 Radio Shack solar panel can sufficiently charge a battery for a 2-meter hand-held radio to accomplish the five required contacts. This simple system always works. We've found that with natural power, as with many other aspects of FD, simpler is better. Whatever the natural-power contrivance, test it before FD. Remember that FD rules state that the natural-power station counts as an additional transmitter.

Entry Paperwork

Sometimes, after all the work is put in, the Field Day team doesn't get recognized

when the FD results appear in *QST*. Proper care with the post-FD paperwork ensures against this. Immediately after FD, reread the rules and take special note of the entry deadline. Use the checklist supplied in the FD Entry Package to organize entry documents. Gather all message forms, logs, pictures, etc, to document bonus points claimed.

Submit a list of stations worked per band/mode (dupe sheet) in legible form. If such a list isn't created during the FD operation, create it at this point. HARC produces this list using a computer duping program that calculates the number of valid QSOs and lists them by call. We input the calls from the logs, not the manual dupe sheets. Mail the completed Field Day entry by Certified Mail requesting return receipt. HARC also includes in the entry envelope a self-addressed, stamped postcard for signing and dating by the checker who receives it.

Collectively reflect on the Field Day experience after completion of the paperwork. Review the results in terms of goals and problems. Obtain suggestions for next year's operation.

From FD to Emergency

The same skills and knowledge needed to achieve a high Field Day score contribute to a successful emergency-communications operation. Proficiency in organization, planning and execution are needed in both cases.

Share leadership responsibility. Assign duties on the basis of existing personal interests to enhance probability of success and to promote continued enthusiasm. Each responsible person must know his job and do it.

Equipment preparation for emergency or Field Day is exactly the same. Test your rigs, antennas and power sources, and make sure they will work when needed. Knowledge gained during Field Day about equipment and what to do when it fails can be applied. If you have to depend on the equipment, you better have a backup.

The operating skills needed for successful emergency communication are the same ones possessed by the better Field Day operators: the ability to operate with brevity and accuracy while subjected to fatigue, physical discomfort, distraction, and QRM and QRN.

Following the Mexico City earthquake, the Kansas City Red Cross had more than 500 welfare inquiries to radio to Mexico City. The inquiries were given to a dozen amateurs to dispatch. Without exception, the ones who got the bulk of the traffic through with the least delay were the experienced traffic handlers and contesters.

Approaching Field Day with the goal of score improvement isn't a frivolous objective. As your FD team's score improves, so does its ability to conduct successful emergency-communications operations.

I wish to acknowledge my wife, Bev, Steve Lufey, KMØL, and John Carroll, KGØY, who helped with this article. □

KORE—The Benefits of ARRL Membership

By Stephen Mendelsohn, WA2DHF
Vice Director, ARRL Hudson Division

Today's Western society is characterized by special-interest groups, each one fighting for prominence and a proper place for its adherents. Nowhere is this more evident than in the high-technology sector, where powerful corporations usually get their way. Amateur Radio is a small part of this world, but our gains have far outweighed predictions. These gains are due to the efforts of the American Radio Relay League, a nonprofit organization devoted entirely to Amateur Radio, which offers its members a wealth of services and support.

Though the ARRL directly employs over 100 people and is composed of a well-orchestrated volunteer force of thousands, some benefits provided by our organization are overlooked. They're often subtle, to be sure, but subtlety does not decrease their importance to Amateur Radio. An acronym that could sum up the League is KORE: Knowledge, Organization, Representation and Evaluation.

In addition to what's mentioned in this article, services include the outgoing QSL Bureau, DXCC program, contest sponsorship, club support, information about overseas licensing and the personal service you get whenever you call or write to ARRL HQ. A huge organization is at your service for the price of only \$25 a year. The immense quality of services to the members puts just about any other service organization to shame.

Some have complained that the cost of membership is excessive. I wonder if you have recently taken someone out for dinner and had a few drinks? One good dinner is equal to the cost of yearly membership. And, as we have seen, the benefits far outweigh the costs. That yearly \$25 can be seen as insurance that the hobby will exist today and in the future.

The ARRL is the KORE of Amateur Radio. If you are not yet a member, how about making 1986 the year that you put the League at the KORE of your hobby. If you are a member, why not tell others about Amateur Radio and the ARRL. ARRL's Membership Program (see page 45) makes it easier—and more profitable—than ever to recruit new members.

[Editor's Note: Remember the Club Challenge for the '80s program. When you get someone to become a new League member, we will send your affiliated club a \$5 commission. Contact the Affiliated Club Program, ARRL HQ, for details.]

Knowledge

With these ARRL publications, members can have a wealth of information at their fingertips.

- *The ARRL Handbook*, one of the standards in the electronics business.
- *The ARRL Antenna Book*, a guide to designing, building and installing just about any type of antenna.
- *The License Manuals*, kept up-to-date with the latest FCC question pools.
- *The Net Directory*, the Yellow Pages of the traffic nets.
- *The Repeater Directory*, a traveler's guide to the world of repeaters.
- *The Satellite Experimenter's Handbook*, a guide to Amateur Radio satellites.
- *QEX*, on the cutting edge of Amateur Radio technology.
- *Gateway*, what's going on in the world of packet radio.

Organization

The League has organized the hobby since its inception. That organization includes:

- National Traffic System (NTS), the major traffic-handling group.
- OSCAR: The ARRL supports AMSAT and provides free orbital schedules.
- Packet Radio: The League organized the five major packet-radio conferences, soliciting papers and laying the groundwork for this newest mode of communications.
- Band Plans: Working with the FCC and band users, the League endorses the use of our bands by frequency, promoting harmony within the service.
- Special Service Clubs (SSC): Affiliated clubs take on a greater role in their communities, and bring Amateur Radio a better public image.
- Amateur Radio Emergency Service (ARES): During emergencies, these groups help local and state governments. The groups are organized and trained by local ARRL officials.
- Volunteer Examiner Coordinator (VEC): The League has a full-time staff devoted to designing exams, training and accrediting Volunteer Examiners, scheduling sessions and mailing material to teams for test sessions.

Representation

Many amateurs read about representation and think they'll never need it. But, like a spare tire, there is security in knowing that it's available. And like a smoke alarm, the League is always there guarding the Amateur Radio Service, whether you think about it or not.

- Washington: Before the FCC and Congress by the League's Washington Area Coordinator, and by various amateurs both in and out of the corridors of power.
- International Amateur Radio Union (IARU): As decisions are made that affect Amateur Radio worldwide, the ARRL represents the interests of American amateurs.
- World Administrative Radio Conferences (WARC): The ARRL represents US amateurs' interests at international frequency-allocation conferences.
- Antenna Cases: The ARRL is primarily responsible for PRB-1, a landmark law that aids amateurs in fighting restrictive local antenna ordinances.

Evaluation

The League provides continuous evaluations throughout the world of Amateur Radio. Examples of this ongoing evaluation process include:

- FCC Proposals: The League's Counsel evaluates proposals in all Communications Services to determine their effect on Amateur Radio. If the proposal merits comment, the ARRL draws up a comprehensive statement.
- Advertising Approvals: The ARRL Staff carefully evaluates new Amateur Radio products before they're accepted for advertising in any League publication.
- Truth in Advertising—If a product, service or statement made in an advertisement is found to be false, the advertiser will be rejected from appearing in QST and other League publications until the problem has been fixed.
- Insurance Programs: If you have ever hassled with an insurance company, you know how hard it is to get coverage. The League's insurance program, covering both individuals and clubs, is one of the finest things to come along in ages. Merely supply a few details and you're covered.

ARRL: A Good Deal and a Good Deal More!

Recruit a member and help your League (and yourself) by participating in the 1986 Membership Referral Program.

Over the years, we've noticed that many of our members join the League because they were recruited by active ARRL members. Radio clubs play an essential role in membership development, and The Club Challenge for the '80s gives clubs both incentives and rewards for getting individuals to join the League. While we want to encourage membership in local ARRL affiliated clubs, we also recognize that this may be impractical for some ARRL members. It's possible that there is no affiliated club within easy driving distance, and some hams just enjoy being part of an informal group. That's where the Membership Referral Program comes in.

If you refer a friend to us who joins the League (regular or senior membership), we will send you a gift certificate worth \$5 toward the purchase of ARRL publications and supplies. There is no restriction on the number of members you may recruit, but they must not have been an ARRL member in the past two years to count.

Referring a Member—It's Easy!

The person making this referral must be a current ARRL member, and will receive a gift certificate worth \$5 for each member recruited in either of the two membership categories described below. The certificate (s) may be used to purchase ARRL publications and supplies directly from League Headquarters. Certificates must be used within six months of the date issued.

This offer may not be combined with club commissions and rebates, including the Club Challenge for the '80s. It does not apply to new Family members or for the special youth rate. This offer is void where prohibited.

Basic Membership Dues, including QST: 1 year, \$25; 2 years, \$47; 3 years, \$65. Amateurs age 65 or over who submit onetime proof of age in the form of a copy of a driver's license or birth certificate may join for 1 year at \$20, 2 years at \$37, 3 years at \$50. Outside the US add \$8 per year for additional mailing cost of QST. For the purposes of this offer, a new member is defined as an individual who has not been a member for at least two years.

Enclosed in this issue of *QST* is a referral card, or just use a facsimile of the card, reproduced below. Don't forget to check out "KORE—The Benefits of ARRL Membership," which appears elsewhere in

this issue. It lists many key selling points of League membership, divided into four categories: Knowledge, Organization, Representation and Evaluation. Good recruiting!

ARRL MEMBERSHIP REFERRAL

Mail to: ARRL, Dept. 86, 225 Main St., Newington, CT 06111



NEW MEMBER
JOINING NOW

Name _____ Call _____

Address _____

City _____ State _____ Zip Code _____

See above for dues rates and other important conditions.

Enclosed is (or charge this amount) \$ _____

1 yr. 2 yr. 3 yr. membership.

Regular rate 65 or older

Payment enclosed VISA Mastercard Am. Express

Acct. # _____ Good from _____ Good to _____ MC Bank # _____

Signature _____

CURRENT MEMBER
MAKING REFERRAL

Name _____ Call _____

Address _____

City _____ State _____ Zip Code _____

5/86

FCC Grants Temporary Waiver for Automatic Retransmission of Third-Party Traffic

On March 14, in response to an ARRL petition for "Extraordinary Relief" in PR Docket 85-105, the FCC temporarily waived its Rules to allow automatic control of packet repeaters above 50 MHz, even while third-party traffic was being relayed. This represented a culmination of an all-out ARRL effort to convince the Commission that these Rules were not in the best interest of the Amateur Radio packet community. The road between the Report and Order in PR Docket 85-105 and the FCC temporary waiver is a somewhat complicated one involving two ARRL petitions to FCC. Let's start at the beginning.

As the readers of this column know from April *QST* (p 46), the FCC acted in PR Docket 85-105 to allow automatic control for digital operation at frequencies of 50 MHz and above. Unfortunately, the Commission continued to require that, if such a station was under automatic control, and third-party traffic was being passed, a control operator must be present to monitor the communications. Thus, as a practical matter, the Commission granted automatic control on the one hand, while adding third-party language that practically prohibited automatic control, since third-party traffic could be passed at any time.

Thus began the ARRL effort to have the Commission reconsider this position. The last week of February was a busy one for the ARRL. On February 24, the ARRL filed a Petition for a Partial Reconsideration of that section of the Docket that precludes operation of Amateur Radio stations under automatic control while transmitting third-party traffic. ARRL stated that this provision, in effect, nullifies any possibility of automatic control of amateur packet repeaters (digi-peaters) or computer-based message systems (CBMSs). This is because there is no sure way of discerning whether the messages are the thoughts of the transmitting station or of some third party, in the case of the digipeater. Thus, while the Commission authorized automatic operation, automatic operation is not legally safe because some other station may send third-party traffic through the digipeater or CBMS at any time. "When a

digital communication station is under automatic control, there is no sure way of discerning whether the messages are the thoughts of the transmitting station or those of some third party." The League concluded that this rulemaking will have a "devastating effect on current packet-radio operations and will inhibit further growth."

On February 27, ARRL President Larry Price, W4RA, Washington Area Coordinator Perry Williams, W1UED, and Executive Vice President Dave Sumner, K1ZZ, visited with the FCC Private Radio Bureau and had separate meetings with staff members of three of the FCC's Commissioners to discuss the League's concerns regarding third-party traffic and packet radio. While the ARRL was not assured of prompt FCC action, FCC staff did express support for packet-radio development during these meetings. As a result of these meetings, the ARRL filed a Petition for Extraordinary Relief the next day.

In this Petition, the ARRL stated that the FCC's Report and Order in PR Docket 85-105 had established an absolute prohibition on the transmission of third-party traffic by amateur stations operating under automatic control. The ARRL stated, "This prohibition threatens to undermine the efforts of more than 14,000 radio amateurs to take the initial steps toward establishment of an amateur packet radio network for the rapid and accurate relaying of messages and other data." The ARRL requested that the Commission temporarily lift the prohibition on third-party traffic being retransmitted by stations under automatic control on frequencies above 50 MHz, using the AX.25 or a compatible protocol until the Commission is able to act on the 19 Petitions for Reconsideration that have been filed.

On March 14, the day the new rules were to go into effect, the Commission granted the ARRL's request for the temporary waiver.

The following is a partial text of this waiver:

(a) The provisions of Sections 97.80(b) and 97.114(b)(4) are waived to permit

amateur stations, retransmitting digital packet radio communications (see Section 97.69) on frequencies 50 MHz and above, using the AX.25 (or compatible) protocol, to be operated under automatic control while retransmitting third-party traffic. See Section 97.3(v).

(b) This waiver applies only to the retransmission of third-party traffic originated at another amateur station which is under local control or remote control. See Section 97.3(m).

(c) When an amateur station is operated under automatic control, devices must be installed and procedures must be implemented which will ensure compliance with the rules when the control operator is not present at the control point of the amateur station. See Section 97.80(a).

(d) This waiver will remain in effect until the Commission takes final action on the petitions for reconsideration filed in PR Docket No. 85-105.

The waiver Order goes on to say:

Control operators of amateur stations capable of monitoring AX.25 packet transmissions must be alert to the increased dependency upon them for monitoring during the period of this waiver. We call upon them to immediately make known to the responsible control operator of a station retransmitting communications under automatic control any misuse of the station so that the control operator can take prompt corrective action.

So packet radio, under these conditions, may continue under automatic control. When will the FCC take action on these petitions for Reconsideration? According to FCC officials, formal action will probably not take place until late summer. Let's hope their final action will permanently change the Rules to avoid the requirement of a control operator while third-party traffic is being passed. The ball is in our court now. It's up to us to make sure that no commercial traffic is inserted in our packet networks. For what the FCC giveth, the FCC could taketh away at a later date.

FCC OKAYS PREEMPTION FOR SATELLITE DISHES

The FCC has released a *Report and Order* in PR Docket 85-87 declaring federal preemption of local regulations of satellite antennas. As with PRB-1, in which FCC declared a limited federal preemption of state and local regulation pertaining to Amateur Radio

antennas, this order ensures that local regulations do not unreasonably interfere with the federal right to construct and use antennas to receive satellite signals. Regulation of transmitting antennas is preempted in the same manner, except that state and local health and safety regulations are not preempted. The text of this *Report and Order*

appears in the *Federal Register* at 51 FR 5519.

FCC TO PUBLISH SUMMARIES IN FEDERAL REGISTER

The FCC has announced that effective immediately it will publish summaries rather than the full texts of Notices of Proposed Rule

Making, rule-making decisions and policy statements in the *Federal Register*. Texts of Reports and Orders will continue to be published in full, as required by federal law. This change is expected to save the Commission nearly \$500,000 annually, and is necessitated by cuts in the FCC's budget by the Gramm-Rudman Act.

BIG ISLAND AMATEUR RADIO CLUB PETITION (RM5361)

The Big Island Amateur Radio Club, of Hilo, Hawaii, has petitioned the FCC to allow Novices and Technicians to operate in the 7050-7075 kHz segment in areas west of 130° west longitude or south of 20° north latitude. This area would include Alaska, Hawaii and the Pacific Islands, as well as the US Virgin Islands and Puerto Rico. The club noted in its petition that the Rules already allow Novice class amateurs to utilize the 7050-7075 kHz segment in Regions 1 and 3, and that the number of potential users would not be significant enough to be a problem to users in the 48 contiguous states.

FCC CITES SWAP AND SHOP NET PARTICIPANTS

A number of amateurs in the Southeastern states have been cited by a Florida FCC monitoring station for participating in so-called "Swap and Shop" nets, which, in the view of the monitoring station, violated 97.112. This section states that "an amateur station shall not be used . . . for communication for material compensation."

The Commission interprets this section as meaning that "amateurs may use their stations from time to time to discuss the availability of a piece of Amateur Radio equipment, but that such activity would be limited to an occasional nature. It's best not to discuss price on the air. Instead, swap phone numbers and finish the dickering off the air" (*The FCC Rule Book*, p 6-10). ARRL discussions with the FCC indicate that the FCC has *not* changed this interpretation, and that the citations were issued without the knowledge or coordination of the PRB in Washington by an individual monitoring officer who interpreted the rule differently.

ILLINOIS TOLL-FREE HOTLINE

Illinois ARRL Section Manager Dave Lattan, WD9EBQ, now has a toll-free "hotline" for Illinois ARRL members. The number is 800-451-2775 (800-IL1-ARRL). The intent of the service is to provide easier communications between ARRL members and the Section leadership. Dave says the hotline is experimental, and continuation will depend on its responsible use. The line has been in use since late February and has been well received.

NEW HQ STAFFERS

New to the ARRL HQ Staff: Karl Muller, W3UBQ, is now the Senior Staff Advisor for Planning and Operations. He recently retired from the Gulf Oil Corporation, Houston. Phil Sager, WB4FDT, is the new Manager of the Regulatory Information Branch. Phil will be writing the League Lines and Happenings

columns in *QST*, and also edits the *ARRL Letter*. Phil is a past Section Manager of Virginia and worked in the former Amateur and Citizens Branch of the FCC in Washington during the mid-1970s. John Hennessey, KJ4KB, is the new Regulatory and Information Branch Assistant. John recently graduated from Wingate College and is from Cheraw, South Carolina. Ed Hare, KA1CV, of Andover, CT, has joined the Technical Department as a lab engineer. Ed has a background in design, testing and prototyping. Scott Gee, WB9RRU, is the new DXCC Assistant. Scott recently graduated from the University of Wisconsin with a degree in International Relations. He is from Rhinelander, Wisconsin.

PRB-1 SUCCESSES

Amateurs in Wooster, Pennsylvania and Tucson, Arizona have successfully opposed tower restrictions proposed in those two communities. In the Tucson area, the Pima County Board of Supervisors passed a zoning ordinance restricting heights and locations of communications towers. A committee of Tucson-area hams was formed to speak for Amateur Radio and to obtain an exemption for amateur towers. As a result of this committee's efforts, Amateur Radio operators obtained an exemption from the zoning ordinance restrictions for all amateur towers 100 feet high or less.

In Wooster, Pennsylvania, after hearing testimony from over a dozen amateurs emphasizing Amateur Radio's importance in times of disaster, the Wayne County Planning Commission voted against a proposed tower construction amendment.

GOLDWATER SCHOLARSHIP CONTRIBUTIONS

Through your generosity, the \$50,000 fund-raising goal for the Goldwater Scholarship Endowment has been achieved. Nonetheless, contributions continue to flow in to the ARRL Foundation to honor a great amateur, a great statesman and a great human being. *We welcome all contributions, regardless of size. Make your check payable to the ARRL Foundation Goldwater Scholarship Fund and send it to ARRL Foundation, 225 Main St, Newington, CT 06111.*

Recent contributors of \$25 or more include Ronald Brecher, WA2EUN; Dana Reed, KA1JEQ; T. A. Kearns, NN6A.

JAMES LAMB, W1AL

We very much regret to have to announce the death of James "Jim" Lamb, ex-9CEI, 3CEI, 1CEI and W1AL. In addition to his accomplishments in the field of early 20-meter DX, Jim is famous as the developer of the single-signal superheterodyne, the noise silencer (noise blanker), the Tri-Tet oscillator, the Heterotone, and early work on fast-scan amateur TV and voltage-regulated power supplies (before the advent of VR tubes). He was the holder of nine patents, mostly in the electronics field. Jim received his Electrical Engineering degree from Catholic University of America in 1922, joined the ARRL Headquarters staff in 1928, and became the Technical Editor in 1929. Because of a continuing illness, he left the staff in 1939,

although his name and title were retained on the masthead for some years. After World War II, he joined the Remington Rand organization, where he formed its electronics division and served as chief engineer. In 1959, he left The Sperry Univac Division to work for Ramo Wooldridge, until 1961. From then, until 1972, he worked with the US Army at Fort Huachuca, where he was chief scientist and chief methodologist. Jim is survived by his wife and five daughters, and 14 grandchildren.

FCC DROPS AUX LINK PROPOSAL

The Quarter Century Wireless Association (QCWA) had petitioned the Commission to permit auxiliary operation on all amateur frequencies. In response to this petition, the FCC issued a Notice of Proposed Rule Making (PR Docket 85-215). In its comments, the ARRL opposed the NPRM, saying "the MF and HF amateur bands . . . are inappropriate for auxiliary operation because of . . . heavy loading of the bands, the vagaries of skip propagation, the unpredictability of HF use for long-range control purposes, and the inability to regulate auxiliary operation through local frequency coordination." The Commission terminated this NPRM on March 24, 1986 without adopting any rule changes because "the comments showed there was currently a good match between the frequencies authorized for auxiliary operation and auxiliary link functions." It also noted that "the potentially disruptive interference which could occur to other amateur activities from expanded auxiliary operation outweighed the increase in flexibility which could be achieved by the proposal."

VOLUNTARY TV/RFI STANDARDS

The Ad Hoc Committee on Public Law 97-259, sponsored by American National Standards Committee C-63, has produced its first voluntary standards for RFI immunity in TV sets and video recorders. These standards specify an immunity level guideline of 1 volt/meter to be used by manufacturers of TVs and VCRs. They are a tentative first step, and some committee members feel that it may not go far enough. Others worry that it will not be adopted by manufacturers. However, other participants think manufacturers have already begun to design the standards into the next wave of equipment. Among the participants in the Ad Hoc Committee were representatives of the Electronic Industries Association, the FCC and the Institute of Electrical and Electronic Engineers, and ARRL Atlantic Division Director Hugh Turnbull, W3ABC.

FCC LEGISLATIVE REQUESTS

The FCC has presented a number of legislative requests to Congress, some of which affect Amateur Radio. Among these are a request for a new Section 333 of the Communications Act that would make willful and malicious interference subject to the more severe criminal sanctions specified in Section 501. That Section provides for a fine of up to \$10,000 or imprisonment for up to one year, or both, for a first offense (a misdemeanor), and the same fine limitation and up to two years imprisonment for

League Advisory Committee Members

Contest Advisory Committee

Atlantic Division—William J. Gibbons, K2TQC, 6333 Meridan Rd., Jamesville, NY 13078
Canada—Bob Nash, VE3KZ, 5260 Fourteen Sideroad, RR 6, Milton, ON L9T 2Y1
Central Division—Gerald Brunung, K9BG, 15 Tillip Ct., Schaumburg, IL 60192
Dakota Division—John D. Zicarelli, W0ZZ, 1735 Crestridge Ln., Egan, MN 55122
Delta Division—Jack Coffee, WD5ELJ, 10026 Hackberry, Baton Rouge, LA 70809
Great Lakes Division—Randy H. Farmer, W8FN, 919 Leatherwood Dr., New Carlisle, OH 45344
Hudson Division—Lewis Tompkins, N2LT RD 1, Box 246A, Stockton, NJ 08559
Midwest Division—Steve Gecawicz, K0CS, 14134 Merry Wood Cir., Grandview, MO 64030
New England Division—Doug Grant, K1DG, 144 Kendall Pond Rd., Windham, NH 03087
Northwestern Division—Bob A. Kile, KG7D, 23332 58th Ave W., Mountlake Terrace, WA 98043
Pacific Division—Gary Caldwell, WA6VEF, 1830 Polk St., Concord, CA 94521
Roanoke Division—David Siddall, K3ZJ, 9783 Oleander Ave., Vienna, VA 22180
Rocky Mountain Division—George E. Schultz, W6UA, 14391 Randolph Pl., Denver, CO 80239
Southeastern Division—James A. White, K1ZX4, 19620 SW 234th St., Homestead, FL 33031
Southwestern Division—Marty Woll, N6VI, 15532 Tupper St., Sepulveda, CA 91343
West Gulf Division—Dennis Motschenbacher, KZ5M, Rt 1, Box 697B Richmond, TX 77469
Board Liaison—John C. Kanode, N4MM, RFD 1, Box 73-A, Boyce, VA 22620
Administrative Liaison—Julie Altardo, ARRL, 225 Main St., Newington, CT 06111

VHF Repeater Advisory Committee

Atlantic Division—Willem Van Aller, K3CZ, 9623 Old Washington Rd., Woodbine, MD 21797
Canada—Dr David Toth, VE3GYQ, 499 Bobbybrook Rd., London, ON N5X 1G8
Central Division—Bob Heli, K9EID, PO Box 68, Marissa, IL 62257
Dakota Division—Eric Foss, KD0Z, 4615 Oakview La., Plymouth, MN 55442
Delta Division—Vacant
Great Lakes Division—Bill Creighton, Jr, K8TUT, 40 Angela St., Athens, OH 45701
Hudson Division—Phil Bradley, KB2HQ, 1119 Hedgewood La., Schenectady, NY 12309
Midwest Division—Joe Eisenberg, WA0WRI, 7133 Yosemite Dr., Lincoln, NE 68507-2077
New England Division—Bruce Marcus, WA1NXG, 134 E Center St., Manchester, CT 06040
Northwestern Division—Clay Fisenwald, K7CR, 8515 Idalwood Dr SW, Tacoma, WA 98438
Pacific Division—Louis Brydon, WA6OCZ, 10 Sheri Ct., Danville, CA 94526
Roanoke Division—Wayne C. Williams, K4MOB, 600 Lakedale Rd., Colfax, NC 27235
Rocky Mountain Division—Whitman E. Brown, WB0CJX, 14418 W Ellsworth Pl., Golden, CO 80401
Southeastern Division—James C. Vice, WD4KTY, Rte 1, Box 462, Alexandria, AL 36250
Southwestern Division—Karl Pagel, N6BVU, PO Box 6490, Orange, CA 92613
West Gulf Division—Elene G. Spiegel, WA5WDW, 2812 Pritchett, Irving, TX 75061
Board Liaison—Lionel A. "Al" Oubre, K5DPG, Star Rte A, Box 185-E, New Iberia, LA 70560

¹Chairman

*Administrative Liaison for all League Advisory Committees

VHF/UHF Advisory Committee

Atlantic Division—Robert Bennett, W3WCO, 626 Lake Dr., Towson, MD 21204
Canada—Dana A. Shtun, VE3DSS, Apt 1116, 40 High Park Ave., Toronto, ON M6P 2S1
Central Division—Joseph Schroeder, W9JUV, Box 406, Glenview, IL 60025
Dakota Division—Terry Van Benschoten, W0VB, 2326-11th Ave NW, Rochester, MN 55901
Delta Division—R. A. "Bob" Taylor, WB5LBT, 10715 Waverland, Baton Rouge, LA 70815
Great Lakes Division—David Smith, W8YZ, 530 Hollywood Dr., Monroe, MI 48161
Hudson Division—Richard T. Knadle, Jr, K2RIW, 316 Vanderbilt Pkwy, Dix Hills, NY 11746
Midwest Division—Jim McKim, W0CY, 1404 S 10th, Salina, KS 67401
New England Division—David C. Olean, K1WHS, Poplar Hill Rd., East Lebanon, ME 04027
Northwestern Division—Marle S. Cox, W7YOZ, 12006 76th Ave NE, Kirkland, WA 98033
Pacific Division—H. Paul Shuch, N6TX, 14908 Sandy La., San Jose, CA 95124
Roanoke Division—Ted Mathewson, W4FJ, 1525 Sunset La., Richmond, VA 23221
Rocky Mountain Division—David J. Pedersen, N7BHC, 4382 Cherryview Dr., Hunter, UT 84120
Southeastern Division—Richard M. Jansson, WD4FAB, 1130 Willowbrook Trl., Maitland, FL 32751
Southwestern Division—Louis N. Anciaux, WB6NMT, PO Box 82183, San Diego, CA 92138
West Gulf Division—James D. King, W5LUU, 7335 Wild Eagle Rd., San Antonio, TX 78255
Board Liaison—Wayne Overbeck, N6NB, 900 Avenida Salvador, San Clemente, CA 92672

Public Relations Advisory Committee

Atlantic Division—John Rouse, KA3DBN, 2703 Bartlett La., Bowie, MD 20715
Canada—A. L. d'Eon, VE3AND, 22 Broadlands Blvd, Don Mills, ON M3A 1J2
Central Division—Jim Romelanger, K9ZZ, 301½ 7th St., Baraboo, WI 53913
Dakota Division—Curtis K. Swenson, K0CVD, 4821 Westminster Rd., Minnetonka, MN 55345
Delta Division—Jim Burlington, ND5M, PO Drawer 1240, Aberdeen, MS 39730
Great Lakes Division—Jack T. Shepherd, W8OMY, 376 Danhurst Rd., Columbus, OH 43228
Hudson Division—Richard S. Moseson, N2BFG, 28 Maple St., N Tarrytown, NY 10591
Midwest Division—Dick Isard, WB0VZ, 2818 Southland St SW, Cedar Rapids, IA 52404
New England Division—William A. Burden, Jr, WB1BRE, 11 Briand Dr., Nashua, NH 03060
Northwestern Division—Bradley Wells, KR7L, 1290 Pudget Dr E, Port Orchard, WA 98366
Pacific Division—Norman Brooks, K6FO, 5901 Adana Cir., Carmichael, CA 95008
Roanoke Division—Stephen K. Thompson, N4TX, 801 North Overlook Dr., Alexandria, VA 22305
Rocky Mountain Division—Wilson F. Sellner, WB7RRZ, 930 Western Hills Blvd., Cheyenne, WY 82001
Southeastern Division—John G. Bolton, Jr, WA4PNY, 1325 Belmore Way, Atlanta, GA 30338
Southwestern Division—Frosty Oden, N6ENV, 7945 Flight Pl., Los Angeles, CA 90045
West Gulf Division—Wayne C. Sellers, WA5YHM, 215 Stephanie Dr., Palestine, TX 75601
Board Liaison—Evelyn Gauzens, W4WYR, 2780 NW 3rd St., Miami, FL 33125

DX Advisory Committee

Atlantic Division—Tony Gargano, N2SS, 32 Bryant Rd., Turnersville, NJ 08012
Canada—Dr Roland Suran, VE3EJ, 7 Corona St., Toronto, ON M6B 3W3
Central Division—Norman E. Meyers, N9MM, 1544 Horseshoe Bend Dr., LaPorte, IN 46350
Dakota Division—Robert G. Parlin, W0SFU, 1507 Katern La., Minneapolis, MN 55418
Delta Division—Joseph A. Butler, K5OS, 242 Woodland Cir., Ocean Springs, MS 39564
Great Lakes Division—Ken Schang, W8LU, 46131 Academy Dr., Plymouth, MI 48170
Hudson Division—David Beckwith, W2QM, 151 Whitney Ave., Pompton Lakes, NJ 07442
Midwest Division—James L. Spencer, W0SR, 3712 Tanager Dr., NE, Cedar Rapids, IA 52402
New England Division—William C. Poellnitz, K1MM, 44 Sunset Dr., Framingham, MA 01701
Northwestern Division—Phil Anderson, W7GN, 19120 SE Cramo Dr., Boring, OR 97009
Pacific Division—W. "Bob" Thompson, K6SSJ, 14703 Eastview Dr., Los Gatos, CA 95030
Roanoke Division—Col. John Parrott, W4FRU, Box 5127, Suffolk, VA 23435
Rocky Mountain Division—Ron Stockton, N0RR, Bonanza Star Rte., Nederland, CO 80466
Southeastern Division—Robert R. Beatty, III, W4VQ, 11 Heritage Cove Ct., Casselberry, FL 32707
Southwestern Division—James T. Raftery, N6RJ, 5893 Grandview Ave., Yorba Linda, CA 92685
West Gulf Division—John Shean, K5DB, 3302 Litchfield Dr., San Antonio, TX 78230
Board Liaison—Rush Drake, W7RM, 41385 Foul Weather Bluff Rd NE, Hansville, WA 98340

Emergency Communications Advisory Committee

Atlantic Division—Bob Josuweit, WA3PZO, 9 Derwen Dr., Havertown, PA 19083
Canada—Jack Strangeman, VE3GV, 512 Pinetree Dr., London, ON N6H 3N1
Central Division—Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis, IN 46220
Dakota Division—Ray Munger, KA0ARP, PO Box 533, Ely, MN 55731
Delta Division—James J. Leist, K8SW, 2632 Valley Wood Dr., Gaultier, MS 39553
Great Lakes Division—Larry Solak, WD8MPV, 9971 Diagonal Rd., Mantua, OH 44255
Hudson Division—Robert Weingartner, WB2VUF, 21 Brook Dr., Morris Plains, NJ 07950
Midwest Division—W.D. Bammels, W0KL, 40 Rockwood Dr., Ottawa, KS 66067
New England Division—Rick Beebe, K1PAD, 6 Tracy Cir., Billerica, MA 01821
Northwestern Division—Gene E. Sprague, KD7G, 10716-23rd Dr SE, Everett, WA 98204
Pacific Division—David B. Tyler, N6DRT, PO Box 6017, Albany, CA 94700
Roanoke Division—L. R. Allison, Jr, K4SUG, 5 Gaston Dr, Rte 5, Box 15, Travelers Rest, SC 29690
Rocky Mountain Division—Joe Knight, W5PDY, 10408 Snow Heights Blvd NE, Albuquerque, NM 87112
Southeastern Division—Joel I. Kandel, K1AT, 5463 SW 92nd Ave, Miami, FL 33165
Southwestern Division—Jerry Boyd, KG6LF, 345 B Ave., Coronado, CA 92118
West Gulf Division—Bennett L. Basora, W5ZTN, 924 Will Rogers Dr., Stillwater, OK 74074
Board Liaison—Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica, MA 01821

repeated offenses (a felony). The amendment would allow the Commission to initially seek immediate criminal prosecution by the US Attorney, and seizure of the offending radio equipment. The Commission could thus dispense with the necessity of first completing lengthy and complex administrative proceedings.

The Commission also proposes to eliminate the Conflict of Interest statute and regulations with respect to Volunteer Examiner Coordinator in Section 154(f)(4)(A) of the Communications Act of 1934 as amended. The existing statutes are meant to prohibit the publishing arm of an organization from knowing the questions on a particular examination. In PR Docket 83-27, the Commission permitted organizations to employ a "Chinese wall" to satisfy the conflict requirements. The FCC now states that with the advent of multiple examinations and various examination packages, the wall becomes unnecessary. This Commission also proposed to

delete the existing certification and record-keeping requirements for reimbursable volunteer examination expenses imposed upon individuals and organizations. Section 154(f)(4)(J) currently requires that they annually certify to the FCC that these expenses have been necessarily and prudently incurred. The Commission says this is an unnecessary paperwork burden upon the examiners and coordinators and an unnecessary administrative burden upon the FCC.

MORE ON HR 3378—PRIVACY ACT

There has been more activity in Congress concerning HR 3378, The Electronic Communications Privacy Act of 1985. Another hearing was held March 5, and the House Subcommittee handling the bill plans a "markup" session (where the bill is changed or partially rewritten) during the second or third week of April. Meanwhile, the Senate Subcommittee on Patents, Copyrights and

Trademarks plans to circulate a revised draft in the next several weeks, and is considering the possibility of one more hearing in April. Talks by the ARRL with the staff of both House and Senate subcommittees reveal that they are drifting back toward outlawing just the intentional interception of Common Carrier communications, and those private communications for which a degree of encryption (scrambling, digitizing) has been provided. All other communications would be regarded as "readily accessible to the public." Congressional staffers admit that no one could get a conviction in cases of simple monitoring of cellular or other common-carrier communications, but they want the words in the bill anyway, so they can jawbone scanner advertisers. They are upset with ads saying, "Listen to cellular on our scanner; it's more fun than soap opera," or, "... the perfect scanner for intelligence agencies that need to monitor the new 800-MHz cellular telephone band."

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Eastern Pennsylvania Section by the petition deadline of December 6, 1985 as a result of notices in October and November *QST*, nominating petitions are herewith resolicited. See the above notice for details on how to nominate.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Southern Florida, North Dakota, West Indies, Oklahoma, Minnesota, Connecticut, Idaho, Western New York and Ohio Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following is suggested:

(Place and date)

Field Services Manager, ARRL
225 Main 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.

Petition must be received at Headquarters on or before 4 PM Eastern Local Time June 6, 1986.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before July 1, 1986. Returns will be counted August 19, 1986. SMs elected as a result of the above procedure will take office October 1, 1986.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1986.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in October *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 nominating petition immediately.

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office July 1, 1986:

- Uncontested*
- Indiana Ronald J. Koczor, K9TUS
 - Maine Clevis O. Laverty, W1RWG
 - Oregon William R. Shrader, W7QMU
 - Wisconsin Richard R. Regent, K9GDF
 - Santa Clara Valley Glenn Thomas, WB6W

FCC CORRECTS TYPOGRAPHICAL ERRORS

In an Order released February 28, FCC corrected the typographical errors in the amendments to Part 97 that were contained in its Report and Order in Docket 85.23. (See Mar *QST*, p 66, for a discussion of the typos.) The changes to permit radio telephone operation at 7075-7100 kHz in the Caribbean Insular Area, adopted in PR Docket 85-104 but inadvertently reversed in 85-23, were also reincorporated. The changes became effective 0002 March 1. For those of you keeping track, the following are the corrected amendments:

APPENDIX

Part 97 of Chapter I of Title 47 of the Code of Federal Regulations, as amended by the *Report and Order* in PR Docket No. 85-23, 51 FR 2712, January 21, 1986, is further amended as follows:

1. The 40 meter band entry in paragraph (b) of Section 97.7 is revised to read:

97.7 Frequency privileges.

(b) Technician class: * * *

Meter Terrestrial location of the amateur radio station Limitations Band ITU Region 1 ITU Region 2 ITU Region 3 (see para [g]) kilohertz

40 7050-7075 7100-7150 7050-7075 1, 3, 32

2. The 7075-7100 kHz entry in paragraph (a) and subparagraph (2) of paragraph (d) of Section 97.61 are revised to read:

97.61 Authorized emissions.

(a) kilohertz:

Frequency Band (kHz)	Emissions	Limitations (See paragraph [d])
7075-7100	A1A, F1B	1, 2

(d) Limitations:

(1) ***

(2) Amateur stations located in Regions 1 and 3, and amateur stations located within Region 2 which are west of 130 degrees West longitude or south of 20 degrees North latitude may also use A3E, F3E, G3E, H3E, J3E, and R3E emissions.

F2A EMISSIONS ABOVE 29.5 MHz

In a Report and Order in PR Docket 85-168 released February 26,

FCC has amended Part 97 to permit the use of F2A emission above 29.5 MHz, except in the subbands where only A1A emission is permitted. ARRL had sought the change to permit identification of 10-meter repeaters by Morse code in the way VHF repeaters are normally identified. The change becomes effective April 23. The following are the Part 97 corrections:

The table in Section 97.61 (a) is revised by adding two line entries after 28000-28300, as follows:

97.61 Authorized emissions.
(a) kilohertz:

Frequency Band (kHz)	Emissions	Limitations (see para [d])
28300-29500	A1A, A3E, F3E, G3E, A3C, F3C, A3F, F3F, H3E, J3E, R3E	
29500-29700	A1A, A3E, F2A, F3E, G3E, A3C, F3C, A3F, F3F, H3E, J3E, R3E	

3. Section 97.61 (b) is revised to read, as follows:

97.61 Authorized emissions.

(b) 50-144.1 MHz:

Frequency Band (MHz)	Emissions
50.0-50.1	A1A
50.1-51.0	A1A, A2A, A2B, A3E, A3C, A3F, F1B, F2A, F2B, F3E, C3E, F3C, F3F, H3E, J3E, R3E
51.0-54.0	NØN, A1A, A2A, A2B, A3E, A3C, A3F, F1B, F2A, F2B, F3E, G3E, F3C, F3F, H3E, J3E, R3E
144.0-144.1	A1A

4. Section 97.61(c) is revised by adding two new sentences at the end thereof, as follows:

97.61 Authorized emissions.

(c) Above 144.1 MHz:

Emission F2A may also be used in the following frequency subbands:

144.1-148.0, 220-225, 420-450, 902-928, 1215-1300, 2300-2310 and 2390-2450 MHz. Emission F2A may also be used on all gigahertz frequencies.

AUDITED ARRL FINANCIAL STATEMENTS RELEASED

The audited financial statements reprinted below set forth the League's financial condition as of December 31, 1985, as compared to a year earlier. The statements show an after-tax net gain of \$27,956 on total revenues of \$7,093,828 for the calendar year 1985.

The financial statements and supplementary financial information will appear in the 1985 *Annual Report*, which will be available in May. Affiliated clubs that return the request form sent to them in April will be receiving a copy of the *Annual Report* as soon as it is received from the printer; members may obtain a copy for a \$1 postage and handling fee.

One Financial Plaza
Hartford, CT 06183
Telephone 203 525 4900

Price Waterhouse

February 28, 1986

To the Board of Directors of
The American Radio Relay League,
Incorporated

In our opinion, the accompanying balance sheet and the related statements of revenues and expenses and changes in general fund balance and of changes in financial position present fairly the financial position of The American Radio Relay League, Incorporated at December 31, 1985 and 1984, and the results of its operations and changes in general fund balance and of changes in its financial position for the years then ended, in conformity with generally accepted accounting principles consistently applied. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Our examinations were made for the purpose of forming an opinion on the basic financial statements taken as a whole. Schedules I - II are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the examinations of the basic financial statements, and in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.

Price Waterhouse

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
BALANCE SHEET

	December 31,	
	1985	1984
Assets		
Current assets:		
Cash and short-term investments (including time deposits of \$200,000 in 1985 and \$100,000 in 1984)	\$ 739,501	\$1,065,693
Accounts receivable (less allowance for doubtful accounts of \$26,500 in 1985 and 1984)	388,400	467,093
Accrued interest receivable	59,793	40,327
Inventories	341,140	241,659
Prepaid expenses	45,684	49,133
Total current assets	1,574,518	1,863,905
Life membership assets:		
Due from current operations	234,081	47,935
Accrued interest receivable	76,315	84,086
Marketable securities, at cost	3,542,374	3,643,013
Life membership plaques	4,581	8,093
	3,857,351	3,783,127
Regular portfolio marketable securities, at cost	2,229,903	1,199,367
Fixed assets:		
Land and buildings	1,132,370	1,154,093
Furniture and equipment	1,116,007	1,061,370
	2,248,377	2,215,463
Accumulated depreciation	(1,229,283)	(3,060,653)
	1,019,094	1,154,810
Other assets	47,201	45,114
Total assets	\$8,722,067	\$8,046,323

	December 31,	
	1985	1984
Liabilities and General Fund Balance		
Current liabilities:		
Accounts payable:		
R. R. Donnelley & Sons Company	\$ 411,987	\$ 284,484
Other	155,036	178,034
	567,023	462,518
Accrued liabilities:		
Deferred membership fees and subscriptions - current portion:		
Life members	323,000	324,258
Term members	1,394,404	1,152,887
Current portion of mortgage note payable	32,428	29,573
Income tax payable	-	86,892
Due to life membership assets	234,081	47,935
	2,948,669	2,442,409
Total current liabilities		
Deferred membership fees and subscriptions - non-current portion:		
Life members	3,534,351	3,458,889
Term members	413,343	320,473
	3,947,694	3,779,362
Mortgage note payable	3,477	37,905
Loan payable	36,500	36,500
Reserves:		
For promotion of amateur radio overseas	5,017	5,594
For Colorado Convention Fund	5,471	5,471
For Project Goodwill	19,956	20,136
For H.P. Maxim Award	77,514	21,258
For Humanitarian Award	105	-
For T. Mullan Foundation	5,000	-
	58,063	52,459
General fund balance	1,725,664	1,697,208
General fund balance and reserves	1,783,727	1,750,167
Total liabilities and general fund balance and reserves	\$8,722,067	\$8,046,323

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
STATEMENT OF REVENUES AND EXPENSES
AND CHANGES IN GENERAL FUND BALANCE

	Year ended December 31,	
	1985	1984
Revenues:		
Publications:		
Advertising-QST magazine	\$1,953,948	\$1,975,111
QST newsdealers sales	143,121	142,779
Standard Handbook sales	655,735	543,861
Booklet sales	784,573	573,627
Booklet advertising sales	15,191	16,929
Tune in the World sales	166,059	134,025
Tune in the World advertising sales	-	10,216
Call Directory sales	41,916	93,575
QEX income	27,145	18,011
ARRL Letter	26,925	16,606
	3,814,613	3,524,740
Other:		
Membership dues (including membership subscriptions to QST magazine):		
Term members	2,523,529	2,477,862
Life members	119,805	117,298
Net investment income (Life members)	204,459	181,394
Total membership dues	2,847,793	2,776,554
Membership supplies sales	140,646	138,004
Interest, dividend and royalty income	728,246	208,144
Revenue from donated equipment, materials and supplies	-	22,533
Increase in cash surrender value of life insurance	2,087	2,134
Contributions	2,732	680
H.P. Maxim and other awards income	-	500
Cash discounts taken	3,745	4,485
Overseas QSL service income	21,996	26,250
Gain on sale of investments	6,346	4,638
Examination fees	96,064	17,736
RSGB membership dues	338	1,723
	2,349,993	2,203,381
Total revenues before deductions	7,164,606	6,728,121
Deductions from revenues:		
Discounts allowed	8,080	8,419
Exchange and credit card collection charges	40,600	19,758
Sales returns and allowances	22,098	15,451
	70,778	43,628
Total deductions from revenues	70,778	43,628
Total revenues, net	7,093,828	6,684,493

Expenses:		
Operating expenses	6,744,139	6,199,343
Administrative expenses - other expenses authorized by the Board of Directors	<u>321,733</u>	<u>336,392</u>
Total expenses	<u>7,065,872</u>	<u>6,535,735</u>
Excess of revenues over expenses before income tax	27,956	148,758
Income tax on unrelated business income	-	<u>(86,892)</u>
Excess of revenues over expenses	27,956	61,866
General fund balance:		
Beginning of year	1,697,708	1,635,103
Reserve for H.P. Maxim Award	-	<u>739</u>
End of year	<u>\$1,725,664</u>	<u>\$1,697,708</u>

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
STATEMENT OF CHANGES IN FINANCIAL POSITION

	Year ended December 31,	
	1985	1984
<u>Financial resources were provided by:</u>		
Excess of revenues over expenses	\$ 27,956	\$ 61,866
Add (deduct) income charges (credits) not affecting working capital:		
Depreciation	265,798	240,472
Increase/(decrease) in reserves	5,604	(102)
Increase in cash surrender value of life insurance	<u>(2,087)</u>	<u>(2,134)</u>
Working capital provided by operations	297,271	300,102
Increase in deferred membership fees and subscriptions - non-current portion:		
Life members	75,482	105,833
Term members	<u>92,870</u>	<u>207,937</u>
Total	<u>465,623</u>	<u>613,872</u>
<u>Financial resources were used for:</u>		
Additions to furniture and equipment	130,082	140,720
Reduction in non-current portion of mortgage note payable	32,428	29,573
Increase in life membership assets	74,224	59,408
Increase in regular portfolio marketable securities	<u>1,024,536</u>	<u>526,011</u>
Total	<u>1,261,270</u>	<u>755,712</u>
Decrease in working capital	<u>\$(795,647)</u>	<u>\$(141,840)</u>
<u>Changes in components of working capital:</u>		
Increase (decrease) in current assets:		
Cash and short-term investments	\$ (326,192)	\$ 117,343
Accounts receivable, net	(78,693)	47,587
Due from brokers for securities sold	-	(150,000)
Accrued interest receivable	19,466	(12,029)
Inventories	99,481	6,471
Prepaid expenses	(3,449)	10,667
Due from life membership assets	-	<u>(179,516)</u>
Total	<u>(289,387)</u>	<u>(159,472)</u>
(Increase) decrease in current liabilities:		
Accounts payable	(104,505)	(261,308)
Accrued liabilities	(59,387)	(83,742)
Due to brokers for securities purchased	-	257,130
Deferred membership fees and subscriptions - current portion:		
Life members	1,258	(25,456)
Term members	<u>(241,517)</u>	<u>52,287</u>
Current portion of mortgage note payable	(2,855)	(2,603)
Income tax payable	86,892	129,264
Due to life membership assets	<u>(186,146)</u>	<u>(47,935)</u>
Total	<u>(506,260)</u>	<u>17,637</u>
Decrease in working capital	<u>\$(795,647)</u>	<u>\$(141,840)</u>

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
NOTES TO FINANCIAL STATEMENTS

NOTE 1 - SIGNIFICANT ACCOUNTING POLICIES:

The American Radio Relay League, Incorporated (the League) is a not-for-profit, tax-exempt organization formed to promote interest in amateur radio communication and experimentation. The League publishes documents, books, magazines, newspapers and pamphlets necessary or incidental to its purpose.

The following is a summary of significant accounting poli-

cies consistently followed in the preparation of the League's financial statements. Certain reclassifications of 1984 amounts have been made to enhance comparability with the 1985 presentation.

Income Recognition

A portion of the revenue from term membership fees and subscriptions applicable to acquisition costs is recognized at the time the memberships and subscriptions are received. The remaining portion is included in revenues on the straight-line basis ratably over the applicable membership or subscription period.

The League recognizes income on donated capital based on the fair market value of the item at the date of donation.

Deferred Life Membership Fees

By-laws of the League provide for a paid-up life membership in the League upon payment of a fee of twenty-five times the annual dues rate. Life membership fees received are deferred and invested to produce income to defray the cost of servicing life members. Deferred life membership revenues (including investment income earned thereon) are amortized to current revenues and funds are transferred to current operations based on a rate designed to offset the costs of servicing the life membership.

Income Tax

The League is required to pay federal income tax on unrelated business income, if any. Such income is derived primarily from net income earned on advertising placed in its QST Magazine.

Investments

Marketable securities are carried at cost.

Inventories

Inventories are carried at the lower of cost or market, cost being determined using the first-in, first-out method.

Fixed Assets

Fixed assets are recorded at cost. Depreciation is computed on the straight-line method for assets purchased prior to January 1, 1981. For assets purchased after that date, an accelerated depreciation method is used. Buildings are depreciated over a 40 year life. Furniture and equipment are depreciated over their useful lives ranging from 3 to 20 years.

NOTE 2 - INVENTORIES:

Inventories are comprised of the following:

	December 31,	
	1985	1984
Standard Handbooks	\$102,495	\$ 71,194
Booklets	137,760	90,720
Tune in the World booklets	18,952	23,715
Membership supplies	<u>81,953</u>	<u>56,030</u>
Total	<u>\$341,140</u>	<u>\$241,659</u>

NOTE 3 - INVESTMENTS:

	December 31,			
	1985		1984	
	Cost	Market	Cost	Market
Life membership portfolio	\$3,542,374	\$3,552,851	\$3,643,013	\$3,384,485
Regular portfolio	<u>2,223,903</u>	<u>2,319,942</u>	<u>1,199,367</u>	<u>1,244,682</u>
Total	<u>\$5,766,277</u>	<u>\$5,872,793</u>	<u>\$4,842,380</u>	<u>\$4,629,167</u>

Investments are comprised of the following:

	1985		1984	
	Cost	Market	Cost	Market
Bankers' Acceptances	\$ 481,100	\$ 500,000	\$ 379,812	\$ 392,344
Certificates of deposit	394,234	400,000	485,000	485,000
Preferred stocks	206,549	158,689	207,347	130,360
Common stocks	498,904	701,901	366,361	447,583
Corporate bonds	2,710,135	2,678,461	1,548,711	1,334,504
Government agency and other issues	1,174,190	1,184,885	1,827,955	1,819,202
Other investments	<u>296,165</u>	<u>298,857</u>	<u>27,194</u>	<u>27,194</u>
Total	<u>\$5,766,277</u>	<u>\$5,872,793</u>	<u>\$4,842,380</u>	<u>\$4,629,167</u>

The increase in unrealized appreciation in the market value of investment securities for the year ended December 31, 1985 was \$19,729 (1984 decrease in unrealized appreciation was \$102,253).

NOTE 4 - LONG-TERM DEBT:

On March 1, 1977 the League signed a \$225,000 mortgage note payable bearing interest at 9.25%, the proceeds of which were used to finance a building addition. The note is secured by property, building and related equipment having a net book value of \$1,019,094 at December 31, 1985. Monthly installments are \$2,882, including interest through March 1, 1987. Required principal payments are \$32,428 in 1986 and \$5,477 in 1987.

NOTE 5 - PENSION PLAN:

The League has a noncontributory group annuity retirement plan which covers full-time employees. The League's policy is to fund pension cost accrued. The total pension expense

for 1985 and 1984 was \$194,846 and \$188,400, respectively, which included amortization of past service cost over a 30-year period. Accumulated plan benefits as of the most recent actuarial valuation reports dated June 1, 1984 and June 1, 1985, are as follows:

	1985	1984
Actuarial present value of accumulated plan benefits:		
Vested	\$380,487	\$266,596
Non Vested	115,080	138,799
	<u>\$495,567</u>	<u>\$405,395</u>

At June 1, 1985 and June 1, 1984, net assets available for plan benefits at contract value (as reported by the insurer, including \$199,856 in 1985 and \$171,782 in 1984 payable to the insurer by the League) are \$519,109 and \$330,741. The assumed rate of return used in determining the actuarial present value of accumulated plan benefits was 7.5% in both 1985 and 1984.

NOTE 6 - DEFERRED LIFE MEMBERSHIP FEES:

The following is a summary of deferred life membership fees and subscriptions activity:

	December 31,	
	1985	1984
Current portion	\$ 323,000	\$ 324,258
Non-current portion	3,534,351	3,458,869
Total	<u>\$3,857,351</u>	<u>\$3,783,127</u>
Beginning balance	\$3,783,127	\$3,651,838
Additions:		
Membership fees received	84,748	85,593
Investment income earned	318,411	349,230
	<u>403,159</u>	<u>434,823</u>
Deductions:		
Net transfer to revenue:		
Life members	119,805	117,298
Investment income	204,459	181,394
	<u>324,264</u>	<u>298,692</u>
Administrative expenses	4,671	4,842
	<u>328,935</u>	<u>303,534</u>
Ending balance	<u>\$3,857,351</u>	<u>\$3,783,127</u>

NOTE 7 - RELATED PARTY:

The Canadian division of the League is incorporated as the Canadian Radio Relay League (CRRL). Effective December 31, 1985 the CRRL assumed responsibility for the Canadian membership activities and established itself as a separate reporting entity and, accordingly, the assets and liabilities of CRRL as of that date have been deconsolidated from the financial statements of ARRL. The CRRL, whose Board of Directors is independent from the League's, collects Canadian membership dues, purchases publications from the League at a discount and resells them to its membership. Deferred membership fees and subscriptions of \$84,682 previously collected and deferred by the League on behalf of Canadian members were paid to the CRRL in December 1985.

NOTE 8 - RESERVES:

Reserves are established for purposes specified by donors of the League's Board of Directors. Such reserves are administered by designated officials of the League in accordance with the directions of the donors or Board of Directors.

	For promotion of American Radio Overseas	For Colorado Convention Fund	For Contest Award	For N.E. Main Award	For Hamvention Award	For T. Millen Foundation
Balance, December 31, 1983	25,594	25,177	570,219	221,571	-	-
Income earned	-	794	1,176	(31,239)	-	-
Expenditures	-	-	(82)	-	-	-
Balance, December 31, 1984	25,594	25,971	570,136	189,332	-	-
Contributions	-	-	2,132	-	105	5,000
Income earned	(522)	-	(180)	(1,928)	-	-
Expenditures	-	-	-	-	-	-
Balance, December 31, 1985	25,072	25,971	570,136	187,404	105	5,000

**SCHEDULE I
ADDITIONAL INFORMATION**

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

OPERATING EXPENSES

	Year ended December 31,	
	1985	1984
Publications:		
QST magazine	\$1,243,535	\$1,157,275
Standard handbook	224,292	170,021
Booklets	272,434	172,495
Tune in the World production costs	71,252	56,071

Advertising production costs	17,002	13,704
Advertising production costs credits	(13,738)	(10,711)
Call directory expenses	24,243	78,314
QST production and other costs	17,178	11,084
ARRL Letter	19,948	18,526
Packet radio newsletter	7,252	2,113
	<u>1,893,398</u>	<u>1,566,872</u>
Salaries	2,211,564	2,068,313
Membership supplies	48,152	49,941
Postage	232,267	186,455
Forwarding expenses:		
QST subscriptions	501,207	291,266
QST newdealers	5,679	2,552
Other publications	202,741	152,218
	<u>514,627</u>	<u>446,036</u>
Telephone and telegraph	57,389	51,614
Office supplies and expenses	164,538	145,707
Laboratory expenses	19,406	23,201
Legal and professional fees	103,717	152,278
Stationery, printing and forms	238,296	203,816
Promotion and support	28,245	30,599
Payroll processing expense	2,980	3,060
Light, heat and water	58,238	55,925
Employee insurance and pension costs	273,578	275,876
Other employee expenses	29,351	26,692
Insurance	16,954	15,951
Interest expense	7,199	9,802
Temporary employees	19,771	29,516
Travel expenses:		
Business	57,686	46,717
Membership contacts	35,670	40,501
Overseas	22,188	5,332
	<u>115,544</u>	<u>97,555</u>
Automobile expenses	1,592	652
Building maintenance expenses	77,374	66,895
Property taxes	53,836	51,495
Payroll taxes	152,650	141,616
Sales and use taxes	1,024	1,125
Depreciation	265,798	240,672
Awards	5,543	12,758
Headquarters station expenses	2,563	9,389
CRRL Headquarters expenses	22,268	20,986
Provision for doubtful accounts	6,357	16,184
Electronic data processing	-	645
Unemployment compensation	2,362	134
Overseas QSL service	28,685	27,397
Distribution of films	5,478	4,987
Computer supplies and maintenance	26,390	23,109
Dues - region 2 and 3	23,769	25,370
House advertising preparation	11,168	8,707
Miscellaneous	4,472	6,423
Product review	7,025	4,084
Subscriptions	3,133	2,201
Rent	7,203	-
	<u>\$6,744,139</u>	<u>\$6,199,343</u>

**SCHEDULE II
ADDITIONAL INFORMATION**

**THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
ADMINISTRATIVE EXPENSES - OTHER EXPENSES AUTHORIZED BY
THE BOARD OF DIRECTORS**

	Year ended December 31,	
	1985	1984
Division Directors expenses:		
Atlantic	\$ 5,486	\$ 4,058
Canadian	8,355	6,688
Central	6,992	4,801
Dakota	2,525	1,544
Delta	2,918	1,081
Great Lakes	9,229	5,292
Hudson	4,903	3,458
Midwest	5,361	5,922
New England	6,248	6,835
Northwestern	9,278	11,343
Pacific	9,691	7,996
Roanoke	8,316	9,314
Rocky Mountain	3,236	4,952
Southeastern	7,713	7,789
Southwestern	10,900	9,586
West Gulf	6,058	5,456
	<u>110,159</u>	<u>94,115</u>
Board of Directors meetings	55,293	51,299
Executive committee	18,476	18,250
President's expenses	12,938	19,517
Other committees	1,044	6,365
Advisory committees	712	1,046
National traffic system	12,000	2,656
Officers' expenses	6,248	19,589
Strengthening CRRL	906	1,523
Membership affairs committee	-	4,933
Management and finance committee	-	11,414
Plans and programs committee	-	3,222
QSL manager expense	1,138	1,531
Ad hoc committee on biological effects	2,832	1,099
Digital Communication Committee	6,073	10,447
Section level expenses	71,707	67,792
Committee to study monitoring and licensing activities	-	1,603
Forward Planning Committee	-	8,271
New Orleans World's Fair	-	5,720
Volunteer resources	5,122	-
Publications	3,460	-
Administration and finance	5,814	-
Membership services	5,802	-
Other	2,509	-
	<u>\$321,733</u>	<u>\$336,392</u>

Moved and Seconded . . .

Minutes Of Executive Committee

No. 422

Charlotte, North Carolina

March 22, 1986

Agenda

1. Approval of Minutes of the December 14, 1985 and January 23, 1986 Meetings.

2. FCC Matters:

2.1. Review of amended draft petition for rules requiring the labelling of home-entertainment equipment with respect to its immunity from radio-frequency interference.

2.2. Consideration of an ARRL position regarding PR Docket 86-63, to provide for examination credit for written examination elements above the Novice Class.

2.3. Consideration of Minute 103, 1986 Annual Meeting regarding the call-sign formulation to be used by reciprocal operators.

2.4. Consideration of an ARRL position toward FCC's legislative requests.

2.5. Consideration of ARRL position toward late-filed reply comments of Don Stoner, W6TNS, in RM-5241, Proposal for a Public Digital Radio Service.

3. Local antenna/RFl matters.

4. Review of progress on Board directives:

4.1. By the President, regarding Minute 53, 1986 Annual Meeting, with respect to PR Docket 85-105, automatic control of digital repeater stations.

4.2 By the vice presidents, for the standing committees.

4.3. By the Executive Vice President, on Board directives affecting Headquarters.

4.4. By the Executive Vice President, with respect to the possibility of the ARRL assisting the FCC with the issuance of some call signs.

5. Studies requested of the Executive Committee by the Board at its 1986 Annual Meeting:

5.1. From Minute 80, review of the terms and conditions governing the availability of mailing lists from Headquarters.

5.2 From Minute 57, review of the policies and guidelines governing the conduct of Section Managers.

6. Report by the President on the coming IARU Region 2 Triennial Conference.

7. Recognition of new Life Members.

8. Affiliation of clubs.

9. Convention matters:

9.1 Approval of division, state and section conventions.

9.2 National Convention matters.

10. Authorization to open account at Andover Savings Bank, and for Paul Rinaldo to sign checks on behalf of the Executive Vice President.

11. Date and place of next meeting.

12. Other business.

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:30 A.M. Eastern Standard Time, Saturday, March 22, 1986, at the Marriott City Center Hotel, Charlotte, North Carolina. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Frank M. Butler, Jr., W4RH, Paul Grauer, W0FIR, Hugh A. Turnbull, W3ABC, and George S. Wilson III, W4OYI. Also present were Vice Presidents Leonard M. Nathanson, W8RC and William J. Stevens, W6ZM; Secretary Perry Williams, W1UED; Director Clyde O. Hurlbert, W5CH; Vice Director John C. Kanode, N4MM; and Counsel Christopher D. Imlay, N3AKD.

1. Approval of Minutes of previous Executive Committee meetings: Corrections in certain ARRL titles were made to the Minutes of the January 23, 1986 EC meeting. Whereupon, on motion of Mr. Turnbull, the Minutes of the December 14, 1985 and January 23, 1986 meetings were accepted as printed and as amended, respectively.

2. FCC Matters:

2.1. Next, the Committee made minor changes to the draft petition for rulemaking which asks FCC to require labelling of home electronic devices as to measures taken to improve the devices' immunity to radio-frequency energy. On motion of Mr. Grauer, it was voted to file the document as amended with the Secretary, Federal Communications Commission.

2.2. On motion of Mr. Butler, Counsel was directed to file comments on behalf of the ARRL in support of the rulemaking proposed in PR Docket 86-63, which would allow credit for any examination elements successfully passed, whether a new license was issued as a result. The comments will urge the Com-

mission to require a standard certificate of completion valid for one year only; to require each applicant to file a Form 610 each time because the form provides a sworn statement as to the accuracy of the facts presented therein; to affirm that the examinee bears full responsibility for the safeguarding of the Certificate until it is accepted by a volunteer examiner team to complete requirements for an amateur license; and to require that all certificates of completion furnished to a volunteer examiner team be dated within a year of the time they are submitted for final credit. The Comments will carry the League's recommendation that the VEC not be required to retain Forms 610 of applicants who fell short of completing the requirements for a license class; instead, these Forms 610 could be returned to the applicants.

During the course of the above, the Committee stood in recess briefly, at 9:15 A.M. Roanoke Division Director Gay E. Milius, Jr., W4UQ, introduced North Carolina Section Manager Rae Everhart, K4SWN, who welcomed the Committee to the Section and to the Charlotte Hamfest and Computer Fair, in progress at the nearby Convention Center. (Applause) Messrs. Milius and Everhart departed at 9:17, and the meeting resumed.

2.3. Next came consideration of Minute 103, 1986 Annual Meeting, which directed that a petition be filed with the FCC, requesting that call-sign formulation for stations operating in the U.S. on a reciprocal basis show the host country first followed by the station call sign (e.g., W1/G2BYN instead of the present G2BYN/W1). The President reported that call-sign formulation was embedded in the Canada/U.S. treaty. The consensus was that all visitors must be treated alike; the staff and counsel were directed to move toward fulfillment of the motion with deliberate speed, taking into account the need for changes in the Canadian/U.S. treaty as a prerequisite.

2.4. The Committee then considered the legislative requests of the FCC to Congress.

2.4.1. On motion of Mr. Wilson, the ARRL urges the Congress and the FCC to preserve the Conflict of Interest statute and regulations with respect to Volunteer Examiner Coordinators in fulfillment of Section 154(f)(4)(A), Communications Act of 1934 as amended ("The Act").

2.4.2. On motion of Mr. Butler, the ARRL urges the Congress and the FCC to preserve the reporting and record-keeping requirements for volunteer examiners and volunteer examiner coordinators in fulfillment of present Section 154(f)(4)(J) of the Act.

2.4.3. The Executive Committee reviewed the FCC proposal to Congress for a new Section 333 of the Communications Act, which would make willful and malicious interference subject to the more severe criminal sanctions specified in Section 501. The Committee expressed strong support for more timely and effective remedies to eliminate malicious interference, but noted that there are significant risks associated with proceeding too quickly from administrative to criminal sanctions. The Committee expressed its belief that the objectives of the legislation could be accomplished through full use of the Amateur Auxiliary to gather evidence and streamlining of the administrative process.

2.5. Next, the Committee considered an ARRL position toward the late-filed "reply comments" of Don Stoner, W6TNS, in RM-5241, Stoner's proposal for a Public Digital Radio Service. Since the late comments did not have the benefit of general public discussion and Stoner did not serve other parties at interest with copies of his "reply comments," on motion of Mr. Wilson the League will file an Opposition to Acceptance of Late-Filed "Reply Comments."

3. Counsel Imlay reported on local RFI and antenna matters. It was the consensus that Counsel Imlay should warn volunteer counsels to be observant for new satellite-antenna ordinances in response to the pre-emption Order in Common Carrier Docket 85-87, which might impinge on amateur rights enunciated in PRB-1.

4. Review of progress on Board directives:

4.1. The President reported on the current status of PR Docket 85-105, automatic control of amateur stations in data communications (e.g., packet stations). The Commission granted on March 14 the waiver requested by the ARRL allowing the relaying on frequencies above 50 MHz by amateur packet stations using the AX.25 or compatible protocol of third-party messages introduced into the network by stations under direct or remote control, until such time as the Commission completes its consideration of Petitions for Reconsideration in the Docket. On motion of Mr. Wilson, the League will file "Oppositions to Petitions for Reconsideration" filed by others insofar as they ask

for automatic control of data stations below 30 MHz and/or appear to ask that automatic data privileges above 50 MHz be suspended until similar privileges can be made available below those frequencies. The League will seek Special Temporary Authorizations for a unified network of approximately 15 packet stations to use automatic control for one year on not more than one frequency per HF band at speeds not to exceed 1200 baud, to determine the potential for interference of such operations to amateur stations using other means of communication.

4.2. Mr. Stevens reported on the progress of the Volunteer Resources Committee toward the tasks assigned it by the Board. Mr. Nathanson presented a similar report on behalf of the Administration and Finance Committee. Mr. Holladay, as chairman, reported on the formation of the Special Committee to Study the Advisory Committee Structure.

4.3. The Executive Vice President presented a report on various assignments to the Headquarters from the Board. The organizational charts called for by a Board motion were distributed. The new ARRL Extra Class certificate, requested by the Board after FCC stopped issuing such certificates, was displayed. A proposal for a variety of bulletin boards in the MCI electronic mail network was perused but not adopted at this meeting. A status report on negotiations for special rates with a hotel chain was presented. Preliminary plans for an amateur-radio visitors' center, museum and library to be opened in 1989 were discussed. In accordance with Minute 64 of the 1986 Annual Meeting the price for general circulation copies of the Repeater Coordinator Newsletter was established at \$1.50 per issue; the Newsletter will continue to be furnished on a complimentary basis to established coordinators. Finally, a program to make League study material more readily available to instructors and students was described. The consensus was that the program was needed; it should, however, be monitored on an ongoing basis by the Publications Committee. During the course of the above discussions, the Committee was in recess for luncheon from 1:08 to 1:45 P.M.

4.4. The Executive Vice President presented a report updating the discussions with the FCC on possible assistance from the ARRL to the Commission in issuance of call signs. The discussions continue, with the next response to come from the FCC; no committee action was required at this stage.

5. Studies requested of the Executive Committee by the Board at its 1986 Annual Meeting:

5.1. The Executive Committee deferred until its next meeting consideration of a staff draft of revisions in the policy under which mailing lists are furnished. The Committee has been asked to make recommendations on this subject to the Board at its July meeting.

5.2. The Board asked the Committee to study whether the general policy on ethics and the specific policy on relations with the Federal Government should be applied to additional leadership volunteers. The study was continued until the next meeting.

6. The President reported briefly regarding the IARU Region 2 Triennial Conference to be held in Buenos Aires, Argentina, beginning on October 20. The ARRL delegation headed by President Price will include Executive Vice President Sumner, International Vice President Ted Olson, K0TO, and Director Turnbull. The CRRL delegation will be headed by Vice President/Secretary Harry MacLean, VE3GRO. Also attending from the U.S. and Canada in their IARU roles are Past Vice President Richard L. Baldwin, W1RU, and Past President Carl L. Smith, W0BWW, President and Vice President, respectively, of the Union; Director Butler as a member of the IARU Region 2 Executive Committee; and CRRL President Thomas B. J. Atkins, VE3CDM, as IARU Region 2 Treasurer. On related matters, the President announced that Director Turnbull had been asked to do preliminary studies on a site in the U.S. which might be proposed as the venue for the next Triennial Conference during the League's 75th Anniversary Year, 1989. The President has asked First Vice President Holladay to represent the ARRL at the 60th Anniversary celebration of the Japan Amateur Radio League in Tokyo November 8, 1986.

7. On motion of Mr. Turnbull, the names of 48 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in QST.

(continued on page 74)

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.

THE SPIRITUALITY OF HAM RADIO

□ March *QST*'s It Seems to Us on spirituality reminds us all of a basic goal of humankind—pushing the envelope between knowledge and the unknown.

In this age of "high tech," our lives and hobby are filled with products that have spun off from this quest into the unknown—computer based appliances, smart hand-held radios, SSTV and packet communications.

However, pleasures in these material spin-offs can wear out with time. Greg Livingston, WA2EVH/1, observes in his letter to Correspondence that chasing "counties, countries, and grid squares" can get boring. He suggests experimenting with an earlier technology—vacuum-tube hardware. Other hams, including myself, have found similar enjoyment in restoring and reactivating old equipment.

Could it be that part of the spirituality of advancing our knowledge base is a need to remember where we have been, and how we got to where we are now?—Roger Fell, N8DZE, Aurora, OH

□ Plaudits to Dave Newkirk, AK7M, writing in the March '86 *QST*'s It Seems to Us, for articulating so eloquently the feelings and thoughts of myself and, I am sure, many others, amateurs and nonhams alike.

He expressed so well why—even though hundreds are lost in air crashes each year—we felt, to such a degree, such frustration and sadness over the loss of those seven aboard the *Challenger*.—Don Walter, W7NG, Seattle, WA

CHALLENGE OF A HAM

□ There is nothing like the challenge and satisfaction of operating with your own home-brew equipment at these power levels! It's a real thrill to complete a satisfactory contact, and I wouldn't trade it for a kilowatt! Greg has gone a step further with his 6CS-6L6 transmitter, and I'd be pleased to provide guidance for any of the younger crowd to build similar equipment in this area.—Herb Levy, N3CDR, Rockville, MD

[Editor's Note: See Greg Livingston's comments in Correspondence, Mar 1986 *QST*, p. 8.]

HIDDEN MESSAGES

□ While recently watching some old Mickey Mouse cartoons on TV, I have been fascinated by some of the high-speed CW gags concealed in them. For instance, when Mickey lifts the flap on his mailbox, it emits a QRQ "HI KID." Then there is a sequence where Donald Duck is about to be stung by an angry wasp which is sending out a fast "CQ CQ CQ" to attract other wasps as it homes in for the kill!

What fascinates me is how these bursts of CW got onto the sound tracks. I can't help wondering if they were slipped in by hams in the various sound crews. I wonder if any of your readers can shed any light on this? More particularly, if the originators of those messages are still around, I would like to give them a quick "dit-dah-dit" and "dit-dit-dit-dit dit-dit." Their messages are *still* being

received and understood, Hi!—Bill Omer, G3DOJ, Burnham, United Kingdom

CLUTTER-CLUNK VERSUS CW

□ The centurions of ancient Rome, during the time of the decline of their empire, sought to preserve Roman civilization and culture against the incursions of the barbaric hordes.

And, so it is that during the last quarter of the 20th Century, a dwindling number of amateur and professional radiotelegraph operators seek to keep the Morse spirit alive during a time of rapid encroachment by "high-tech," high-speed, fully automated systems of communication.

It is essential to preserve the cultured and civilized tones of the radiotelegraph signal as compared to the totally mechanical, barbaric, uncivilized and uncultured sounds of the "clutter-clunk," "churgle," "grunt," "chirp-chirp," "beep," "oink," "splutt," "honk," "hoot," "howl," "whine," and buzz of the so-called modern high-tech, instantaneous "communications."

It is said that history repeats itself. It would seem that what we are experiencing is a parallel to that of the Roman Empire. Surely the howls and grunts of the barbarians of that time were more intelligible than the sounds of our modern "communications" systems.

Could such a decline in the ability to communicate with each other herald the decline and fall of our American civilization?—Charles P. Krause, N7ESJ, Reno, NV

VEC

□ I am 39 years old and have wanted to be a ham my whole life, but did not get involved until last spring when I passed my Novice test at the Dayton Hamvention. It was, as are all testing sessions I have attended, conducted by the ARRL/VEC, professionally handled and expertly presented. The study guides for each class of license prepared by the ARRL have also been excellent. I just purchased the new Extra Class study guide, and it is the best so far! Keep up the fine work you are doing in all phases of Amateur Radio.—Speed Gray, N8GZI, Grand Rapids, MI

LET'S GO SCREEN!

□ As we go toward the 21st Century, I wonder if we will see a ham radio that connects to our popular microcomputers where our SCREENS will serve as our new radio's front panel. Virtual radio. What color do you want? That is to say, no knobs, no switches, just your SCREEN and the right software. Use your keyboard. Use your mouse. Naturally there would have to be provisions for a headphone and speakers, mic, amp, etc, but this new hardware could get *real small!*

Look at your present rig. Imagine the entire front panel being video. By using colors, windows, and just medium resolution graphics, startling things could come to the SCREEN for information and control. All info, from *Callbooks* to references could go SCREEN.

Add to this programmability. Certain frequencies at certain times. I want my S meter larger ... okay. I want my frequency for VFO number 3 over here ... okay. I always wanted *this* color front panel ... okay. And you program in how many knobs, their function, size, shape, color, etc. "Roll yer own Radio"! *No 2 would be the same!*

Add real-time digital audio filtering. Add auto logging. Add packet/modem. Add clock. Add calendar. Add auto call. Add concurrent running with other programs. Add scope display. Add counters for QSOs, hours run per band, etc. What's the MUF? Okay, it's right on the SCREEN!

Will we see it? Are ham transceivers just peripherals waiting to be programmed? Are the next significant radio breakthroughs software? Kudos to Doc DX and the Packeteers! The first SCREENERS! It's an interesting time in technology to be a ham.—John D. Seney, KBIHE, Manchester, NH

"FOR ID"

□ An asinine remark heard at times on repeaters is one of identifying. I've never heard it on other bands.

It goes like this, "W9ABV this W9XYZ for ID." Why the "for ID" when identifying? That "for ID" really implies that the operator doesn't know he/she is identifying when saying "W9ABC this is W9XYZ."

Or, maybe that operator thinks everyone is stupid so he/she must tell them he/she is identifying.

The real corker happened tonight when two stations were talking back and forth for almost an hour with both identifying as above about every 4 to 6 minutes or so. How disgusting!—Frank L. Guth, W9BCC, Stevens Point, WI

"T" IN RST STANDS FOR TRIVIA

□ Trivia is a craze of modern life. It concerns bits of useless, or relatively useless, information. As participants in this life, Amateur Radio operators are vulnerable to this fad, although we deny our hobby is trivial!

Amateur radio is marked by some useless information which all hams, at least those on CW, foster. Consider the RST report. Question: When did you last hear anything other than "9" for the *last* digit in such a report? Probably never. Any other numeral would be rare. If one has heard a lower one, it was during days before transistors and PLL! So, it is not trivia to ask "Why use that numeral?"

We now have highly stable circuits and excellent filters, hence a nonpure dc note is the rarity. Purity is commonplace. Why include, then, an index of tone in a reporting system? A good note may be assumed always. Therefore, a digit assigned to the "T" position of an RST report is unnecessary, even detrimental to efficient communication. That position is a remnant of radiotelegraph communications history.—Charles J. Ellis, W0YBV, Cambridge, LA

Unusual Awards

Jubilee 150 Award

The Wireless Institute of Australia (SA Division, Inc) has a beautiful new award for hams and SWLs who earn 150 points during 1986. The multicolor certificate contains six languages, all celebrating South Australia's 150th birthday this year (see p 12, Mar QST). Contact a station only once on each band. Here's what the points/contact look like (they're calculated from the location of the station claiming the award).

QTH/Band	1.8	3.5	7	14	21	28	50 and Above
VK5	1	1	1	1	1	1	1
VK1-4,6-8	3	1	1	1	1	2	5
Other Oceania	5	3	2	1	2	3	10
Rest of World	6	5	3	2	3	4	10

(Exceptions: Satellite and EME count 5 points.) WIA affiliated-club stations count double: VK5s WI WIA ALE ALM ARN APC ARC BAR BPA BWR LZ RCN SR. Jubilee station VK5JSA counts 15 points (alternative prefixes allowed). Stations other than VK5 are allowed repeater contacts on VHF/UHF. Any mode or band, and awards will be endorsed appropriately if requested. Contest contacts count. (Remember the VK/ZL/Oceania Contest: Oct 3-4, phone; Oct 18-19, CW.) Submit log extracts showing call, name, QTH, plus date/UTC, worked/heard, RS(T) received/sent, band/mode, points claimed. For further information and to apply, write to Mr. R. J. Bruce, VK5OU, GPO Box 1234, Adelaide 5001, South Australia.

10th Asian Games Award

The Korean Amateur Radio League, Inc, is sponsoring an award commemorating the

10th Asian Games, to be held in Seoul Sep 20-Oct 5. Open to hams and shortwave listeners. Contacts may be made Jan 1-Oct 5, 1986. (1) Class HL: issued to those working 10 HL stations, including at least one HL1 (Seoul) station. (2) Class DX: issued to those contacting 10 countries participating in the Asian Games (including an HL station); your own country doesn't count. Cards from the commemorative station, HL86AG, count toward five HL stations or 5 participating Asian countries. (The 36 member countries of the Asian Games include A4 A5 A6 A7 A9 AP BY DU EP HM HS HZ JA JT JY OD S2 V8 VS6 VU XV XW XZ YA YB YI YK 4S 4W 7O 8Q 9K 9M 9N 9V HL.) Applications with usual data go with 10 IRCs/\$4 US to KARL, CPO Box 162, Seoul 100, Rep of Korea.

Derby and District Amateur Radio Society 75th Anniversary Award

An outgrowth of the Derby Wireless Club, 1911, the club is sponsoring this award in conjunction with the Derby City Council for contacts with special-events station GB3ERD during the anniversary year of 1986. In addition to GB3ERD, amateurs outside the UK must work two other stations in Derby; hams within the UK need to work 4 Derby stations. Copy of log details showing the 1986 claims must be certified by two other amateurs and accompanied by a 9- x 6-in SAE plus 75p UK or 5 IRCs (outside UK). Send your entry to G4HDP, 97 Woodlands Rd, Allestree, Derby DE3 2HH, UK.

TTI Award

The Radio Club of Costa Rica sponsors the TTI award, requiring two-way contacts (any mode) with seven of the eight call areas of Costa Rica: T12, San Jose; T13, Catago; T14,

Heredia; T15, Alajuela; T16, Limon; T17, Guanacaste; T18, Puntarenas; T19, Isla del Cocos. If you worked the club's official station during 1983 (TI0RC, TE30RC), you may use the contact to replace one call area. Send your verified list of cards to the Awards Manager of the Radio Club de Costa Rica, Apartado 2412, San Jose, Costa Rica.

New Cagou DX Award from New Caledonia

The New Caledonia Amateur Radio Association is pleased to announce the availability of a new DX Award—Diplome Cagou—an attractive multicolored certificate featuring a map of the New Caledonian Islands and a drawing of New Caledonia's unique bird, the Cagou. Six contacts are required (any band) since Jan 1, 1972. SWLs may also submit heard reports. No cards required; just submit log extracts. The fee is 12 IRCs to cover the award and airmail return postage. Write to ARANC Award Manager, Box 3956, Noumea, New Caledonia.

Islands on the Air (IOTA)

IOTA is now an RSGB-sponsored award, catering to DXers who are interested in contacting the world's islands and island groups. In the mid-1960s, the award was created by Geoff Watts, a prominent British shortwave listener. In 1985, RSGB took over this award, one seeing a lot of interest in these days of poor propagation. If record keeping and atlas searching intrigues you, send the equivalent of \$3 US for your 7-sheet packet to Roger Balister, G3KMA, La Quinta, Minbridge, Chobham, Woking, Surrey GU24 8AR, England. (Now, let's see, it's just a little jaunt over to the west coast of Florida to Sanibel Island!)

THE DX BULLETIN

After a number of years at a tough job, Jim Cain (K1TN) has relinquished publishing *The DX Bulletin*, an operation that has now wound up in the hands of Chod Harris, VP2ML. Chod, a former ARRL employee and a recent DX editor of 73 magazine, has operated from Easter Island, Sierra Leone, Galapagos, Christmas Island, Senegal, as well as Montserrat (and others). Landline discussion with Chod indicates he has plans to appear regularly at DX gatherings and has ideas of his own for future enhancement of this weekly publication. For further information, contact Chod Harris, VP2ML, *The DX Bulletin*, 816 Fourth St, Suite 1001, Santa Rosa, CA 95404, tel 707-523-1001.

VE3KFE/4U—NO MORE FUN

The following is courtesy of W6BDN.

There are many aspects of DXing that enhance the challenge and sport of the pursuit. When you've worked a country, the question occasionally arises as to what country you have worked. Usually it is no problem. Sweden is Sweden, for instance. Sometimes it's more

Flash! Clipperton Update

Hard on the heels of last month's How's DX? lead story comes word that Clipperton FO0XX will be operational again for about a week in early May. Their main goal this time will be to contact stations in Europe, Africa, the Middle East and the USSR who were unsuccessful in working the previous DXpedition.

complicated—the USSR calls (and others) can be quite confusing. And some of those new call signs ...!

VE3KFE/4U, Contingent UN Disengagement Observer Force in the Golan Heights—now there is a challenge! Is it a separate UN enclave? Is it a country? Will it become a country? (Surely, it is not Canada.) But, how about Israel? (It's Israeli occupied.) But then, is it in Syria? Does it count for anything? These questions, and others, are all potential tormenters for the questing DXer. But, this is all part of the fun.

When the QSL card arrives, however, the

sport (or anguish) is ended. Imprinted thereon is, "This card counts for Syria, YK." No more questions. No more fun.

TRAVELERS' CENTURY CLUB

The February column carried a brief item submitted by WA7HHX (and numerous others) about the TCC. Some interesting "extras" supplied by W6CF show that this club was first organized in 1954 by a group of the world's most widely traveled people. (W6CF notes that one of the club's founders is an ex-SWL, and that the club's countries list was derived from ARRL's list!) TCC's "official list of countries and island groups" encompassed a total of 308 listings as of early last year.

Although some listings are not actually countries in their own right, they have been included because they are removed from parent countries, either geographically, politically or ethnologically. After consideration as to how long one must have stayed in a country or island group to qualify, it was decided that even the shortest of visits would suffice.

The "differences" are interesting, particularly in Europe: Bosnia and Herzegovina (Sarajevo,

Troster's Tips for Easy Listening

For your first DXperience operating as a DX station, choose someplace that is not extremely rare—say the Caribbean or a Pacific Island. You'll get plenty of action and can practice and sharpen your techniques of coping with a pileup before you go for the really rare DX location, where inexperience could lead to a disastrous lid-like performance.

First, you will need proper licensing and (perhaps) various radio permits to operate. Get those before you leave. You must be able to present such certified documents to ARRL to prove your operation was legal, and therefore can count for DXCC, etc.

Tips: Write to ARRL for licensing information on the country you plan to visit (well in advance!), ask an amateur in that country for licensing/permission information, and you can also write the Department of Posts and Telegraph in the country of your concern.

More next month from W6ISQ.

Yugoslavia); Croatia (Zagreb and Dubrovnik, Yugoslavia); Macedonia (Skopje, Yugoslavia); Cyprus (Rep of); Cyprus (Turkish Federated State of). [I wonder if they have a Criteria Advisory Committee.—Ed.]

If your interest is piqued, write to the Travelers' Century Club, 8033 Sunset Blvd, No. 9, Los Angeles, CA 90046.

7P8CT/3D6BG/G3ABK

G4GEE relates the sad news that his friend Fred Burns (calls above) died on Sep 3, 1985. Fortunately, G4GEE has the logs for Fred's operation in Lesotho (Apr 2, 1983 to Mar 3, 1984). During this period, there was a problem with a

pirate using 7P8CT, mainly affecting US stations. This bogus operation seems to have centered around Aug 15-16, 1983, mainly on CW around 0000Z. Fred actually did very little CW operating. In addition, G4GEE has the logs for Fred's operation as 3D6BG, covering Jul 3, 1985 until his death.

Bob Nash, G4GEE, will willingly deal with any requests for cards directed to his home address. (If you've previously submitted cards via the bureau, you might wish to try again.) Bob notes that he will also respond to any requests for cards for his own operation as 7P8DD: Bob Nash, G4GEE, 135 Farren Rd, Wyken, Coventry CV2 5EH, West Midlands, England.

HOW'S DX?

Pundit W6CF has accomplished some additional fun-type research, coming up with an "early" use of this column's title! Really, this all started with Jim asking me if I knew when the phrase was first actually used in print. But it was W6CF who discovered that there was an obscure pre-WW II magazine called 73, the "Official Publication of the Federation of Radio Clubs of the Southwest ARRL" (no relation to the current periodical). It was about this period of time that the Southwestern Division of the League "split off" from the Pacific Division. (That's probably about when all that formidable Northern and Southern California DX Clubs' rivalry started!) The How's DX? column of that period was written by Bill Seitz, W6HXU. Even then, it captured a few distinct flavors of what would come later, that of W6QD (the magazine's Advertising Manager of the time); W1JPE/WIDX, the mastermind behind QST's initiating and writing a DX column of this type; and polished and prolific long-time QST DX Editor W9BRD.

THE CIRCUIT

□ **HL5AP:** HL5AP (ex-HM1AP, HM9AP,



After years of maritime operation, HL5AP retired at yearend. See first item in The Circuit.

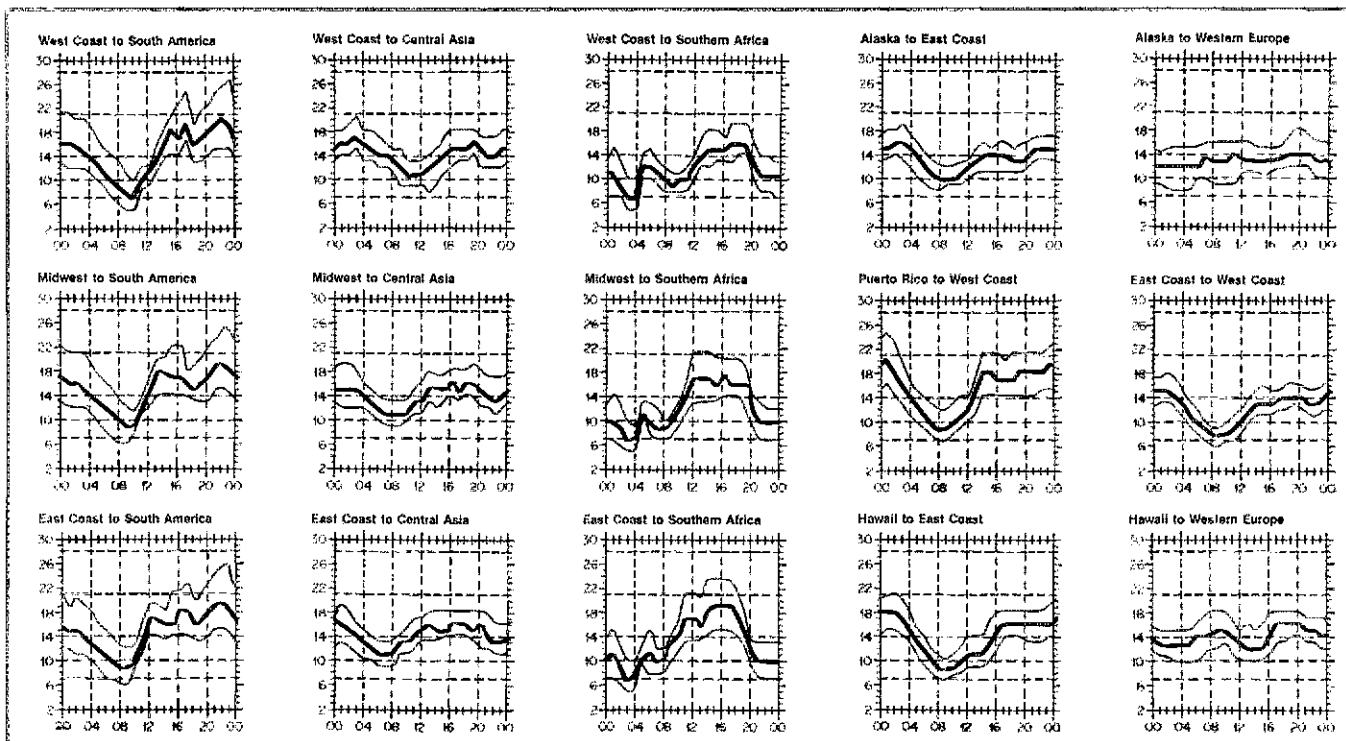
PA9SR, EL0P, 5L0P, EL0P/MM, HM5AP/DL, YB0ZAA/HM5AP) retired his maritime operations at yearend. All confirmations go via Byong-joo Cho, PO Box 4, Haeundae, Pusan 607-04, Rep of Korea.

□ **SCDXC:** The Southern California DX Club recently elected N6CGB as President, W6FRZ as VP, N6OU as Treasurer and KG61P as Secretary (Directors include N6V1, AS6AOA and W6AE).

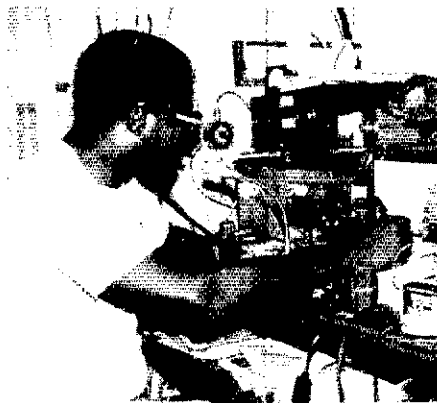
□ **7J6AAB:** YL KA6ZYF toured Japan Nov-Dec, operating on 20 and 15 from six locations. Mady enjoyed being called by XU1SS, BY1QH and JT1KAA! Special thanks from her to the JA hams who permitted her to use their stations.

□ **KC4AAC:** K00R is still looking for a valid route for his Nov 14, 1980 contact with this one.

□ **P4:** As of Jan 1, petitions for operating on Aruba go to the Ministry of Transport and



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic



J88AR, president of the St Vincent and Grenadines Amateur Radio Club. (tnx K1KI)

Telecommunications, Oranjestad, Aruba (Caribbean). The existing reciprocal agreement with Netherlands Antilles will also apply to Aruba.

□ **Aruba:** In line with the item above, it should come as no surprise that a big operation was planned for the ARRL CW DX Contest by K9GL/VP2V, W9YH, J87J and VP5FUX.

□ **Volunteer:** KB4JHX, a member of the Southeastern DX Association and a former member of the South Florida DX Association, is now residing in the Atlanta area and is willing to volunteer as a QSL Manager. You can reach Buzz Ashby at 681 Battersea Dr, Lawrenceville, GA 30245.

□ **The Colvins:** Lloyd and Iris noted (earlier this year) that they concluded their Swaziland operation with 130 countries worked and about 6500 two-ways. The DXpedition was unusual in that

it used a small multination, two-vehicle convoy organized in Lesotho. The group included Lloyd, Iris, 7P8CM (English), 7P8DF (German) and 7P8CI (Austrian). The group (with the exception of Lloyd and Iris) made the trip primarily to conduct the first major satellite operation from Swaziland; it was successful, with some 400 QSOs in 40 countries.

□ **T32:** Not much help now, but mail received at our earlier deadline time indicated a JA expedition to Eastern Kiribati the end of March. Cards via Junichi Tanaka, JH4RHF, 1-4-6 Kotobuki, Hattori, Toyonaka, Osaka 561, Japan.

□ **Deadlines:** In line with the above, please note that this column now gets mailed to HQ the 7th of the month for the issue two months hence (eg, mailed May 7 for the July issue). Plan your hot news accordingly if you want to make a timely issue of *QST*. Last-minute input to your editor can go via 305-248-0282 after 6 PM Eastern Time.

□ Association Des Radio Amateur (3A) De Monaco, PO Box 2, MC-98001 Monaco Cedex.

□ OEVSU (OE), Theresiengasse 11, A-1180 Vienna, Rep of Austria.

□ ARRSU QSL Bureau (T7), PO Box 77, RSM-47031, San Marino.

Special Notes

□ **QSL Corner,** Mar 1986, contains information on the operation of the ARRL Outgoing Service. The Dec 1985 column contains information and addresses for ARRL Incoming Bureaus. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

QSL Corner

Administered By Joanna Hushin, KA1IFO

QSL BUREAU ADDRESS CHANGES

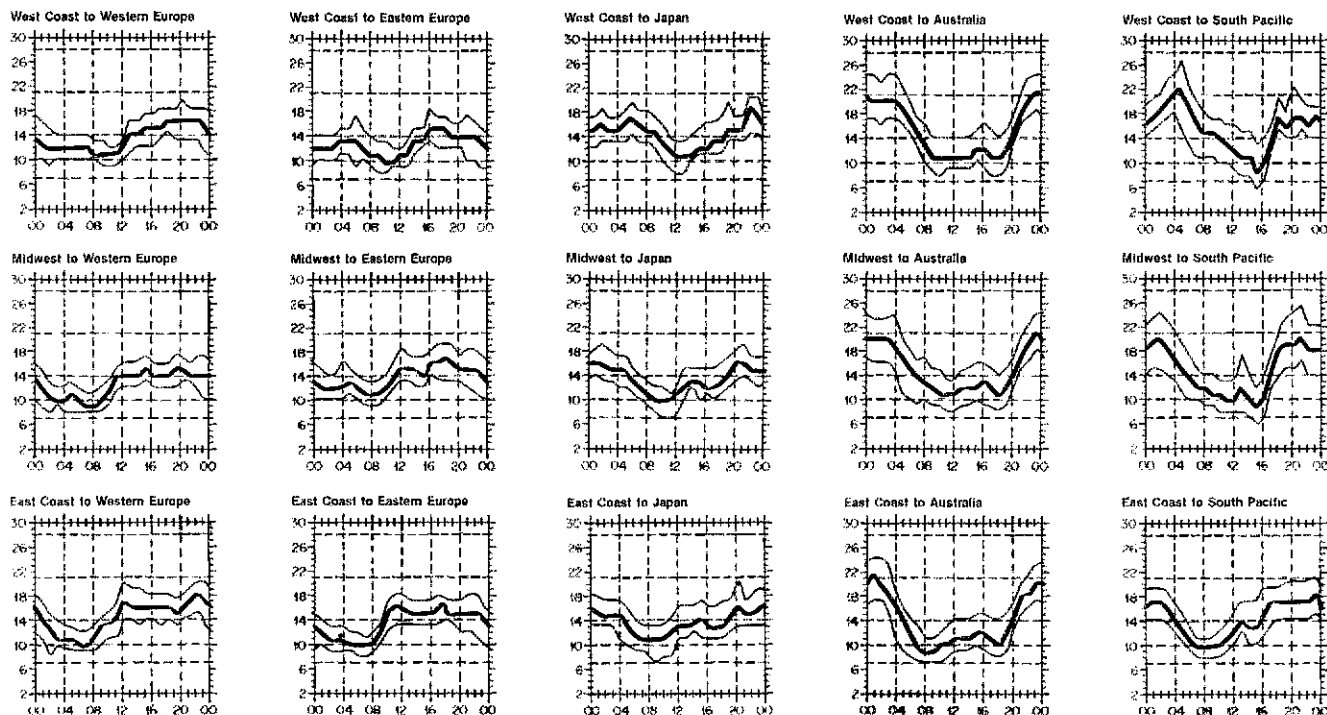
□ W1 QSL Bureau, Mt Tom Repeater Assn, Box 216, Forest Park Station, Springfield, MA 01108.

□ REF QSL Bureau (F), PO Box 273, F-81209 Mazamet Cedex, France.

□ HI QSL Bureau (HI), c/o Luis P. Caamano, HI8LC, PO Box 88, Santo Domingo, Dominican Republic.



Thanks to an American friend who sent him a couple of copies of *QST*, TA2NC, of Eskisehir, Turkey, recently became a member of the ARRL. Equipment in Turkey is scarce or very expensive, so TA2NC has to make do with an old receiver on 21, 14 and 7 MHz, but he soon may be able to get a used transceiver.



frequency, or FOT). See April 1983 *QST*, page 63, January 1977 *QST*, page 58, September 1977 *QST*, page 35, and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for May 16 to June 15, 1986, assume a sunspot number of 10, which corresponds to a 2800-MHz solar flux of 72.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from December 1 through December 31, 1985. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed								
A9XG/102	JA4VAD/298	SM4EPR/102	YB2BGZ/129	N1ASJ/100	WB2QHO/101	KJ4CO/102	KC7LZ/108	KA9LTR/183
HB9CRV/124	JA8DJY/228	SM4OGQ/108	YB4FNN/100	W2P/106	W3DBA/110	AK6Q/224	W7BG/276	WBVX/100
IK6CGO/210	SK4EA/146	SM7MPM/106	YU2NW/233	WA2YNH/265	N4HZ/101	WDSJCX/107	NJ8N/277	W0IZV/100
JA2VB/126	SM3CBR/152	VE6BB/107	ZS3BI/101	WB2ONZ/102				
Radiotelephone								
CT1AVR/155	G4VKV/100	IK2AEO/105	LA2LZ/104	YB5QZ/104	K2BDY/DU/168	W2BIE/256	WA2KDC/103	KA6KKN/273
DA2TH/107	JA8DJY/228	IK2AEO/105	LZ2AB/107	YC6EML/109	N2CTJ/103	W2DFZ/100	KJ4CO/102	KC7LP/104
DF5CT/101	HB9DAX/102	JN1WOZ/110	SK4EA/143	YV6BTF/116	N2DXJ/181	W2JUM/197	AK6Q/129	KD7YD/100
EA5CED/110	HB8AON/100	JA4VAD/274	SV0DC/118	KB1GN/100	N2FS/106	WA2ICE/101	N5FNW/105	KY7M/190
FD6ITD/216								
CW								
A22ME/101	FD6IDZ/113	IK6CGO/165	JA8DJY/202	LZ2AB/110	SM4OGQ/108	K3SEW/112	KN7L/100	KA9LTR/128
DL1KH/102	G4AFU/100	JA4VAD/136	KL7UR/100	SM3CBR/128	YU2NW/218	WC5N/100		
160 Meters								
WB2CZB/100								
5BDXCC								
IV3TQE	HC1OT	N6JR	LA9TCA	DK3OI	LZ2AB	NM8K	DL5MBY	DK5JI
PT7WZ	AK1L	W2KF						

Endorsements

Mixed								
A22ME/180	HB9CND/236	QZ3Y/349	4X4FU/326	KB2RV/309	N4AH/320	WD5GJB/300	K7WF/280	K9PQG/322
A71AD/298	I2MOV/285	PT7YS/352	AD1V/224	KB2RZ/301	N4LX/311	K6AG/318	KA7JVV/171	KA9CFD/179
DJ4XA/326	I3OBQ/311	SM4EAC/331	AG1C/263	ND2K/200	NA4D/305	K6AXC/322	KA7KMP/150	KJ9N/249
DJ5IH/262	I3VRV/326	SM6AEK/340	K1EFI/317	NI2C/247	W4FDA/331	K6FLX/300	KC7EJ/293	KD9Q/290
DJ5MC/316	IV3PRK/334	SM6LIF/250	K1LEC/250	W2CKR/285	W4HR/353	K6G6F/271	KX7J/279	K8BU/268
DK3GJ/328	IT9AF/311	TF3SV/322	K1VR/319	W2KF/222	W4MWT/315	N6DR/161	W7GLU/295	N9DOK/261
DL1VJ/269	JA1CJF/328	V9FB/170	KA1CRP/124	W2UGM/210	W4VWW/285	N6HL/302	W7HS/220	W9BM/351
DK9K/168	JA1SVP/313	VE2WA/290	N1AKX/303	WB2SZY/128	WB4FTU/301	N6VO/285	K8CCV/183	W9ISF/173
DL5MBY/248	JA2AH/329	VE3GS/332	W1CYB/271	W1CH/186	K3GL/360	W6CF/343	K8E5/258	W9KR/1267
DL8NU/338	JA2GSQ/182	VE3OX/293	W1PEA/303	W1PEA/303	K3WGR/254	W6ERS/343	K8BB/163	W9OKL/297
DL8UP/312	JJ3WUG/186	VE7AHA/312	W1SG/255	KA3ZF/152	N3CSL/128	W6KFX/305	KA8JZ/201	W9UQ/280
EA2CR/288	JR6BU/288	VE7DX/310	WA1LOU/282	N3RL/311	K4KZ/128	W6RFV/319	W8ELE/327	W9WM/344
F6FHO/293	JA7HMZ/301	VE7XO/291	WA1WTP/294	N3TO/292	N5UR/319	W6WO/300	W8GS/319	WA9AEA/186
F6HGB/148	KH6BZF/296	YU1OW/301	WA1ZLK/296	AG4S/293	NX5B/288	WA6OGW/317	W8ZC/355	WD9IX/309
F9BB/214	OH1SM/263	YU1DZ/320	K2CM/333	K4LNO/301	W5VJP/318	W8RIU/311	W8VDC/300	K8OU/300
F9YZ/330	ON4UN/337	YU3DQ/300	KA2BZS/290	K4OC/310	W5ZF/321	W86SRK/265	WD8OFB/195	KN0V/303
G4EDG/252	ON5FU/314	YV5BNR/282	KA2K/300	K4RZ/321	WD5AAM/285	K7BR/325	K9BY/322	K8OC/KH2/208
HB9BMZ/182	ON7EM/307				WD5ETI/149	K7SPL/220	K9FYZ/315	W0BX/266
HB9AZO/294								
Radiotelephone								
A22ME/176	I3OBQ/306	QZ3PZ/328	XE1OW/301	WA1ZLK/296	KE4SN/175	W5MUJ/150	WB6RIU/311	WB8WIV/125
A71AD/288	IV3PRK/334	OZ3Y/356	YD3JU/344	KA2BZS/275	W4EBO/316	W5VJP/318	WB6SHK/265	K9DXO/318
DF7NM/299	I4BAC/321	PT7YS/351	YU6ZA/201	KB2RZ/301	W4MWT/314	WD5AAM/285	K7SPL/218	KJ9N/224
DJ4XA/304	I8OLK/328	SM4EAC/331	ZS5PG/327	KB2TN/152	W4RXT/290	K6AXC/322	KC7EI/293	K8BU/291
DJ5IH/256	I8SSW/317	SM6AEK/332	4Z4VG/205	N2ERN/130	WB4FTU/293	K6BKL/205	KD7UJ/175	N9BA/303
DL5MC/276	JA2AH/327	SM6CVX/329	K1EFI/303	N2KW/222	K5BG/289	K6NM/291	W7BG/275	W9BM/327
DL4NN/183	JA2GSQ/181	SM6LIF/250	KA1ION/152	NI2C/222	K5KNA/160	N6HL/220	W7GLU/290	W9DMH/313
DL8NU/335	JJ3WUG/186	Y9FB/170	N1AKX/280	W2CKR/271	K5BG/276	N6VO/263	K8IQB/271	W9OKL/297
F6FHO/291	JA7HMZ/276	VE3GS/332	N1BPJ/177	WA2YNH/265	K5QA/324	W6CF/277	K8REG/209	W9WM/235
HB9BMZ/177	KH6BZF/293	VE3QA/356	W1CYB/271	KB3OO/300	KD5VU/206	W6DSY/206	KC8CV/310	WA9AEA/182
HC1OT/200	IJ3MJC/263	VE3XO/291	W1CH/181	KM3N/210	N5AFV/154	W6NGZ/201	NJ8N/270	K8OC/KH2/202
I1GEA/329	ON4UN/337	VE7AHA/300	N3RL/303	N3RL/303	N8DO/202	W6RFV/311	W8GS/276	W0YL/176
I1UW/325	ON5FU/313	VE7DX/302	WA1LOU/265	K4LNO/301	W5FGO/250	WA6OGW/315	W8NOF/202	WD8GBU/153
I2MOV/281	ON6HE/312	YV1CW/211	WA1WTP/293					
CW								
DF8ZH/267	HB8NL/141	JA7FS/266	VE7AHA/260	W1JR/299	WB3JRU/268	WB4CSK/201	K7WF/200	K8BB/125
DF9HE/209	I2MOV/155	JA7HMZ/261	VE7DX/227	WA1WTP/131	AG4S/277	AK5Q/174	KU7Y/204	WB2CQ/301
DJ2GW/232	I3OBQ/304	OZ3Y/300	4X4FU/277	N2AC/209	KN4B/232	KD5MD/283	KY7M/176	K9PQG/203
DJ4XA/286	ISUNA/201	SM5DAC/189	AG1C/142	K3WGR/250	N4GG/166	WB5DPP/156	N7EPD/128	K8UG/269
DL1VJ/269	JA1BGS/249	SM6CVX/186	K1EFI/280	N3RL/276	N4GV/1126	N6VO/202	N7RO/250	N8RR/309
HB9CND/236	JA1SVP/267	VE6CHW/182						
RTTY								
W6MI/130								
160 Meters								
W1JR/129								

DXCC Notes

Annual Listing Corrections

Mixed: PT7WA/310, VE3NSZ/157, W1RED/321, WB1DQC/309, W2PN/342, K5GH/326, K5GOE/280, WA6TLA/315, WB8PYL/322, W9WY/332, WA0IDK/312. Phone: K1MIZ/298, KA2AJT/225, N2ERN/104, W6OMR/313, WD9HAW/300. CW: VE3BK/297.

The totals shown below are exact credits given to DXCC members from January 1 through January 31, 1986.

New Members

Mixed

DF4IA/104	G3UKH/105	JE7LHT/110	OE5THL/106	VK2COP/109	K3KG/321	WC5E/103	W7UN/113	N9CNF/101
DF9KV/103	JA1FVB/106	JA9FF/126	PA3BUD/132	YU2QW/153	K3MMB/132	W5EFA/309	W7YRC/109	WB9CRL/101
DJ8UQ/159	JE2RDO/108	JR0UC/102	PA0BN/103	Z55AZ/102	KC3SA/104	KA6CUU/136	KD8WX/111	KI0G/102
DL6FBH/105	JH3BXO/132	DL6SM/109	PY3AJZ/120	5V7NG/106	W3IOT/104	W6GQK/196	NDBD/102	NOCB/111
EL2AY/113	JJ3JL/110	OH2EE/221	SK0CT/112	KX1T/122	W3YFI/102	W6TWR/109	W8URM/148	WACRIM/100
G3CRF/115	JA4CZM/123	OK1FIW/136	VE7HMS/100	N2DCP/103	KC4OZ/150	KC7EG/106		

Radiotelephone

EL2AY/113	IV3AAC/104	JA5SLM/110	YU2BOP/231	KZ2X/104	K4HV/175	KA6CUU/106	K7KNG/123	KD9EC/163
F6HIZ/279	I6IOU/156	JA9FF/124	YU2CZA/125	N2CFD/103	KC4OZ/146	W6OB/252	KA7BOE/114	N9BRV/109
H89AV/103	JL1XMN/133	OH2EE/114	ZD9CC/108	KA3MMB/114	KF4CR/101	W6SIY/111	W8FO/169	N9CNF/101
HJ3AA/126	JH4UVU/182	SM6CST/279	5V7NG/106	KC3NO/129	W4ODE/122	WB6LHW/121	W8OLC/215	KD6FW/104
I2YFY/121	JR4TET/113	YC2AFP/104	K2KAB/101	KW3X/101	WC5E/101	K7EHI/113		

CW

AL7BL/107	G3CRF/108	JA4CZM/123	PA3BUD/117	YU2QW/138	KA2DYB/102	W4JTL/187	KD8WX/105	N0FIO/107
DL6NU/104	GW3SB/101	OH2EE/107	SM4OT/104	6W1CK/104	N3BNA/129	N7DVN/103	W8URM/138	NI0G/119
E4AMY/298	I2YWR/107	OK1FIW/127	YB2BNJ/107	K2SD/120	N4HHZ/107	K8EJ/282		

RTTY

JA3GM/105	NE4R/104	W6GC/101	W8AH/102
-----------	----------	----------	----------

160 Meters

I2BBJ/106	OK2BOB/101	K1LPS/102	W2LW/102	K5NA/102	WA8TXT/106	K7VIC/100	WD9AHJ/102	N6XA/101
-----------	------------	-----------	----------	----------	------------	-----------	------------	----------

Satellite

W3BWU

5BDXC

ON5WO	KD9M	WB6ZUC	K5SSR	DF3FJ	NQ6E	CT1UA	W9WY	TI2KD
VE3CPU	KC2RS	OH2EF	N5BA (#2000)					

Endorsements

Mixed

AL7BL/265	HA5AW/231	JA8JF/319	XE1XF/279	W2HG/290	KT4M/250	K6BWX/225	K7SFN/312	W9JVF/252
DF6OI/129	H89AHA/337	JA0SC/307	YO3AC/333	W2LW/318	N4AXT/306	K6CFV/124	KC7E/276	W9RY/325
DJ6BN/308	H89ALH/321	OE1LO/346	YO9ANW/157	N4HHZ/142	W2MPI/309	K6LY/142	NB7R/286	W9YTR/310
DJ7CX/341	H89BFCQ/297	OE1ZOS/155	YS1GMV/299	N4HOH/228	W2PD/321	K6BK/304	WA7GQA/182	WA9EKA/307
DK1YK/321	H89HT/313	OK1ZL/312	YU2BOP/276	W4FH/260	WA2DSC/230	KE6L T/288	K8UE/306	WB9YX/312
DK5QK/312	I1BW/285	OY7ML/323	YU2CZA/183	W4JTL/287	WA2NPD/281	KT6T/282	K8BIZ/307	WD9JKZ/259
DL1FBO/253	I2YWR/282	OZ1FAO/262	4X4FJ/348	W82BNJ/319	W4OHZ/313	NG6W/280	K6BV/326	K0WWW/325
DL1FBW/174	IK8EPC/203	OZ2E/264	K1VVK/310	AJ3K/184	W4RA/298	W6NUJ/345	N8ZA/315	KB0U/308
DL1HH/351	IS4NY/232	OZ79G/326	KN1M/192	K3JG/290	WD4R/294	W6QJ/205	NF8Q/274	KD6LL/204
DL1RB/318	JA1JWP/314	OZ7YY/325	KV1S/225	KB3YJ/182	WR4K/326	W6SCC/202	NM8K/293	NOEL/322
DL3BK/354	JA1VN/317	OZ9PP/321	N1AFC/270	KC3D/165	WB5FI/309	W6SIY/179	NM8R/150	ND0F/257
DL7FAH/263	JH1OXV/290	PY1DH/347	N1CPC/149	KQ3Q/230	KMSA/200	WA6AJ/291	WB8IP/307	NI0G/156
DL7SY/314	JA2XW/341	JA2TM/318	N3GB/254	N3GB/306	KUSB/275	WA6HAT/311	WA6VK/286	W9RY/300
DL8AA/305	JA3YS/281	SM4EMO/308	WA3DVO/310	WA3DVA/304	N5FC/317	WA6WZO/318	WB8IXE/282	W9CJ/337
DG2GL/318	JA4FWW/310	SM5RK/334	WR3DNC/302	N5TC/308	N5TC/308	WB6FCR/283	WB8OTZ/283	W9JLZ/317
F3AT/353	JA1UQP/333	SM6CMU/321	W1WLW/333	AA4DO/148	NA5C/291	AL7EL/313	K9AWK/337	W0ULU/127
F5LQ/328	JA3GM/326	SM7LPY/201	WA1FCN/261	AA4FL/151	NJ5J/255	K7CUJ/278	K9K/287	WA0JRB/295
F6DHB/313	JA4JBZ/249	SM0BZH/307	K2NT/300	AA4NC/266	N5SM/268	K7DXD/202	K9T/302	WA0LLQ/161
F6G8H/154	JA5EN/326	VE3BHZ/309	K2QE/345	K4GQ/187	W5DM/249	K7KG/336	K89CH/200	WA0OAH/334
G3KDB/329	JA6GJ/307	VE3IMO/226	K2YGM/312	K4NV/285	W5KWK/253	W7QEV/149	N9FAJ/175	WB0BJP/175
G3GIQ/338	JA6VA/326	VE3LDT/300	N2BJ/299	K4SV/289	WA5ZJ/296	K7OZ/319	N9EJL/226	WB0WAC/270
G3UML/338	JA7BJ/319	VE3KN/334	N2JD/297	KF4YH/227	WD5COV/211	K7PM/264	W9IU/347	W0DBHV/202
GW3SB/240	JA8QR/206	VK5WO/337	W2GA/327	KC4MJ/179	A16W/289			

Radiotelephone

AL7BL/264	I1YG/326	OE1LO/343	6W1CK/215	K3KA/312	WB4YZC/272	W6MDH/271	W7LJ/147	N9AIB/250
CP5AI/200	I2EOW/253	OE1ZOS/154	K1MZN/150	KA3DLT/159	AE5E/272	W6NJU/335	W7QEV/300	W9CZ/301
CP1FW/289	I2JSB/292	OE2GKL/324	K1RAW/322	K8BH/176	K85FU/309	W6UVW/133	W7UZA/293	W9PVD/151
DF4TI/134	I2KUW/207	PY2TM/313	KA1PL/302	N3GB/285	N5FW/306	W6VZ/300	WA7QAA/137	W9RY/318
DJ4ZD/226	I5KKW/312	PY2WT/282	W1MGP/210	AA4NC/229	NJ5J/255	WA6DGK/152	K8VVA/200	W9TEI/300
DJ7CX/317	I5TDJ/344	PY25JR/203	W1WLW/293	K4RSB/309	W5EFA/308	WA6IVQ/253	NM8K/289	WA9EKA/303
DL1HH/338	IK8EPC/200	SM5BCO/341	WA1WMS/199	KC4HN/181	W5KWK/251	WA6WZO/318	W8C/1302	WA9VU/280
DL7SY/306	IS4NY/231	SM5RK/334	KB2HZ/300	KC4MJ/178	WA5PIE/175	WB6FCR/282	W8CUO/344	WD9JLZ/203
EA1TE/125	JA1JWP/310	SM6CMU/298	KB2XP/250	KE4WV/228	WA5ZJ/294	WB6GFF/229	W8JRW/250	K0SE/301
EA5AD/282	JA1UQP/331	SM7LPY/201	N2BJ/297	KF4VS/127	KB6BW/260	K7CUJ/249	W8TLC/126	K0WWW/319
F2MO/343	JH1OXV/215	VE1OC/198	W2GA/320	KF4YH/226	KB6JK/304	K7DXD/201	WB8VKL/283	KB0U/305
G3UML/338	JA2XW/331	VE2FSU/190	W2ICQ/317	K74M/250	KD6WD/183	K7PM/234	WB8WZS/298	KB0V/150
G4GED/254	JR2JBS/180	VE3QJ/249	W2MPI/309	N4AXT/305	KE6L T/287	K7TIC/140	WD8IXE/271	K1J0Y/225
G5AFA/331	JA3GM/317	VE3KN/333	W4RA/298	W4RA/298	KF6EN/175	KC7E/127	WD8OTZ/283	ND0F/169
H89AHA/331	JA4FWM/308	VK5WO/332	WB2BNJ/319	W4TDFW/301	N6DJ/256	KD7CL/249	K9ALP/210	W0JMZ/312
H89BFC/274	JR6EN/250	XE1XF/276	WB2CVL/307	WA4WTG/321	NG6W/255	KD7TD/150	K9KK/282	W0SFU/339
I1BSN/311	JA8XJF/318	YC3CEV/213	WB2NIC/310	WB4PZM/156	KT6T/281	KI7V/289	K9TI/292	W0ULU/296
I1FNX/315	JA7BJ/316	YC3AC/319	AJ3K/157	WB4VHE/192	N6AHV/301	NB7R/275	KB9CH/191	WA0JAH/334
I1HAG/315	JA0SC/259	YS1GMV/299						

CW

DJ7CX/278	G3YBH/125	JA3GM/305	PA0LB/286	Z24JS/193	W2TOC/280	NA5C/190	KR8Y/206	W9RY/294
DK6NC/227	H89BFC/228	JA6VA/287	PY2TM/311	K1NTR/129	K4NV/285	W6SIY/152	WD8IXE/216	WA9EKA/295
DL1HBT/176	H89HT/292	JH7ONG/155	SM4EMO/199	K1VKO/241	KG4O/150	K6TS/225	AK9Y/189	KA0O/150
DL1HH/294	I1BWU/232	OH2BN/296	SM6CMU/277	W1KEE/174	W4DJL/295	WA7HC/129	K9TI/279	K50M/225
DL7SY/275	I8WY/275	OY7ML/237	SM0BZH/263	W1WLW/295	WM4Z/204	K8LJG/295	N9EJL/125	W0ANZ/214
F6HWM/157	JA1JWP/298	OZ1FAO/250	VO1CA/200	NA2G/151	N5FW/291	KD8KX/202	W9CA/202	W0HBB/151
G3KDB/278	JH1OXV/254	OZ2E/237						

160 Meters

W2TOC/150

Walker A. Tompkins, K6ATX: "Always Typing Xcitement"

Author, historian, television scriptwriter, radio broadcaster and ham all aptly describe Walker "Tommy" Tompkins, K6ATX. A native Californian, Walker is well-known for writing Santa Barbara-area history books and for his twice-a-day historical vignettes, which have aired for the past 19 years on Radio KBL5. In the ham fraternity, Walker's claim to fame rests in the skillful combination of his writing talent and Amateur Radio knowledge to produce four (soon to be five) adventure novels (see page 158, this issue, for ordering information): *SOS at Midnight*, *CQ Ghost Ship*, *DX Brings Danger* (all updated in 1985), *Death Valley QTH* (new in 1985) and *Grand Canyon QSO* (to be released later this year). The main character of the series is teenage ham Tommy Rockford, K6ATX. Tommy—who likes scuba diving, football, cars, girls and, most of all, Amateur Radio—often finds himself embroiled in dangerous situations and uses bravery and ham radio to save the day.

Writing and hamming, Walker's long-time vocation and avocation, began at an early age. As a farm boy and high-school student in Turlock, California, in the early '20s, Walker and his dad used to sit up to all hours "fishing for DX" on their one-tube radio. Then another farm boy down the road, 6ADB, got him interested in hamming.

"I wound coils on oatmeal boxes, got a chunk of galena crystal from a Radco mail-order catalog, made a catwhisker out of a pin and strung a flat-top antenna with 4-foot spreaders. The folks gave me a 5-watt transmitter and a pair of Frost headphones, and I went on the air about 1925. But I got a newspaper reporting job as a high school sophomore, and my all-consuming passion to write left me with no time for hamming. But the virus was in my blood and would strike me in 1952."

What prompted you to combine adventure and Amateur Radio in your books?

For some 30-odd years I wrote Western fiction, "thud and blunder" stories for pulp magazines long extinct. In 1952, the dormant ham radio virus in my blood went out of remission. I got myself a Novice license, later a General class, and during the mid and latter '50s was very active in ham radio: CW on 80-40-20, 2-meter AM, president of the Santa Barbara Amateur Radio Club, and founder and publisher of their monthly newspaper, *Key-Klix*. So I suppose it was natural that I would want to try an adventure story starring a ham. My goal was to tell an exciting story that at the same time would encourage teenagers to take up hamming as a hobby. I also tried to insert sugar-coated moralizing without appearing to preach good values—antidrugs, anticigarettes, respect for women, pride of country, respect for parents, etc. I hope I got away with it.

Is your main character, Tommy Rockford, purely fictional or does he have his roots in a real amateur operator?



Despite a busy writing schedule and landlord-versus-antenna problems (now resolved), author Walker Tompkins, K6ATX, hopes to fire up his "museum piece" gear and spend more time on the air.

Tommy is a fictional character. He was the hero of a long series of Western adventure novels, so I used him again for good luck. The other characters are based on hams I have known and have the same call signs and similar names. For example, Doc Baldwin, K6CRJ, is really Dr Nils Bolduan of Santa Barbara. Roy MacCormack, W6AMD, was the late Roy Cormack. In *SOS at Midnight*, the real Santa Barbara County Sheriff Jack Ross appears as Santa Bonita County Sheriff Ross Jackson. I always got their permission and keep myself well aware of the laws of libel at all times.

Do any of your amateur experiences appear in the novels?

Yes, I weave my own ham experiences and philosophies into the stories. I like to include other juvenile hobbies besides ham radio to appeal to wider audiences. That's why Chub Downey appears as a rockhound in *Death Valley QTH*. I also set my stories in locales which actually exist, with real landmarks, such as The Wreckage log cabin, Washington's town of Ocean Park in *CQ Ghost Ship* and San Miguel Island in *DX Brings Danger*. All the locales and details in my latest book, *Grand Canyon QSO*, are real, although the plot is, of course, fictional. I made two runs down the rapids of the Colorado River to research that one.

Do you get to meet many people who are familiar with your Amateur Radio adventure novels? How do they react to your books?
Over the 30 years since K6ATX first appeared

in a novel, I have received many fan letters from readers around the world. But, authors seldom meet their reading public. My most significant fan letter, received in 1966, was from a GI in Vietnam who said that my book *SOS at Midnight* had saved his life. He said reading it as a kid inspired him to get a ham ticket; when he was drafted into the service, his ham experience led to a job in the Signal Corps. One night, he left his jungle outpost to string telephone wire to link his command post with a forward position. They couldn't use radio for communication in that particular situation because the enemy was intercepting messages, so they used land line. When he got back to his outfit, he found that the Viet Cong had ambushed them, killing every GI except him. Hence his belief that ham radio saved his life, via my book. I never heard from him again. My own son was over there at the time. I often wondered if the signalman's luck held out. But his letter sure made me humble and grateful that my own beloved son got back okay.

Besides writing and Amateur Radio, what other activities have you been involved in?

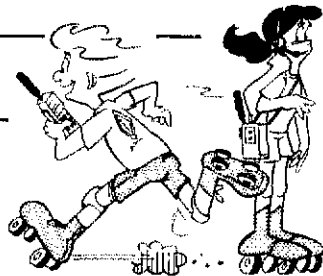
Woodworking, historical research, environmental protection, playing electric organ. As a teenager, I was a drummer in a jazz orchestra, and by age 24 traveled around the world—paid for by writing fiction. I serve on boards of directors of history-oriented organizations and landmark committees, and made amateur movies prior to the videotape cra. My main hobby, though, is writing. I've had 55 hardcover books published since 1931 and over 1500 magazine articles. As a kid, my big ambition was to get my byline in *National Geographic Magazine*. The editors saw an article of mine in *Parents Magazine* entitled "Ham Radio Around the World." They asked me to do a similar article for them. I did, getting 25 cents per word—fabulous for me! That was around 1958, and the article hasn't come out yet! They said after they had bought it they found they couldn't illustrate it! I got my money, but I would have done it for free. It was the bitterest disappointment of a 55-year career.

What should we be doing to make our hobby more appealing to young people?

We need a QST-type magazine which would appeal to the Novice operator or the about-to-be ham. QST is so technical I think it scares off some kids, but of course QST has to keep abreast of the state of the art.

Can you give us a hint as to what Tommy Rockford encounters in future adventures?

If ARRL should order another Tommy Rockford book, it will be titled *Murder by Morse Code* and will feature hang gliding, mountain climbing, Shuttle launches from our nearby Vandenberg Air Force Base and ham radio heroics by Tommy, who, as the books say, is planning a career as a NASA astronaut. □



Help Us Meet Your Needs

This month's column comes in the form of a questionnaire. Please fill it out and send it to my address, which is listed at the top of the page. I will compile all the responses and report the results in a future column. I hope everyone will take a few minutes to fill out this questionnaire truthfully and accurately. The results will be very helpful in making the column more enjoyable and informative.

Age: _____ Age first licensed: _____

Present license class: _____

Do you plan to upgrade? Yes No

If yes, to which class? _____

Other hams in your family?

Yes No

If yes, which family members are hams?

How did you get interested in Amateur Radio? _____

Do you belong to a ham club?

Yes No

Does your school have a ham club?

Yes No

If no, do you have an interest in helping to start one? Yes No

How many hours a month do you get on the air? _____

Equipment you use: _____

What is your favorite band and mode?

Why? _____

CW speed (please be honest!)

_____ WPM

Awards received, if any: _____

How often do you read the Making Waves column? never occasionally

usually always

If "never" or "occasionally," why don't you read it more often?

What types of things would you like to see in the column?

What types of things should be left out of the column?

How can Making Waves be improved?

Would you like to see it appear every month, or is every other month okay?

every month

every other month

Why do you like Amateur Radio?

What can be done to interest other young people in Amateur Radio?

Are any of your friends hams?

Yes No

Do you feel uncomfortable about talking to your friends about ham radio?

Yes No

If so, why? _____

Are you a League member?

Yes No

If not, how do you get to see *QST*?

Are you aware of the new, low membership rates for young hams who meet certain requirements?

Yes No

How would you rate your experience as a Novice? Wonderful Average

Terrible Never held Novice ticket

Why? _____

What should the League do to get more young people interested in Amateur Radio?

What should be done to ensure that young people maintain an active interest in Amateur Radio after they're licensed?

Name/Call (optional)

Address _____

DAYTON, ANYONE?

I will be attending the Dayton HamVention® April 25-27. Just stop by the ARRL booth and we can chew the rag awhile. If I am not at the booth when you drop by, stop in again later because I would like to meet as many people as I can. You can even drop off the questionnaire at that time in order to save yourself the 22 cents postage!—Scott, N7DDM

555



CRRL Officers and Directors

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO
Honorary Vice President: Noel B. Eaton, VE3CJ

Directors: G. Andrew McLellan, VE1ASJ
Albert G. Daemen, VE2IJ
Raymond W. Perrin, VE3FN
William A. Gillespie, VE6ABC
William Kremer, VE7CSD

Counsel: B. Robert Benson, QC, VE2VW
Suite 1600, 2020 University Ave
Montreal, 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

What the Minister Said

Frustration. It's press time and the outcome of the Jack Ravenscroft case is still not known. Jack, VE3SR, is the Ottawa-area amateur who was sued for \$35,000 for allegedly interfering with a neighbour's furnace control, microwave oven and home-entertainment equipment. The following letter was presented as evidence at the trial. It was written last summer, by the Minister of Communications, to the plaintiffs. At that time, the plaintiffs were applying pressure to have Jack's Amateur Radio licence suspended. We think the letter is instructive. It shows that DOC is willing to become involved in a case, even at the highest levels, and that DOC tries to be helpful and fair. Read on.

Under Section 4.1(d) of the Radio Act, I do have the discretion to suspend or revoke a radio licence when the operator has willfully failed to operate the station in accordance with the Radio Regulations or with the conditions of his licence.

The malfunction of various devices in your residence is not the result of the improper

operation of the amateur radio station but rather the inability of these devices to adequately reject the amateur's transmissions. Manufacturers in Canada and abroad are aware of the need to design any item using solid state electronics to operate satisfactorily in the presence of radio waves, but often have chosen to modify affected units as a lower cost alternative to including the added protection in all units sold. It has been my staff's experience that problems, when they occur, can be resolved.

I understand that officials of my Department have assisted in the investigation of the problems with your furnace, electric organ and, to some extent, your microwave oven. Representatives of the manufacturers and retailers of these devices have been able to eliminate the interference to the electric organ. Unfortunately, tests with the microwave oven have proved inconclusive. I also understand that you wish no further tests, or modifications to your electrical devices, even though

these are necessary to technically resolve the interference.

The regulations made under the Radio Act concerning interference are designed to provide protection to the reception of radio communications. All the electrical devices in your home investigated to date are not used for radiocommunications purposes, resulting in my Department's involvement being limited to that of a technical advisor to the manufacturers and their service agents.

As this matter is somewhat beyond my jurisdiction and with incomplete tests on the devices involved, I am sure you can appreciate why I cannot revoke your neighbour's radio licence.

I realize that you have elected to seek a legal solution before the courts. I encourage you, however, to participate in further tests as proposed by my Ontario Regional Director ... as the best means to achieve a satisfactory solution.

Yours sincerely,
Marcel Masse

DOC NEWS

□ DOC has announced a new procedure whereby candidates for the Amateur and Advanced Amateur certificates may receive credit for proficiency in Morse code sending and receiving. Called *attestation*, it allows three people, who must be holders of Advanced Amateur or Professional Radiotelegraph Operator's certificates, to examine a candidate and supply a *letter of attestation* indicating that the candidate has the required proficiency in code. The new procedure is designed to cut costs for DOC, cut costs for candidates (who will save \$10 each by not taking the DOC-administered code tests that will still be available) and be more convenient for all. At press time, DOC advised that details of the new procedure were still being worked out, but would be available shortly, so the new procedure could be used after April 1.

□ A reminder: It's now or never! Deadline for comments on DOC's *Proposal for Restructuring the Amateur Service* is May 16.

SECTION MANAGER REPEAT SOLICITATION

Since no nomination petitions for the office of Section Manager, Maritimes-Newfoundland Section, were received by December 6, 1985, the cutoff date stipulated in the Section Manager Election Notice that appeared in October and November 1985 *QST*, nominating petitions are hereby resolicited.

Guidelines for submitting a petition, and for the election of the Section Manager, are as ap-

peared in October and November 1985 *QST*, except that the new cutoff date will be June 6, 1986. If more than one valid petition is received, election ballots will be mailed out on or before July 1, 1986, and returns will be counted after August 19, 1986. A Section Manager elected as a result of these procedures will serve for an 18-month term that will begin on October 1, 1986.



Field Day is coming! Last year, after no Field Day for four years, Fredericton Amateur Radio Club decided to try it again. In the back row (l-r) are VE1ZC, VE3NET and VE1TE; in the front row (l-r) are VE1CF, VE1BGX, VE1BF and VE1BQJ. Be sure your club or group participates this year! 1986 rules, log/dupe sheets and summary forms are available from CRRL. (VE1TE photo)

NOTES FROM ALL OVER

□ The Expo 86 Amateur Radio Committee, made up of representatives of British Columbia Amateur Radio Clubs and chaired by Robert Smits, VE7EMD, has announced that there will be an Amateur Radio exhibit on the main floor of the Canada Pavillion at Expo 86. Theme of the exhibit will be Communications for Everyone. The exhibit will stress the public service aspects of Amateur Radio. The station, VE7EXPO, will demonstrate the latest in Amateur Radio technology: OSCAR satellites, amateur television and packet radio. It has taken three years to sell Expo 86 officials on the idea of an Amateur Radio exhibit. Congratulations to the committee and its chairman on a job well done.

□ Scarborough Amateur Radio Club is offering a special award to celebrate its 40th anniversary. The idea is to accumulate 40 points, 20 by contacting stations in Ontario and 20 by contacting stations in other parts of Canada. For Canadians, each contact is worth one point. Five bonus points are given for contacting a station using a special prefix or for contacting a member of Scarborough Amateur Radio Club. Ten bonus points are given for contacting the Scarborough ARC station, VE3WE. For US and DX amateurs, all contacts and bonuses are worth double. Of course, all contacts for the award must be made in 1986, the anniversary year. To claim your award send a copy of your log, signed by two amateurs and yourself, along with \$1 or 3 IRCs, to Scarborough Amateur Radio Club, Box 174, Station D, Scarborough, ON M1R 5B5.



President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, W0BWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama,
N1CIX/JH1VRQ

Regional Secretaries:
John Allaway, G3FKM
Secretary, IARU Region 1
10 Knightlow Rd
Birmingham B17 8QB
England

Alberto Shaio, HK3DEU
Secretary, IARU Region 2
9 Sidney Lanier La
Greenwich, CT 06830
USA

Masayoshi Fujioka, JM1UXU
Secretary, IARU Region 3 Association
PO Box 73, Toshima
Tokyo 170-91
Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

The CCIR and You

The CCIR (International Radio Consultative Committee) is the radio technical arm of the ITU (International Telecommunication Union). Its function is to provide the technical bases on which ITU makes decisions. There are a dozen or so CCIR Study Groups, each of which is concerned with some specific technical area, such as satellites, broadcasting or antennas, and so on. Most of the principal administrations have national CCIR study groups, which either originate questions to be studied or which provide input to the international study groups. The international study groups consist of representatives from the various national groups and, by a continuing exchange of ideas and technical papers, an international consensus is reached on the many technical problems which confront the ITU as the result of World Administrative Radio Conferences. A few years ago, technical matters concerning the Amateur Service were assigned to Study Group 8. Since that time, qualified radio amateurs in some of the major countries have participated extensively in the work of the CCIR.

ITU decisions at a World Administrative Radio Conference (WARC) are based on a combination of political and technical factors. In recent years we have become somewhat more adept at dealing with the political factors than we were, say, a decade ago. We radio amateurs have made a conscious worldwide effort to make sure that the

Amateur Service was well understood by the WARC delegates from the various administrations, and, on the whole, we have been reasonably successful. This successful approach has been important because, whether rightly or wrongly, the political factor in ITU plays a highly influential role.

But we need to improve our performance on the technical side of the ITU decision-making process. That is why, at its meeting last November in Melbourne/Auckland, the IARU Administrative Council urged a continued and expanding participation in the work of the CCIR on matters affecting the Amateur Service at a national and international level. At that meeting, VK3ADW (president of the Wireless Institute of Australia and himself active in CCIR work) spoke in support of continued involvement in the work of the CCIR, noting that amateur participation in the 1978 CCIR Special Preparatory Meeting had laid the groundwork for our success at 10, 18 and 24 MHz, and urged that IARU take advantage of similar opportunities in the future. It was noted by the IARU president that each country should have a competent amateur on its national CCIR Study Group 8 Committee—because that Study Group is responsible for both the Amateur and the Amateur-Satellite Services, and that member-societies should be encouraged to fund the attendance at meetings of such a representative.

In the years prior to and after WARC-79, we were fortunate to have the Amateur Radio

Service in the United States represented on the US National Study Group 8 Committee by Merle Glunt, W3OKN, funded by ARRL. Subsequent to W3OKN's retirement, we have been similarly fortunate to have the expertise of Charles Dorian, W3JPT, representing US amateurs, again funded by ARRL.

In a few other countries, the Amateur Service is similarly well represented by other distinguished and competent amateurs. But not in enough countries. Although most of the readers of this column are in the United States, where the situation is well under control, nevertheless this is hereby an appeal to the Amateur Radio leaders in other countries, countries where the Amateur Service is not represented on their national Study Group 8 committees, to make aggressive efforts to achieve such representation.

On other occasions in the past I have mentioned one of our greatest weaknesses in the Amateur Service: our reluctance, our diffidence, about speaking up strongly and aggressively on behalf of the Amateur Service to the officials of our respective administrations. Oh, this is not a universal problem, of course, because in many countries we have a strong and positive relationship with our administrations, but there are areas where improvement is needed. It is this strong and positive relationship *everywhere* that is one of the goals of IARU. It is that sort of relationship which will help to ensure success at the next General WARC, whenever that might be.

REGION 2 TRIENNIAL CONFERENCE

As we've pointed out in these pages a number of times in the past (eg, see the article on the Region 3 conference on page 56 of March 1986 *QST*) the "business" of IARU is conducted regionally at their triennial conferences, one per region per year. In 1986, it's Region 2's turn, and their conference will be held in Buenos Aires, Argentina, October 20-25. Through the office of IARU Region 2 Secretary HK3DEU the flow of documents has already started. Most of the societies in North, Central and South America will be represented at the conference, including ARRL and CRRL. International liaison with the two other regions will be accomplished through attendance by representatives of Regions 1 and 3, and immediately following the Region 2 conference there will be the annual meeting of the IARU Administrative Council.

AWARDS

In commemoration of the 10th Asian Games, which will be held in Seoul, South Korea, Sep

20 to Oct 5, 1986, KARL will issue the following two awards for QSOs from Jan 1 to Oct 5, 1986. Class HL: issued to those who make contacts with 10 HL stations, including at least 1 HL1 (Seoul) station. Class DX: issued to those who make contact with 10 countries participating in the Asian Games, including an HL station but not including one's own country. Send \$4 US or 10 IRCs plus your QSLs to KARL, CPO Box 162, Seoul 100, Rep of Korea, prior to Sep 20, 1987. According to KARL, the prefixes of the 36 countries participating in the Asian Games are A4, A5, A6, A7, A9, AP, BY, DU, EP, HM, HS, HZ, JA, JT, JY, OD, S2, V8, VS6, VU, XV, XW, XZ, YA, YB, YI, YK, 4S, 4W, 7O, 8Q, 9K, 9M, 9N, 9V, HL. The commemorative station, HL86AG, is expected to be operating during the Asian Games, and QSLs received from HL86AG will count as five HL stations or five participating country stations.

The Israel Amateur Radio Club is offering a handsome certificate for contacts made on or after Jan 1, 1984 with stations only in Tel Aviv-Jaffa. All bands and all modes, and the

same station can be worked on more than one band for credit. Accumulate at least 10 points, one per QSO, except that a contact with 4X75TA counts as 10 points and contacts with Jaffa stations count 5 points. Send a list (no QSLs), certified by an Awards Manager or two other hams, along with \$3 US, to 4X6LM, Shlomo Mussali, Postbox 8225, Tel Aviv 61081, Israel.

Strays

QST congratulates...

□ Rob Brownstein, NS6V, of Santa Cruz, California, on being named *First Corporate Fellow* of the worldwide marketing and communication strategies company, Regis McKenna Inc.

YLISSB 1986 CONVENTION

Seattle, Washington will host the 1986 YLISSB Convention at the Edgewater Inn June 26-29, 1986. KU7F has arranged for sunshine and clear skies, so make your reservations through her and join the many Sidebanders who will be attending. There will be the usual business meeting and DX forum, as well as a cruise through the San Juan Islands to Victoria, BC, a harbor cruise to Blake Island/Tillicum, bus tours of Victoria, BC and Seattle, and sufficient time to explore the area on your own. For more information, contact KU7F, Flo Reitzel, 3125 NE 83 St, Seattle, WA 98115.

CHANGES IN YLRL CONTEST PROCEDURES

1) For the YL Anniversary Party, cups will be awarded for both NA-YL and the DX-YL with the highest scores. This change applies to both the CW and SSB portions of the YL Anniversary Party.

2) Certificates for the highest score in a district or country will be awarded only if there are at least two logs submitted from the district or country. In addition, there must be a minimum of at least 10 contacts.

3) A first-place certificate will no longer be issued in the YL Anniversary Party unless the winner is *not* a YLRL member (not eligible for cup). (If a DX-YL does not wish the cup because of duty charges, a certificate may be awarded.)

4) No longer will ARRL Sections be used in exchanges and in scoring contests. Starting Sep 1986, states/provinces/countries will be used.

5) Starting Sep 1986, contests will run for 36 hours unless otherwise specified. However, participants may work only 24 hours of the time. Operating breaks must be indicated in the log.

6) Operating times for the 1986 YL-OM, DX-YL to North America YL Contests will not change in 1986. The times for Howdy Days and the YL Anniversary Party will be announced at a later date.

YLRL 1985 Anniversary Party Results

CW		SSB
WD4NKP	Gold Cup	4X6KT
KA6SOC	2nd Place	1T9JLA
N2EVZ	3rd Place	DJ1TE

Combined SSB/CW Scores

WD4NKP—Corcoran Award
CT1VH—DX Hager Award
No entry for NA/CA Award

CW Scores

WD4NKP	1,183*	WA2NFY	218*
KA6SOC	1,128*	WA8FSX/7	193*
N2EVZ	1,075*	KA8OMX	99*
K8ONV/4	940*	CT1YH	1,045*
WD8MEV	831*	DF2SL	765*
WD5FOX	775*	G4RKK	760*
KM8E	659*	DF6UI	700*
VE7YL	553*	ISUNA	450*
W3CDO	345*	JA1AEO	191*
NM7N	341*	I2KYM	180*
KA5GIS/1	270*	JA1YL	150*
K4LMB	220	G8LY	56*
		VB3KS	50*

SSB Scores

K8KCI	8,921*	AW2ZWL	101*
WD4NKP	8,113*	1T9JLA	14,175**
KM8E	6,785*	4X6KT	10,598*
VE7YL	6,250*	DJ1TE	10,443*
WD5FOX	6,171	YU3AN	7,425*
N2EVZ	5,148	IO2KYM	7,265*
KA6SOC	4,994*	CT1YH	6,865*
WD8MEV	4,891*	4X6DW	4,235*
W2GLB/7	4,557	DF6UI	4,163*
K8EPE	4,368	GM4YMM	3,825*
KD5MD	4,089	DL3LS	1,392*
WA3HUP	3,762	IS8LLJ	1,021*
KC9V	3,610*	DF3BN	990*
KE5UO	3,098	LA6K	855*
WA1UVJ	2,438*	JA1AEO	786*
KD8SC	2,063*	PA3CEB	856*
K6INK	2,040	PA3CIS	563*
WB4NKO	1,881	ZL1BBN	450*
KD7SH/4	1,588*	DL2ZBM	420*
AL7FJ	1,575*	V13KS	388*
WA8FSX	1,457	G0DEM	351*
WA2NFY	1,438*	JA1YL	344*
K4LMB	1,428	SM8HNH	324*
KA5ONE	1,344*	G4XHX	316*
K6DLL	971*	E12EF	297*
W1ZEN	879*	F8ISN	240*
VE3CLT	640*	E12M	180*
W2EEO	216	G8LY	156*
		G4ESR	23*

*low-power multiplier
**Although 1T9JLA had the highest SSB score, she is not a YLRL member and not eligible for the Gold Cup.
Check logs: NY4H, KU7F, WA6AOE, IS8PFO.

Meet the Novices and Technicians Day

Date: June 7, 1986, 1700-2100 UTC.

Eligibility: All licensed women operators throughout the world are invited to participate.

Procedure: Call "CQ YL."

Operation: Only frequencies in the HF bands that are open to Novices and Technicians may be used. Suggested frequencies: 80 meters—3.720-3.740 MHz; 40 meters—7.120-7.140 MHz; 15 meters—21.120-21.140 MHz; 10 meters—28.120-28.140 MHz. No cross-band operation. Net contacts and repeater contacts do not count. A station may be worked only once for credit. Maximum power: 200-W PEP. Mode of operation: CW.

Exchange: Station worked, RST, name, QTH, license class. Entries in the log must also show time, band and date.

Scoring: 3 points for each YL Novice or Technician worked, 2 points for each YL General or Advanced class worked, and 1 point for each YL Extra Class worked. Total score = total number of points.

Awards: Top scoring Novice or Technician—YLRL postcards; top scoring General class or higher—YLRL postcards.

Logs: All logs submitted must show date, time, band, station worked, RST, and the name, QTH and license class of the station worked. Do not send carbon copies of logs. Please print or type. Logs must indicate the name, call sign, address and license class of the operator, and must be signed by the operator. No logs will be returned. Logs must show the claimed score and be received by July 7, 1986 by YLRL Vice President Mary Lou Brown, NM7N, 504 Channel View Dr, Anacortes, WA 98221.

ALARA Award

Rules: VK/ZL: Contact 10 members; include 5 Australian call areas. DX: Contact 5 members; include 4 Australian call areas. All contacts to have been made with members on or after June 30, 1975. No repeater contacts allowed.

Submit a complete extract of log entries (date/time UTC, band, mode, call sign of ALARA, report sent, report received, name), certified correct by two other amateurs whose signatures must be appended. In the event of an applicant in an isolated location being unable to obtain certification, QSL cards should be forwarded in lieu. Include full name, address, signature and call sign. All contacts must be made from the same call area. Official ALARA Net contacts do not qualify. Special endorsements available, eg, mixed, all CW, all 20 MHz. Endorsement stickers available for each 10 additional members contacted. For DX applicants, 5 additional. Fee: the equivalent of 3 Australian dollars or 7 IRCs. Fee for additional stickers: 1 Australian dollar. No fee for stickers awarded with the original issue of the certificate, only for additional stickers applied for later. Applications go ALARA Awards Custodian Mavis Stafford, VK3KS, 16 Byron St, Box Hill South, VIC 3128, Australia.

VISUAL MEMORIES FROM THE 1985 GLOUCESTER COUNTY ARC HAMFEST



W2AFZ was first licensed in 1920 (when New Jersey was in the 3rd call area and she was W3AFZ). Della is active on 40 meters and is club historian for the Gloucester County ARC.



N2RE (left) arranged for speakers and the YL program, while Hamfest Chairperson N2FJM "ran the show."



The two principal speakers at the August 1985 Hamfest were Teacher in Space semifinalist Jeanine Duane, WB2MBW (left) and QST's "How's DX?" Editor, Ellen White, W1YL/4. (photos courtesy W1YL/4)

Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN
Club Program Manager, ARRL

MORE GREAT IDEAS FROM KB9UM

Details on Stanley W. Henson's booklet, *14 Ideas for More Radio Club Fun*, were given in the December 1985 column. Here's the 12th idea, from the Contests and Activities heading.

QSL Contest

How can a QSL card contest be fun? Everyone uses standard print-shop cards except the artist with the hand-painted cards and the rich guy with the multicolored jewels he sends only to rare DX stations. And besides, there are a lot of sore losers in some clubs!

To overcome these insurmountable problems, simply ask everyone to enter in the contest the best card they have *received* from

another station. "Best" can be defined however you please, so any characteristic of QSL cards can be stressed: originality, artistic design, humor, etc. Judging and prizes are easier to arrange for a local contest when the ego attachment is removed from the entries. The contest can then be more fun since it will be easier for everyone to go away happy.

Cheers For RARA

The Rochester (NY) Amateur Radio Association (RARA), a Special Service Club with over 900 members, has long been a club with excellently implemented ideas, from their annual hamfest, one of the largest in the US, to their professional-appearing newsletter, the *RARA Rag*. Ron Jakubowski, K2RJ, recently sent to ARRL HQ a copy of their 1985-86 Directory, an idea that other affiliated clubs may well want to emulate. The directory lists

all the amateurs in the local area, first by their call signs, alphabetically, then by their names. The 5- by 8-inch directory pages serve as yearly updates to a small, handy binder the club gives to new members. The size is just right for carrying around. And it's handy when you can't remember the name of the amateur you're talking to on the local repeater.

If Your Club Wants to Do This

If your club is interested in developing a similar directory, you can obtain a printout of *all* radio amateurs in a specific geographical area from ARRL HQ. The cost is minimal—merely a \$6 processing fee, plus postage, plus 1 cent per printout page. Each page lists 44 names, call signs and addresses. Write to or call the club program at ARRL HQ for order forms. [ARRL]

New Special Service Clubs

Becoming a Special Service Club (SSC) is not for every Amateur Radio group. It takes commitment, planning and, mostly, a membership that sets the highest standards for itself. A number of your fellow clubs have recently undertaken the commitment and become SSCs. Here's a rundown of each of these special groups, their city, state and number of members:

Amateur Radio Caravan Club,
Albuquerque, NM (176)
Kings County Radio Club,
Brooklyn, NY (45)

Renewing Special Service Clubs

After completing a year of Special Service, SSCs go through a review process with their respective Affiliated Club Coordinators (ACCs). With successful programs behind them, they plan their next 12 months of activities. Recently renewing SSCs are presented here, each club name followed by the city, state and number of members:

Amador County Radio Club,
Pine Grove, CA (92)
Metropolitan Radio Club,
Little Rock, AR (60)

Volunteer Examiner Information

from the ARRL/VEC, 225 Main St, Newington, CT 06111

Locating A Test Session: Sessions are advertised publicly via local Amateur Radio club newsletters and repeaters. A printout of sessions in any state and some overseas locations is available from ARRL HQ for an SASE. We list ARRL/VEC sessions plus those of other VECs who inform us of their testing schedules.

Registering to Take an ARRL-Coordinated Test: A completed FCC Form 610 application and a check or money order for the test fee, payable to the "ARRL/VEC," should be sent to the local VE Team where you intend to be tested. "Walk-in" candidates may be allowed at some sessions, but registering in advance helps. If you write to a VE Team, send an SASE to cover postage and handling.

Test Fee: For ARRL-coordinated sessions held during calendar 1986, the test fee is \$4.25, payable to "ARRL/VEC." A check or money order is preferred.

What to Bring to the Session: Bring the *original* plus a photocopy of your current FCC-issued Amateur Radio license, and the *original* plus a copy of any temporary upgrade certificate issued by a VE Team less than 1 year prior to the test date. (Duplicates of lost licenses are available through the FCC's Gettysburg office.) Also bring two forms of positive identification (including a photo ID, if possible) and at least two pencils and a pen. Scratch paper and answer sheets are provided.

Calculators: Nonprogrammable and "scientific" calculators are welcome. Pocket computers that store words are not allowed. Programmable calculators will be allowed only at the discretion of the VE Teams; be prepared to demonstrate that the memories have been cleared.

Exam Format: Written element exams are four-choice multiple-answer tests. A score of 74% or more is required to pass a written element exam. Most VECs assemble tests based on the ARRL-issued multiple-choice question pool. Code test transmissions are played from an audio tape prepared by the ARRL/VEC with message contents similar in format to an Amateur Radio QSO. The code test is "fill-in-the-blank" style and may be passed by answering at least 7 out of 10 comprehension questions correctly or by copying on paper at least one continuous minute of perfect copy from the code test transmission. The ARRL/VEC does not require a code sending test, based on the FCC's recommendation. Code tests may be copied on typewriters, but prior arrangement with the VE Team is required so that other candidates are not disturbed.

Which Question Pool(s) to Use: FCC revises the four written element question pools on a staggered basis, with one of the four pools revised every three months. The 1986 scheduling calendar that the ARRL/VEC will be using for putting into use the question pools revised by FCC is as follows:

Question Pool	Revised by FCC	ARRL/VEC Tests Will Change	ARRL/VEC Tests Good Through
Element 2 (Novice)	Jul 1985	Jan 1, 1986	Dec 31, 1986
Element 3 (Tech/Gen)	Oct 1985	Apr 1, 1986	Mar 31, 1987
Element 4A (Advanced)	Jan 1986	Jul 1, 1986	Jun 30, 1987
Element 4B (Extra)	Apr 1986	Oct 1, 1986	Sep 30, 1987

ARRL/VEC Retest Policy: A candidate who fails a written element and who has exhausted all code test possibilities at a session may not be retested during that same session. If a convention or hamfest test session schedules multiple sittings, a failed candidate may request that the VE Team retest him or her at a subsequent sitting. Retesting is allowed if the VE Team has a *different* test version available and the VE Team determines that it has the time and resources available to accommodate the retest. A candidate for retest is required to pay another test fee, and may be required to complete a fresh application Form 610 at the Team's request.

Special Tests: Candidates who require special assistance, materials or equipment because of physical disability must attach to the application a signed and dated physician's statement certifying the nature of the disability, plus a letter explaining what special assistance, materials and/or equipment must be used to conduct the examination. (See Section 97.26(g) of the FCC Rules.) Be sure to notify the VE Team well in advance so that special arrangements can be made. If Braille or tape-recorded written tests or special-pitch code tapes are needed, contact the ARRL/VEC at least one month in advance to ensure materials will be available. Further questions about testing persons with disabilities should be addressed to the ARRL Program for the Disabled at HQ.

How to Become an ARRL-Accredited Volunteer Examiner: Qualified Advanced or Extra Class licensees (see Section 97.31 of the FCC Rules) are invited to notify the ARRL/VEC of their interest in becoming an accredited VE. Send us your name, call sign, license class and full mailing address.

Registering an Upcoming Test Session with the ARRL/VEC: Complete a Test Session Registration Form and submit it to the ARRL/VEC office at least 30 days in advance of your session. We need four weeks or more advance notice of a session to serve you in the most cost-effective and accurate way.



On December 18, 1985, the Fellowship ARC (Miami, FL) brought a little cheer to the children of Miami's Mailman Center High Risk Clinic by letting them talk to Santa Claus via Amateur Radio. Lou Dorfmeister, KB4ARD, was one of Santa's helpers in this highly successful event. (photo courtesy KB4ARD)

It is with deep regret that we record the passing of these amateurs:

WB1ABL, Ralph A. Morris, Burton, SC
W1AL, James J. Lamb, Cupertino, CA
W1BKA, James D. Parker, Riverside, CT
W1J1W, Andrew M. Kelly, Brighton, MA
W1LPQ, Carl O. Lilippop, Dalton, MA
*W1RH, Robert W. Hart, Brookline, MA
KD2CC, Dorothy L. Richards, Bridgeport, NY
WB2GIM, Ernest J. Beetow, Hamburg, NY
WA2GJI, Royden F. Allen, Rome, NY
W2GND, Harry A. Harchar, Highstown, NJ
KB2IG, Kenneth A. Griffen, Northport, NY
K2JTU, Lester Vansyckel, Milford, NJ
KA2RYG, William W. Lewis, Fairport, NY
W2YUH, John F. Hickey, Lakehurst, NJ
W3DBM, Charles M. Kirchner, Baltimore, MD
W3FNV, Robert N. Fox, Linticum Heights, MD
K3HXX, Charles R. Follweiler, Claymont, DE
*W3OU, Carroll W. Lufcy, Edgewater, MD
K3ZAJ, Charles J. Felice, Philadelphia, PA
WB4ANW, Quinton R. Kellems, Jacksonville, FL
W4AWW, Nolen W. Cardwell, Jackson, TN
WD4CJJ, Dick Lacefield, Bowling Green, KY
WB4CPY, Leon R. McCall, Tampa, FL
W4DBV, T. H. "Robbie" Robertson, Rome, GA
WA4EKU, Addison Hosea, Lexington, KY
K4FLO, Neil J. Jorgensen, Orlando, FL
KE4GM, Harry J. Stewart, Seminole, FL
W4IKG, Harold Weinberger, Miami Beach, FL
WA4KXU, Wren Harris, Albany, GA
K4LUO, George T. Bowden, Jr., New Bern, NC
W4LXB, John E. L. Brierty, Callaway, VA
WD4OQL, Stanley F. Gale, Nashville, TN
K4OYY, Herbert R. Browning, Putney, GA
KA4VPO, Stanley F. Carson, Oak Ridge, TN
W4WA, George A. Behlen, Jr., Cayce, SC
*WA4ZNI, Joseph E. O'Brien, Queens Village, NY
WB4ZOZ, Clarence M. Downing, Charlotte, NC
W5BGX, John F. Harding, Enid, OK
KD5CC, John C. Carnutt, Roswell, NM
W5DTL, John A. Hunter, Baton Rouge, LA
W5GNV, G. K. Knappe, Midwest City, OK

W5HC, Herbert F. Keller, Jr., Little Rock, AR
WB5HVE, Herbert A. Draeger, Mountain Home, AR
*KA5LBM, Kyle B. Merrill, Clinton, OK
WB5NCO, Sam T. Peery, Cordell, OK
K5ORF, Anol B. Elliott, Albuquerque, NM
WB5TYK, Charles E. O'Neill, Cheyenne, OK
W5VHK, Earl G. Andrew, Escondido, CA
K5YJT, Leo B. Hackney, Dallas, TX
W6BG, William G. Gerlach, Claremont, CA
W6BOY, Albin A. "Sparky" Putzker, Honolulu, HI
WB6DGT, Bob R. Main, Gardena, CA
KB6HLD, Joseph R. Dutra, Sacramento, CA
WA6HXV, Edward J. Gasco, Lomita, CA
KH6JW, Edward F. Drury, Kailua, HI
W6NJO, Earcel C. Caster, Oakdale, CA
WA6OCR, George H. Dauber, Costa Mesa, CA
W6QWH, S. A. Woodhouse, Hemet, CA
K6TC, Del Werle, Lone Pine, CA
K6UB, Hubert Farley, Paso Robles, CA
W6UEN, William De Armond, Sepulveda, CA
W6VDI, John Bryden, Huntington Park, CA
KE6XE, Wade C. Moore, San Diego, CA
W6ZHU, Merton G. Roberts, Petaluma, CA
W7AG, Herbert V. Kramer, American Fork, UT
W7ALM, Chester R. Lamont, Astoria, OR
K7DA, M. B. Elton, Portland, OR
KA7GIT, Michael E. Conley, Clinton, WA
W7HMA, Clinton Ray Maggard, Bremerton, WA
W7KAV, Donald Peterson, Las Vegas, NV
W7KRM, Thomas H. Olmstead, Henderson, NV
*W7NJS, Elizabeth H. Taylor, Milwaukie, OR
WB7QWJ, Rex L. Sanger, Seattle, WA
KA7SMZ, James J. Deligan, Seattle, WA
WA7TJZ, Philip Kwart, Phoenix, AZ
W7YWW, Louis S. Springer, Loveland, CO
WA7ZBB, Harry C. Sweeney, Elgin, TX
WD8BHM, Edward J. Blau, Escanaba, MI
W8EPU, Royal N. Weaver, Portage, MI
N8FDB, James Crichton, Youngstown, OH
WRJEX, Chris R. Thomson, Toledo, OH
W8JLS, Lester E. Srnka, Powers, MI

W8NTV, Lynn T. Faulkner, Grafton, WV
W8PIQ, John Standen, Chesterland, OH
KA8POR, Julie Kay Walworth, Wauseon, OH
KA8RYT, Howard E. Funk, Bryan, OH
W8SA, Henry Mills, Southfield, MI
WB8SQX, Robert J. Nuzum, Fairmont, WV
N9AKD, Cleo Garland Wortham, Bay, AR
*W9CU, Walter Laud, Hammond, IN
N9CXN, Thomas W. Chiczewski, Elmwood Park, IL
K9DSF, James Ruyle, Godfrey, IL
*W9EAL, Henry G. Shaleen, Chicago, IL
KB9EZ, Jean F. Hinchman, Parker, IN
K9GDB, Clarence E. Hass, South Bend, IN
W9KCF, Richard D. Wehrheim, Deerfield, IL
KA9MXN, Chester H. Huber, Pewaukee, WI
K9QEK, Wallace W. Fett, Chicago, IL
W9RUF, Ralph O. Koenig, Sr., Brookfield, WI
WB9WXP, Melvin M. Smith, Winchester, IN
KA9DIQ, John M. Toman, St. Louis, MO
WB9CW, Roy Noblette, Springfield, MO
W9LQL, Flo K. Hart, Longville, MN
W9WCY, Vernon G. Perry, Cedar Rapids, IA
G6VU, Hugh Carmichael, Belfast, Northern Ireland
H18RA/KP4, Ramon Reynoso Pena, San Lorenzo, PR
VP5AQ, Arthur W. Quelch, Grand Turks Island, Jamaica

*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.

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

May 1936

Disastrous floods in March covered 14 northeastern states, isolated 20 large cities; amateur radio rose to meet the greatest emergency communications need of all time. Eighteen pages of narrative, pictures and call signs only begin to tell the story of our filling the breach left by disrupted wire services, crippled broadcast stations, and over-loaded circuits of National Guard units and State Police. League Hq. station W1MK at low-lying Brainerd Field airport was completely inundated, but staff personnel operated from their own locations with emergency power.

One sour note amid the sterling performances: The mayor of Johnstown, Pa., a center of flood devastation, accused an amateur of causing a panic by "broadcasting" false reports of a broken dam and ordered local amateurs shut down. (They didn't comply.) W1CDB of the League staff went to the city to investigate, found the charges totally unfounded, and was able to turn the unfortunate incident into good public relations for the amateurs' achievements.

Since the new pentagrid converter tubes (e.g., 6A7, 1C6) can perform two functions (usually mixer and oscillator), WBFUQ decided to use one in a super regenerative circuit (detector, quench frequency generator) on 5 meters, finding it neatly filled the bill.

The Federal Communications Commission is setting rough standards for modulation systems, both broadcast and amateur, because of continuing instances of poor signal quality. As one aid to achieving compliance, W9AYH describes a meter-type monitor to indicate both carrier shift and modulation percentage. For those with cathode-ray scopes, W3DQ developed a neat circuit for coupling to the receiver so the station being QSOed can be informed of his quality.

Plug-in coils or other methods of switching bands are unnecessary in W1JFN's approach to station capability—he built separate rigs for each major band,

with a common power supply.

"More contacts, more countries, higher scores and more fun than ever before" summarizes results of the week-long 1936 DX contest held in March. For the first time in the history of the competition, a non-W station (XE2N) made top score. W4DHZ was high U.S.A. scorer.

Two separate receiving systems, identical except for antenna configuration and location, can provide a common output of "dual diversity" reception, primarily to reduce selective fading. J. L. A. McLaughlin and Jim Lamb have collaborated on a deluxe model from which we can get some ideas for less expensive designs of our own.

The "resonance wave coil" is a circuit with the conductor wound so that the diameter of the coil is small in proportion to its length. W1BSJ uses 870 turns of no. 20 wire on a 1-inch-diameter wood dowel 30 inches long as a receiving antenna—and with considerable success.

Knowing that a single wire half-wave antenna radiates best at right angles to its axis, W3ZZ erected two of 'em—one in a N-S direction and the second E-W. Switching between the two, or feeding both simultaneously, provides different directional effects.

A rather obscure note mentions that RCA is starting production of a new audio power tube of all-metal construction using beam-power techniques. The type? 6L6!

25 Years Ago

May 1961

A typewriter-like keyboard atop a compact assembly of semiconductors and memory cores will produce perfectly formed Morse code. Designer W6MUR says the unit is programmed on space units rather than "mark," which simplifies the circuitry.

With present-day sideband exciters nearing 100-watts output, the grounded-grid amplifier is getting more attention. W6HFN uses a pair of zero-bias 572s in parallel for a near-kW.

A study by Stanford's engineering crew will be most helpful to hams working on earth-moon-earth projects. K6DSJ of that Institute's staff shows that a pulse aimed at the earth's satellite produces an echo with a long "tail" as reflections come back from the rough mountainous surface.

Preparing us for a hoped-for piggy-back launch of an amateur satellite, K5VFN and K6QMJ discourse on fundamental tracking principles such as Doppler, equatorial crossings, map overlays, tuning procedures, and the like. At present, we're not certain whether the orbit will be polar or more east-west.

Product detectors were popularized largely for side-band reception, but W2WBI found that effective rejection of all signals except those beating with the local oscillator made the technique useful in a t.r.f. receiver. Blocking by local signals is also reduced.

Effectiveness and convenience are combined in K9CFE's roof-mounted mobile antenna designed for multiband use on the lower frequencies. Bands are switched from the driver's seat.

When used as an absorption wavemeter, the common grid-dip oscillator unit has very low sensitivity. W2PRT designed a simple "T-patch" one-transistor circuit to read the signal strength on an ohmmeter.

Propagation conditions were lousy the first weekend of 1960s Sweepstakes fray, but improved enough the second weekend to rekindle enthusiasm: W9IOP set a new SS record, and Frankford nosed out Potomac Valley in the club competition.

Novices working 80 meters, say 3725 kc., must take special care not to generate second- and higher-order harmonics that fall in nonamateur bands. W1ICP describes yet another antenna coupler that will keep harmonics under control.

If space limitations confine your 20-meter antenna to a simple grounded quarter-wave vertical, try VE3DZL's method of adding a "twin" for a bidirectional array to provide improved gain.—W1RW

New World Record on 3456 MHz

Reg Galle, VK5QR, has sent along information about a contact with VK6WG, Wally, across the Great Australian Bight over a distance of 1,885 km on 3456 MHz. This, I believe, is a new world DX record on that band. Reg writes:

After seven years of frustrating non-success trying to bridge the 1885-km path across The Great Australian Bight from frequency of 3456 MHz, I came up with a fresh approach to the attempt. After successfully 'selling' the idea to my good friend Wally, VK6WG, we quickly implemented it. Wally agreed to modifications to his setup and built a two-band horn feed for his 4-ft dish, enabling operation on 2304 and 3456 MHz. He also acquired an amplifier with an output of 3-4 watts, built by WA2FGK. The scheme was to use two identical 19.964-MHz crystal oscillators (I built two and sent one over to Wally), which were fed into [a pair of] Microwave Modules [28/432-MHz transverters] and mixed with the existing

[local] oscillator chain at 404 MHz to produce 384 MHz. The module was then lined up on 384 MHz to produce 10 watts. Wally fed this to a tripler to 1152 MHz through a filter to another tripler to 3456 MHz and through another filter to the 3-4 watt amplifier. In my own case I fed the 10 watts at 384 to an amplifier for 30 watts reduced to about 20 and into a tripler to produce 12 watts on 1152 MHz. This was then fed into another tripler via a filter to produce perhaps 2 watts on 3456, which was fed to the 10-ft dish through another filter. This dish was equipped with a log periodic for 1296/2304/3456, replacing the 3-turn helix used for Mode L work.

On Jan 25, at 1300 UTC, I established contact with Wally, VK6WG, on 144 MHz. We changed to 432, and then I went to 1296 and set the 10-ft dish accurately on Wally. He then went to 2304, and I was able to adjust the slug in the MM to zero beat the 2304 signal, thus ensuring we were on identical 1152 frequencies. A touch up on the dish

was necessary with the reduced beamwidth on 2304 MHz.

Listening to the third harmonic on my 3456 converter indicated Wally's exact position, with the result I heard his signal almost immediately. Between 1315 and 1325, we exchanged reports of 539 both ways. On Jan 26 at 0730 we again made contact first on 432 and then straight down to 3456. We stayed there on CW until 0755, when we returned to 432. Signal reports this time were better. I gave Wally 569, and he gave me 559. We are claiming this QSO as a new world record for 3456 MHz.

Andy, WA2FGK, passed along information about his amplifier. It is a two-stage class-C amplifier using MSC silicon bipolar transistors in a common base configuration. The first stage uses a 3135-1 and produces about 250 mW of output. The second stage uses a 3135-5 and amplifies this to 3-4 W. The amplifier was run off a 22-V supply, drawing about 450 mA on transmit.

DIODE MIXERS

In the March 1986 New Frontier column a simple diode mixer/detector was described. Due to lack of space a plot of the relationship between diode current and incident power was omitted. Figure 1 shows this relationship for a typical point contact diode (1N23) at 10 GHz. The plots show results obtained for several different total series circuit resistances. In effect, this is normally the series resistance of the meter used to measure the diode current.

While on the subject of mixer diodes, it is worthwhile to point out that there are a number of different types of diode. The diode of choice depends on the circuit function. Figure 2 shows the characteristics of three types of diode: the point-contact diode, the zero-bias Schottky diode and the high-barrier Schottky diode. The point-contact diode is a good general-purpose choice, often available at low cost. It requires about 1 mW of LO power to give minimum noise

figure. The zero-bias Schottky diode is the choice when LO power is limited. It can give optimum noise figure with only -5 dBm LO power, and functions almost as well with only 100 μ W of LO. It is however more sensitive to burnout from high incident power or static discharge. At the opposite end of the spectrum is the high-barrier Schottky. This diode requires 3-4 mW of LO power for optimum noise figure, but has good resistance to burnout or static discharge. It would find use in systems where a lot of LO power is available or in an up converter such as might be found in a transverter using the same mixer on both transmit and receive.

KA5VKG, have been doing some work using passive reflectors on 24 GHz in the Woodlands, TX area. Using a 15-in-square aluminum plate, they found that alignment was very critical. In order to line up the path they stuck a mirror to the front of the reflector and used a "Q-beam" spotlight in front of one antenna. They then adjusted the reflector until they saw the light reflection. Under these conditions (path length unspecified) they were able to make contact with good signals. Mark states that he is planning more work on 24 GHz.

NEW 13-cm RECORD

Al Ward, WB5LUA, has written with information about a new US tropo-record contact on 2304 MHz between himself and W4ODW at a distance of 624 miles. Details next month.

24-GHz NEWS

Mark Allen, KA5YFU, and Ken Mullen,

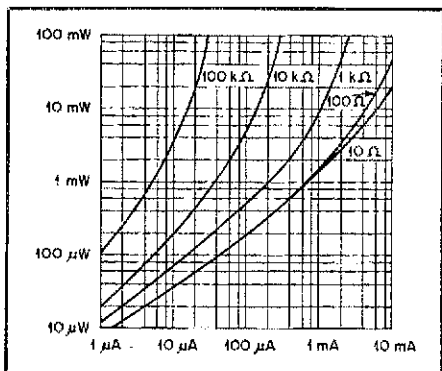
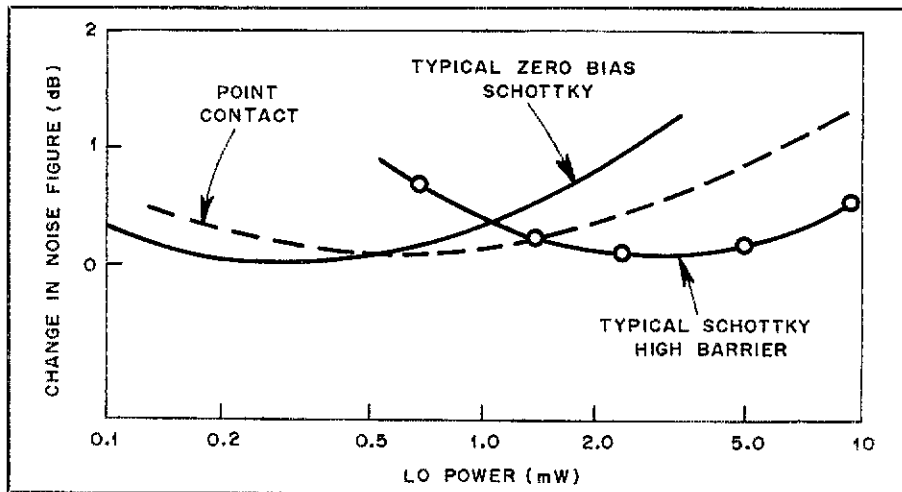


Fig 1—Current output versus power input for a typical point-contact diode at 10 GHz. Resistance values are total series resistance. Curves are approximate. (from RSGB VHF/UHF Manual)



Characteristics of three types of diodes: the point-contact diode, the zero-bias Schottky diode and the high-barrier Schottky diode.

Record-Breaking Aurora

By now, most VHFers and many other hams have heard of, or experienced, the tremendous geomagnetic event that peaked February 8. For HF operators, washed-out bands were the result. But for those of us who call the world above 50 MHz home, it produced some of the most exciting auroral conditions in many years. So intense and widespread was the propagation, that this entire column will be devoted to attempting to record the story, and still a lot will go unsaid.

All of the VHF bands from 6 meters through 70 cm are known to have been affected. No reports of 33- or 23-cm contacts have yet been received, but those bands could very well have been involved as well, so strong were the signals and numerous the contacts made on the other bands.

The numbers put out by The National Oceanic and Atmospheric Administration (NOAA) are impressive, to say the least. By February 5, the 2800-MHz solar flux rose to 103, not a particularly lofty reading for those of us who became accustomed to the 200-plus figures during the past solar peak, but unusual for this low ebb period. Readings in the upper 60s and lower 70s have been common in recent months. But the real story is told by the magnetic indexes. The Fredricksburg A index can go as low as 0, and quite frequently reaches values of 30 to 50 during magnetic disturbances. On February 8, it hit 208. The A index is an average for a 24-hour period, with those taken at both Fredericksburg, Virginia and Anchorage, Alaska regularly reported in the weekly NOAA report of solar and geophysical activity. The other magnetic index, the K index, is recorded every three hours at the same locations as well as at Boulder, Colorado. It employs a different scale than does the A index. In this case, a

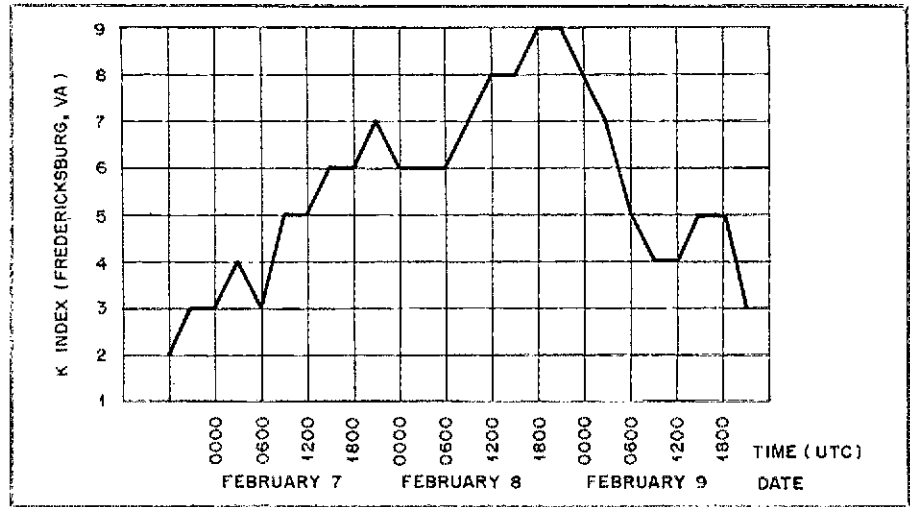


Fig 1—K indices for Feb 7-9, 1986. Source: *Preliminary Report and Forecast of Solar Geophysical Data*, 11 Feb 1986. (graph by W3EP)

scale of 0 to 9 is used. A value of 9 is very rare indeed, but it was reached during two three-hour periods at Fredericksburg on February 8. Figure 1, prepared by W3EP, illustrates the magnetic levels and enables us to trace the progress of the aurora on the various VHF bands.

The magnetic fireworks were caused by a spot group that began its energetic activity February 3 with what is termed an "M2/1B class flare." Several strong radio noise bursts were recorded, the most intense one a 245-MHz value of 51,000 at 1013Z February 7. That value normally runs in the few hun-

ded, but often reaches a few thousand during solar storms.

The weekly publication from which these numbers were taken is available free to those with a serious interest in solar and geomagnetic occurrences. It is called *Preliminary Report and Forecast of Solar Geophysical Data*. Those wishing to receive it may write to the US Department of Commerce, NOAA, Environmental Research Laboratories, Space Environment Laboratory, Space Environment Services Center, 325 Broadway R/E/SE2, Boulder, CO 80303.

ON THE BANDS

6 Meters—So much for the science part of the story. What did the aurora of February 8 do for VHFers? Suffice to say, the bands from 6 meters through 70 cm were absolutely wild. I first got wind of what was to happen when I received a morning phone call from G3COJ. Brian said that an aurora was in full swing there and that his countrymen, who had received 6-meter operating privileges just one week earlier, were having a great time. He suggested the possibility of transatlantic contacts and suggested alerting some of the East Coast 6-meter operators. I immediately phoned KITOL and informed him of what was transpiring. This later turned out to be a good move, as Lefty was heard twice during the evening by Swedish station SM6PU, and he heard the GB3SLX beacon (50.018). Unfortunately, no two-way contacts across the pond took place, but some 50-MHz transatlantic propagation was surely present.

Nor was this the extent of 6-meter activity. In addition to the literally hundreds of aurora contacts made throughout the afternoon and evening of February 8, openings from much of the US to several South American countries were reported. FY7THF, the French Guiana beacon (50.038), was heard widely around midday, as

was HC2FG, the Ecuador beacon (50.1). You can imagine K3ZO's surprise when he began to hear FM stations around 50.125. Although a veteran of the HF bands, Fred is somewhat new to 6 meters, so he was not accustomed to hearing these stations as many of us were during the past solar peak. Nevertheless, he collected his wits and switched his rig over to FM to complete a FB QSO, in Spanish, with HK3HVU. It sounded to this conductor as if the YL operator on the other end was even more surprised than Fred. Later in the evening, the proprietor of the HC2FG beacon was worked by stations in many parts of the country. Since Gus was on at the same time the beacon was being heard, it is obvious that the beacon is not located with his regular station. A number of transcontinental contacts were made, apparently via auroral E. It was this form of propagation that was almost certainly responsible for KITOL's being heard in Sweden and his reception of the British 6-meter beacon. Auroral E often forms during or after an aurora, most frequently in the more northern latitudes. Signals propagated by this mode customarily do not exhibit the buzzy sound usually present on auroral signals. Nor was this all. Many reports have reached me telling of both KH6IAA and KH6IJ working many West Coast

stations, and some as far east as Minnesota and Texas.

From Great Britain, G3COJ reports that, using just 10 W, he was able to work northern Gs, GIs and GMs as well as PA0XMA. He is reactivating his old 40-W linear, as the 4CX250B job, used during the permit days, must remain cold with the power restriction that came with general availability of the band.

Nor was the Western Hemisphere alone in experiencing very unusual 6-meter propagation for this time in the solar cycle. JA1VOK reports that, after hearing TV audio signals on the usual Australian frequency of 51.75 MHz, he went on to work VK4TL and VK4FXX. Hatsuo says that signals ran as high as S9 plus 20 dB. He believes that these are the first contacts made on the JA-VK path this season.

2 Meters—The stack of mail reporting 2-meter auroral accomplishments is impressive, to say the least. In a two-page column, it is impossible to do more than scratch the surface of what transpired. So, I will try to hit what appear to be the high spots. One of the things that made this session particularly notable was the wide geographical area covered. Stations from coast to coast and several as far south as Florida par-

EME Annals

Figures are number of different stations (not total QSOs), number of US states and number of DXCC countries all worked via EME. Compiled March 9, 1986. Deadline for next update is March 1, 1987. Beginning with the next appearance of the EME Annals, stations, other than those noted as being the first to establish moonbounce contact on the particular band, not heard from over a two-year period are subject to being dropped from the list. Minimum numbers of stations worked to qualify for listing on each band are noted. These can be expected to change, depending on activity levels and available QST space.

The Beginnings

January 27, 1953: first Amateur reception of echoes from the moon—W4AO and W3GKP. Frequency: 144 MHz.
 July 27, 1960: first Amateur two-way contact via the moon—W1BU and W6HB. Frequency: 1296 MHz.
 April 11, 1964: first 144 MHz two-way moonbounce contact—W6DNG and OH1NL.
 May 20, 1964: first 432-MHz two-way moonbounce contact—W1BU and KP4BPZ (followed shortly by a number of other contacts from KP4BPZ using the 1000-foot dish at Arecibo, Puerto Rico).
 March 15, 1970: first 220-MHz two-way moonbounce contact—WB6NMT and W9CNK (followed by a contact the next day between WB6NMT and K2CBA).
 October 19, 1970: first 2304-MHz two-way moonbounce contact—W3GKP and W4HHK.
 July 30, 1972: first 50-MHz two-way moonbounce contact—K5WVX (now K5CM) in conjunction with W5WAX (now K5SW), and WA5HMK in conjunction with W5SXD.

Current Standings

6 Meters (No Min)

K5WVX*	2	2	1
WA5HMK*	2	2	1
WB6NMT	2	2	1
W7FN	1	1	1
K6MYC	1	0	1

2 Meters (Min 20)

VE7BQH†	466	50	55
K1WHS†	430	47	43
WA1JXN/7†	344	50	43
K8BRQ†	339	—	50
SM7BAE†	306	50	65
W5JN	266	—	40
W7FN†	243	50	31
WA4NJP	235	—	36
SM2GGF	222	—	31
WA6MGZ†	210	50	40
OZ1EME	200	40	35
UA1ZCL	200	—	25
KDBSI	195	—	25
K17D	194	—	24
W7HAH†	192	50	34
WA9KRT	186	—	32
N4GJV	176	46	33
YU3USB	170	—	42
WB5LBT	162	—	38
KB7Q	161	41	36
OH7PI	160	—	42
WA4LYS†	159	40	43
N7NW	150	—	—
JA6DR	138	—	25
W5LJU†	136	30	31
K1FO	132	35	20
K1MNS	132	—	34
KR5F	130	28	28
K9KO	125	—	25
WA2GSX	123	37	32
W5HM	123	—	21
AL7FS	119	49	11
F6CJG	118	—	62
Y22ME	118	—	58
WA4MV1	115	24	20
SM4IVE	110	—	45
UA3TCF	110	—	40
SM4GVF	110	—	—
WA1JXN/C6A†	102	32	26
KB7WW	101	23	21
F6BSJ	99	—	55
YU3ZV	97	—	52
SM2GVF	90	—	44
WA3VSJ	88	38	27
PA0VST	87	28	24

*worked all continents
 †participated in first EME contact on particular band
 —information not provided

WB6PAT†	87	27	28
W0RWH†	86	26	24
K7KOT	86	—	17
K6GDH	83	22	27
WA8ZHE	83	—	26
DL8OAT	82	—	52
VE1UT	77	42	30
N6AMG†	77	31	—
WD4DGF	75	21	22
VE2DFO	71	22	13
K9YT	68	28	16
K1GVM	68	20	20
W7UBJ	67	36	7
K5GW	63	34	14
W1JRF†	62	19	20
JA6JK	61	—	—
K6MYC/KH6	60	—	14
W5SAG†	59	21	19
WB9QMN	57	18	27
KE5C	57	—	17
PA2VST	57	—	—
WB8ART	57	—	—
W5UWB	56	25	21
K2QR	56	21	15
N7WS	56	—	17
K07GK	56	—	15
G5OSZ	55	39	11
K4PKV†	54	32	12
WA4CQG	54	—	17
K2OS	53	—	15
ON7RB	50	—	38
W8IDU	49	29	12
WB5LUA†	49	29	12
DK1PZ†	48	—	12
WA7KYZ	45	29	8
W9BOZ	43	19	11
SM2ILF	40	—	25
W2GNS	40	—	15
W6SD	39	21	11
I2MBC	39	19	11
K7NII	38	24	5
K3VGX	38	18	7
W7CI	38	14	4
UB5JIN	38	—	38
K5BMG	37	24	9
DJ5MS	37	—	—
WA3GSC	36	15	10
KD9Z	36	—	7
K3MD	35	15	8
WA7BJU	34	27	2
AB3D	34	19	9
W7JF	34	18	6
SM2JAE	34	—	19
K2RTH	33	19	6
SM5CFS	33	—	—
WB2LSP	32	19	7

WA8TKJ	32	17	14
K9KFR	32	13	10
K5UGM	31	20	8
KA8Y	30	21	6
K5MB	30	14	4
OH5IY	30	—	29
N2MB	29	17	7
W5FF	28	—	6
W4WD	28	22	6
WD8ISK	28	18	8
WB9VEM	27	—	18
WB4EXW	27	24	3
4U1TU	27	17	8
DL9SP	26	—	11
UA3MBJ	26	—	—
WD5AGO	24	12	11
K5FF	23	20	5
W4DFK	23	14	6
OZ1GFX	23	7	9
K6PVS	22	—	9
I4EAT	21	12	7
K9TI	20	—	11
K5WE	20	—	5

OK1KIP	120	—	32
DL7YC	109	—	—
VE4MA†	106	33	27
FC1FHI	106	24	—
K1FO	105	30	26
SM6CKU	102	24	26
W5FF†	100	48	19
HB9AB	100	—	—
YU2RGC	98	25	23
OE5JFL	98	—	22
WA1RWU	97	—	—
OE9XJI	97	—	—
K8WWT†	96	27	23
W6RRY/5	94	38	22
G3SEK	92	20	23
HB3G	89	—	24
VE7BBG	86	39	21
JA4BLC	84	—	—
KL7WE†	81	34	18
W6RAP†	81	32	11
I2COR	81	—	31
W4WD†	77	32	22
F2TU	75	—	—
WA1RWU	75	—	—
K3GCO	74	28	21
K5FF†	73	37	19
KU4F	73	24	16
W5HUQ/4	69	32	20
ON4DY	68	24	20
DL3AAD	67	—	21
DF7VX	66	16	18
GW3XYW	63	—	17
K3 3 1	62	13	17
DF3RU	61	24	20
WB3ESS	61	—	—
K5HJU	61	—	—
DK5AJ	59	—	42
K3GCO	58	—	16
K8WWT	57	20	28
WA4ZTK	56	23	12
YV5ZZ	55	—	—
K0TLM	53	30	12
SM0DJW	50	—	—
G2LQR	49	14	17
DL9DL	48	—	—
DK1PZ	48	—	—
W1UHE	44	18	14
W5UKQ	43	31	13
ZL3AAD	43	—	—
SP5CIC/SM0	41	12	14
DL7OY	39	—	—
DL6WU	38	—	—
JA3AIF	36	—	—
WB4IZR	36	—	—
AD1C	35	20	12
W0YZS†	34	18	12
W9IP/2	33	—	—
OH2DG	33	9	14
K0KFR	32	13	10
LATK	32	11	13
OE5EFM	28	5	11

DL7VX	27	—	—
W3CCX†	25	11	12
G3IOR	25	—	—
N2CB	24	—	—
DF9CY	24	—	—
KH6HP	23	13	8
HB9BM	23	—	15
DJ4JU	22	—	14
VK3UM	21	—	—
W7HAH	20	11	6
N6AMG	20	6	10

23 cm (No Min)

K2UYH	50	7	21
OE9XJI	50	7	21
VE7BBG	43	8	18
G3LTF	41	8	18
SM6CKU	40	4	17
OK1KIR	39	7	11
WB5LUA	33	6	18
GW3XYW	31	—	16
K4QIF	27	5	14
Z5SJJ	26	—	13
OE5JFL	24	—	13
G3WDG	22	5	13
SM6FHZ	19	2	11
VK3AMW	17	3	12
DF0EME	16	—	11
SM4DHN	14	—	—
WA8NLC	13	—	9
SP5CIC/SM0	12	2	10
I2COR	12	—	11
G4CCH	12	—	—
HB0BM/P	11	—	9
YU1AW	9	—	8
ZL3AAD	9	—	6
K5JL	6	—	6
N6CA	9	4	5
DL7YC	7	—	—
I2COR	6	—	—
YU1AW	5	—	5
W2NFA	4	2	3
PA8SSB	4	2	3
W1BU*	4	2	2
VE4MA	3	1	3
WB6IOM	2	2	2
HB9PQ	2	2	1
W6HB*	1	1	1
KH6UK	1	1	1
W1FZJ/KP4	1	1	1

13 cm (No Min)

OE9XJI	8	0	5
W4HHK	3	2	2
WA4HGN	3	1	2
DF0EME	2	1	2
OK1KIR	2	—	2
G3WDG	2	—	2
W3GKP	1	—	1

icipated. This led to many contacts over distances beyond those normally attributed to aurora. It appears that a new North American DX record for the mode was set by Connecticut station KA1ZE and WBØDRL in Kansas. The distance involved is 1348 miles. According to W1JR, who has been keeping track of such things, the previous best aurora DX in this part of the world was a 1232-mile contact between K8EUR and W0PWC that took place in 1982. Other notable distances covered include: K5SW Oklahoma and W1VD Connecticut (about 1273 miles) W9IP/2 in northern New York to K5SW (1226 miles), and the same station to WBØDRL (1229 miles). W9IP notes that most of the long-haul QSOs were between 2130 and 2230Z, when the band seemed to be in the best shape. Note how well this correlates with the accompanying K index graph. Mike says that he had 88 contacts in 42 different grid squares on 2 meters and still had time to run up a good total on 70 cm.

Many described 2 meters as sheer bedlam, with signals reaching from the bottom end to over 144.250. The event was particularly exciting for newcomers, and provided them many new states and grid squares. One report, from such a new VHFer, recounts the experiences of KC2KK. Peter, who is 16 years old, says that he completed 38 QSOs in 15 states during the fracas. What particularly impressed him was the strength of the signals, with many stations reading S9. K3ZO, a relative newcomer to VHF, did not spend all of his time working South Americans on 6 meters. Fred also took advantage of the conditions to up his 2-meter state total by 9, to 33. This aurora was especially unusual in how far south and west it reached. The most southerly station I have heard about is WD4AHZ Sarasota, FL. Ron heard a number of stations, but the only one he was able to work was WB4FDU North Carolina in EM95. Equipment

includes a 160-W solid-state amplifier to a Cushcraft 215WB at 41 feet. A station 80 miles south of him was not able to hear any of the aurora signals. Another unusual aurora QTH reporting is Santa Rosa, CA, WA8LLY/6 heard several aurora stations and managed to work WA7IJV Oregon for state number 13. Steve notes that the signals peaked at 40 degrees with an elevation of 20 degrees. Many may be missing the fact that aurora signals are often stronger if the antenna is elevated. OSCAR arrays sometimes come in handy for something besides working the satellite. Many impressive reports were received, but that of Colorado resident W0VN is one of the most impressive in terms of illustrating the breadth of the aurora propagation. Charlie lists 52 contacts in 36 grid squares and 23 states. Sta-

Gateways: Keys to Opening New Communication Doors

A gateway is a portal between two domains or regions. For example, in computer networks, a gateway is a facility where different networks meet. Data from one can be transferred to the other. In Amateur Radio, packet-radio gateways illustrate the concept. A station having transceive capabilities on both VHF and HF, and the equipment to switch traffic, could function as a gateway. Thus, the packet gateway functions as a portal to VHF networks for HF network users, and vice versa, as shown in Figure 1.

Similarly, in Amateur Space Program jargon, a gateway is a facility where a terrestrial network interfaces a space network.¹ For example, a terrestrial repeater with its user community could interface AMSAT-OSCAR 10 and its network of satellite users, the Amateur Radio space-communications community. The facility providing this network interface is a gateway. A typical satellite gateway facility might look as simple as Figure 2.

Conceptually and functionally a satellite gateway is straightforward. Typically, signals originated by 2-meter FM users are converted to baseband audio by the repeater's receiver. Then, by any one of several means, the audio is linked to the satellite station's uplink transmitter. Conversely, satellite downlink signals are received at the ground station, converted to baseband audio and then shipped back to the repeater's transmitter. From there they go out on FM just as if they were a normal repeater signal.

The overall system (including the gateway, the repeater, the satellite ground station and the users in both the terrestrial and space communications networks) is functionally identical to normal satellite systems used by individuals, except the user on one end has an extra link inserted to "remote" him from the satellite station. Indeed, regular satellite

users might be unaware they were talking to someone quite apart from a regular satellite station. You might be strolling down the street in sunny Orlando, Florida with your 2-meter hand-held radio and chatting with a chap in Honolulu or Sardinia. And, except for the repeater squelch tail, no one would suspect the unique nature of the QSO in progress. But dozens of these types of gateways have operated since AO-10 was launched in 1983. Two years ago, the first transcontinental QSO via AO-10 using hand-held radios took place when two gateway stations hooked up and hand-held users in West Virginia and California QSOed through the gateways in their vicinity.

Two types of gateways have been used with AO-10. The first and most basic type provides single channel access through a local repeater on one end and a fairly standard AO-10 ground station on the other end. The second type of gateway is slightly more complex. It takes a few dozen kilohertz at one frequency and translates it to the AO-10 uplink frequency. The uplink could contain several mixed SSB and CW signals spread across, typically, 40 kHz. This rarer type of gateway uses what is called a linear translator.² Yet again, AO-10 users might be totally unaware that the person they are talking with is using a gateway to access AO-10.

Gateway operation through AO-10 requires skilled operators; completely automatic control is still in the future. With AO-10, anten-

nas must occasionally be aimed and Doppler shift corrections must be made. While the control operator of a simple gateway has only to manage a 2.5-kHz chunk of AO-10 spectrum, linear translator operators need be much more skilled. The relative challenge is comparable to the difference between steering a canoe and a barge through a narrow channel.

The advantages of using a gateway to access AO-10 are many. Apartment dwellers unable to field the modest antennas required for direct AO-10 access can still enjoy the occasional thrill of working true DX by using a gateway. Mobile operators can enjoy intercontinental QSOs on VHF even before the new generation of satellites is born.³ Demonstrations at conventions and hamfests might be greatly enlivened with the addition of a gateway operation to show off Amateur Radio's "high ground." Emergency communications might be enhanced if a trunk line to the affected area passed via a gateway and AO-10 to master command centers and logistics-support areas. Many more classes of uses might be imagined.

But one of the most important aspects of gateway operation is the facilitation of demonstrations to the uninitiated of the thrill and challenges presented by today's Amateur Radio in a space context. Moreover, if you surveyed hams today, you'd probably find that if they had just one radio, it would likely be a 2-meter hand-held radio. Thus, with a gateway to use, a newcomer with hamdom's most basic equipment, a hand-held radio, could try out hamdom's highest achievement—AO-10! That is a significant capability bridge that should further spur gateway use.

Yet some veteran satellite users have expressed dismay and concern with some aspects of gateway operation. The concerns most often fall in one of two categories. The first is a turf issue. "They'll use up all the spectrum and available power." The second is more subtle. "If gateways are really good,

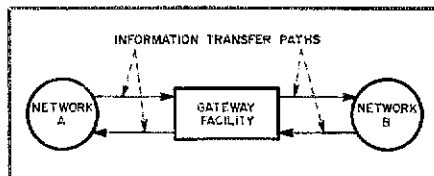


Fig 1—The gateway as a bridge between networks.

¹Notes appear on page 71.

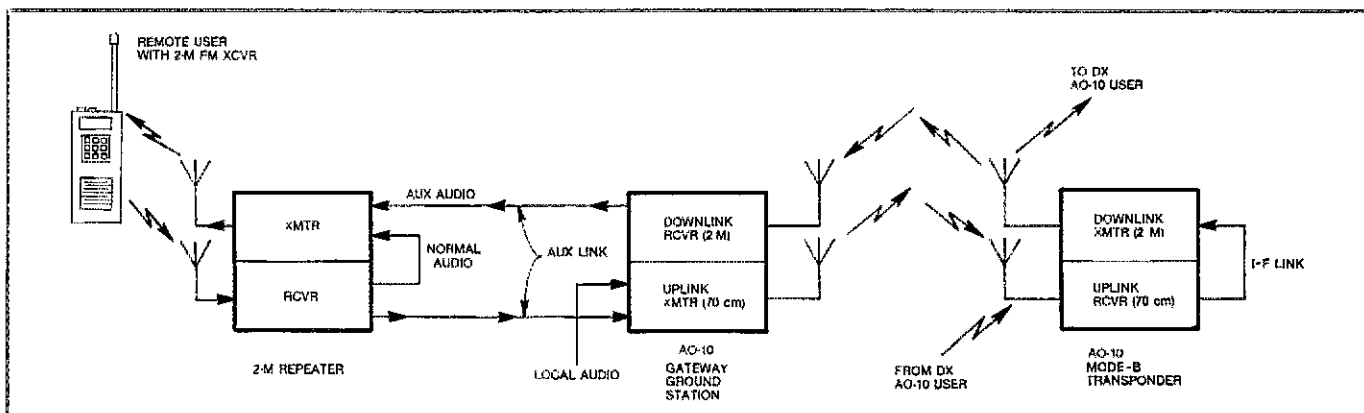


Fig 2—Gateway functional block diagram. The aux link between the repeater may be any convenient mode such as telephone line or aux RF link. Even 24-GHz Gunnplexer transceivers have been used.

there'll be no reason to obtain one's own satellite station, people will ignore the desired space education aspects of getting to know how to track and use satellites, and so forth. And if they don't need to know anything, they won't need AMSAT to provide information. AMSAT membership will drop and it won't be able to build satellites anymore!"

Fortunately, none of this has happened. In the first case, the number of gateway operations has not been excessive. The very fact that AO-10 does not always present itself for use at convenient times has tended to limit gateway operation since few find it sufficiently compelling to warrant rising at, say, 3 AM.

On the second issue—the matter of diminished AMSAT membership with increased gateway use—again, fortunately the issue has remained mostly academic because gateway operations have not proliferated. Moreover, many gateway users have found AO-10's challenge so appealing they have obtained both their own OSCAR equipment and AMSAT membership to boot.

In addition, the built-in constraints on gateway operation seem to work to encourage truly interested individuals to do more, to learn more. Individuals accessing the satellite through a gateway often find it so fascinating they want to get more flexibility in who they talk with on the satellite and when they operate through it. This strongly impels them toward obtaining their own stations and to become full-fledged AMSAT members. Those who remain occasional gateway users are perhaps content to queue up for a short QSO on AO-10 through the gateway and that's that. These folks have had fun, enjoyed the tryout and will probably tell friends about it. They can continue to be AMSAT's guest on the satellite even though we hope they will eventually help to support new satellite construction by joining.

Gateway operation is a great way to taste the wine before purchasing the bottle. And it offers some nontrivial benefits and experience to many who try it. See if there is an experienced AO-10 operator in your area and a cooperative, knowledgeable repeater operator, too. You might suggest that these folks get together for a gateway experiment. Your friends may never forget the experience of their first AO-10 contact made from the comfort of their "whatever!"¹

Next month, we'll take a first look at Japan's first homebuilt Amateur Radio satellite, JAS-1. Employing both digital and voice transponders, JAS-1 will be launched late this summer.²

Notes

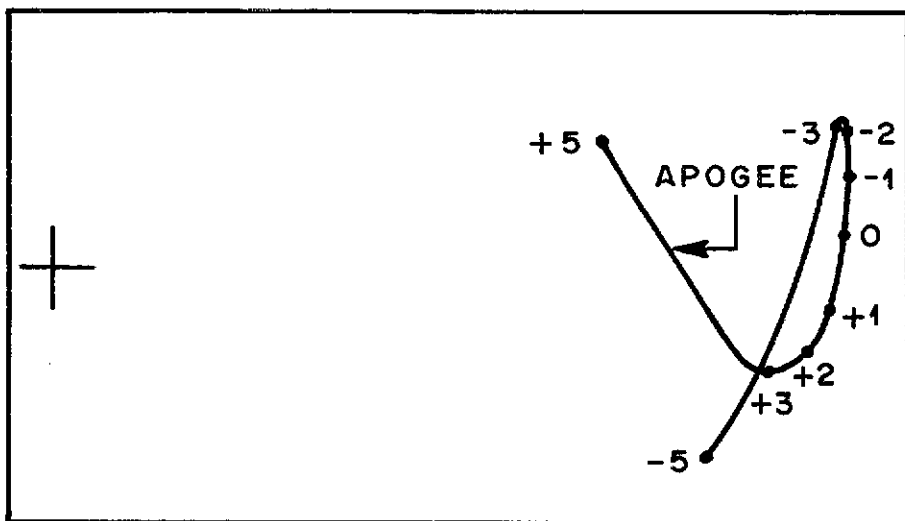
¹The term "teleport" is also applied to the interface of space and terrestrial networks.

²Functionally, a linear translator is very similar to the linear transponder employed by AO-10.

³See last month's column on prospects for mobile satellite work.

⁴A revised booklet on gateway operation is available for a \$5 donation to AMSAT. Checks only, please, made payable to "AMSAT." Send to AMSAT, PO Box 27, Washington, DC 20044. Mark your envelope "Gateway" to speed your request.

⁵Free information on satellite-tracking software, AMSAT satellite nets and how to get started on the satellites can be obtained by sending a business-sized SASE (with postage commensurate with your request) to the column conductor at the address above.



AMSAT-OSCAR 10 ground-track cursor for the OSCARLOCATOR. Reference data is for May 15. [REDACTED]

World Above 50 MHz

(continued from page 69)

tions worked essentially spanned the continent—from Californians K6PVS DM14 and WA6LHD CM88 to NE7X Washington CN87 to the west and K4MSK EM85 in North Carolina to the east.

1¼ Meters—This band was as hot as this conductor has ever heard it. Having succeeded in making only a single aurora contact before, I was elated to find a number of strong signals present when I checked the band about 2115Z. For the next 2½ hours, with some time out to make my first ever 70-cm aurora contacts, I added three new states to the W3XO total with contacts with K9HMB and W9UD Illinois, AF1T New Hampshire and WQ4V South Carolina. Other enjoyable exchanges with K1PXE, WA1STO and K1RT Connecticut; W1GXT Massachusetts; K2OS New York; WB8BKC Michigan; and WB2NPE New Jersey rounded out this conductor's 1¼-meter activity. Signals ran between 55A and 58A.

70 cm—Although it would be difficult to come up with such figures, it wouldn't be surprising to learn that more 70-cm aurora contacts were made Feb 8 than in the entire previous history of VHF. This conductor had never heard aurora on this band prior to this, but was convinced to abandon 1¼ for a while after receiving a phone call from nearby W3IP informing me that he had just worked WB5LUA in Texas. Mike further told me that his beam was straight west at the time, and also noted that one had to transmit about 3 to 4 kHz above where the aurora signal was heard due to the Doppler. Armed with this bit of intelligence, I ventured into the unknown waters of 70-cm aurora. I didn't set any records (it later turned out that Mike had), but I did make my first buzz-mode contacts on the band, working N18O and K8WW Ohio as well as W9IP/2. No new states, but a lot of fun.

One of many who must have heard 70-cm aurora for the first time during this amazing ses-

sion was VHF veteran WB5LUA near Dallas. Of course, aurora is not too common that far south. Al writes that he found 2 meters loaded with signals, so he went to 1¼, working WBØDRL with 59A signals at 2132Z. The two then went to 432.1 and exchanged 55A reports. Al's next contact was with W3IY/4 Virginia a few minutes later, followed shortly after by W3IP. Al says that the distance to W3IP, calculated by W1JR, is 1181.5 miles, which should be a record for the band, at least in North America. WB5LUA went on to make a half dozen more 70-cm contacts, including NØLL Kansas, KØUS Nebraska, and KØRZ, WBØQMN and KDØGT Colorado.

Not all of the propagation during February was aurora. Several reports tell of a fine tropo opening along the Gulf, peaking Feb 21. WASHNK near Houston tells of making 70-cm contacts with 8 states and 18 grid squares as far east as South Carolina.

23 cm—The aurora news for this band is all negative so far. With the intensity of the propagation on 70, one would expect that something should have been going on here. Anyone have any reports? Some did try with notice results. Two who made the attempt were W3IY/4 and W3IP. Both were running quite-low power, however. Others, who had the capability, were so busy on the lower bands that they never were able to find the time. One good candidate would have been K2UYH, but Al tells me that he was tied up with getting out the Newsletter and did not do any operating that day.

TWO CONFERENCES COMING UP

May is the month for both the Eastern and the West Coast VHF Conferences. The 12th Annual Eastern affair will be held May 16-18 at Rivier College, Nashua, New Hampshire. For details, contact Lew Collins, W1GXT, 10 Marshall Terr, Wayland, MA 01778, or call 617-358-2854 (from 6 to 10 PM Eastern Time). The West Coast Conference is coming up May 2 through 4 at Anaheim, California, the home of Disneyland. Either Randy, WB6ESQ, or Keith, K6PVS, can provide further info. [REDACTED]

Coming Conventions

ATLANTIC DIVISION/NEW YORK STATE CONVENTION

May 16-18, Rochester

The 1986 edition of the Rochester Hamfest/Atlantic Division/New York State Convention will be on Friday, Saturday and Sunday. The flea markets open at noon on Friday. Indoor and outdoor space will be available this year. Indoor space for non-commercial sellers available by advance reservation only. Write or call for additional indoor-space information. Commercial exhibits Saturday and Sunday only. Open on Saturday at 8:30 AM and Sunday at 9:30 AM. Site of the big weekend is at the Monroe County Fairgrounds, East Henrietta Rd (Rte 15A) and Callkins Rd. Hotel headquarters is the Rochester Marriott Thruway. Both locations are near NY Thruway exit 46. Volunteer license examinations will be conducted on Saturday. Advance registration is necessary. Space may be available for last minute registrants. Check with license-exam chairman A. G. deBleek, KW2X, 59 Bay Knoll Rd, Rochester, NY 14622. Programming begins at 10 AM Saturday. Groups presenting programs are SAYLARC, NTS, WDN, NYPON, NYS, NYSPTEN, Navy MARS. Feature programs will be Problems of the Beginner Ham by Larry Wolfgang, WA3VIL, ARRL Asst Technical Editor, Computers in Amateur Radio by Jon Bloom, KE3Z, ARRL Laboratory Supervisor, and Use of Radiowaves in Medical Diagnosis and Research, by Dr Nikolaus M. Szeverenyi, Department of Radiology, Upstate Medical Center.

May 16-18
Atlantic/New York State

May 17-18
Oklahoma State

June 6-8
Oregon State

July 5-6
West Virginia State

July 11-13
Texas State

July 19-20
Southeastern Division

ARRL NATIONAL CONVENTIONS

September 5-7, 1986—San Diego, California

July 10-12, 1987—Atlanta, Georgia

August 19-21, 1988—Portland, Oregon

OKLAHOMA STATE CONVENTION

May 17-18, Broken Arrow

The Broken Arrow and Tulsa ARCs host during the Green Country Hamfest at the Votesh SE Campus, 4600 S Olive, Broken Arrow (111th St S and 129th E Ave). The fun begins with a mixer Friday evening at the Travelodge. Flea-market and dealer exhibits open 9 AM Saturday. Spend the day browsing exhibits or attend one of the interesting programs, maybe meet a wheel from Newington, perhaps upgrade in one of the ARRL FCC examination sessions. Park the harmonics in the children's event room so the XYL can enjoy programs headlined by classes on candy making and wardrobe planning. The evening's family BBQ dinner is affordably priced and includes entertainment by Earl Jennings, K5JE, premier Bluegrass performer.

Preregistration price is \$4 each, maximum \$12 per household, or \$5 each at the door. Flea-market tables are \$7.50, \$10 at the door. Dinner tickets are \$5.25 and \$2.75 for children under 12. For more information, contact Dave Horn, KK3I, 918-492-5286, or write BAARC, Box 552, Broken Arrow, OK 74013. Special convention rates are available on request at the Travelodge 2600 N Aspen, Broken Arrow, OK 74012, or call 800-255-3050.

NORTHWESTERN DIVISION CONVENTION (UPDATE)

The Northwestern Division Convention scheduled for May 31-June 1 in Vancouver, Washington, has been canceled.

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)—May 2-4: The Cochise ARA will hold its 1986 Hamfest at the club's training facility on Moson Rd which intersects Rte 90 five miles east of the 90/92 junction in Sierra Vista. No charge for "tailgaters;" primitive overnight accommodations for RVs. Talk-in on .52 and 146.16/76. All ham radio, computer or related businesses are invited to participate. Ham exams on May 4. For more information, contact Don Morgan, W7ACI, tel 602-458-5293, or CARA, PO Box 1855, Sierra Vista, AZ 85636.

California (Fresno)—May 2-4: The Fresno ARC is sponsoring their 44th Annual Hamfest on Fri 5 PM-9 PM, Sat 8 AM-11 PM, all day Sun. Admission is \$5, \$6 at the door. Full registration is \$23 in advance, \$25 at the door. Activities include exhibits, swap tables, banquet, amateur examinations and special-event station W6TO on air from our emergency van at the hamfest. Talk-in on 144.34/94. For further information and reservations, contact Fresno ARC, PO Box 783, Fresno, CA 93712, or call Harry Billings at 209-268-6314.

California (Sacramento)—May 4th: Doors open 9 AM-3 PM. Talk-in on 145.19 and 224.78 MHz. This is the big event in the Sacramento Valley sponsored each year by North Hills ARC. Free admission, advanced table sales, food and drink available and free parking. For information, contact, HAMSWAP 86, c/o NHRC, PO Box 41635, Sacramento, CA 95841.

Colorado (Boulder)—May 4: The Rocky Mountain VHF Society will again hold the annual spring Ham Radio & Computer Swapfest, 9 AM-3 PM, rain or shine. As in the past, it will be at the Boulder National Guard Armory at the end of Boulder (4750 N Broadway). Admission \$3 per family. Activities include flea-market for ham radio, computer, electronic parts and equipment, technical seminars, equipment demonstrations, hand-held radio testing and refreshments. There

is no extra seller's charge. Some tables will be furnished for people bringing equipment to sell. Sellers are encouraged to bring their own tables. If any seller needs more than one table, they must contact the organizers in advance. Talk-in on 146.16/76. For more info, contact Dave McClune, WB0ZID, 5338 Spotted Horse Tr, Boulder, CO 80301, or call 303-530-1872.

Colorado (Colorado Springs)—May 17: The Pikes Peak RAA will hold their 1986 Swapfest beginning 8 AM. Location is the Rustic Hills Mall at Palmer Park and Academy Blvd. Free admission. Table rentals \$8 in advance, \$10 at the door. Talk-in on 146.37/97. VE testing on site. For information or reservations call, Al, N0CMW, 303-473-1660, or write PPRAA-Swapfest, PO Box 16521, Colorado Springs, CO 80935.

Connecticut (East Hartford)—May 4: The Pioneer Valley Radio Association will hold its annual Flea Market at East Hartford High School (formerly known as Penney High), 869 Forbes St, 9 AM-3 PM. Plenty of free parking available. Dealer set-up at 8 AM. Dealer tables \$8. General admission \$2. For further information or to reserve a table, contact Dave Rose, KW1V, 13 Long Crossing Rd, East Hampton, CT 06424, tel 203-267-8993. Talk-in on 146.19/79. Amateur Radio exams will be given by the Newington Amateur Radio League VE Team. Walk-ins accepted.

Georgia (Hartwell)—May 17-18: The Anderson, Hartwell and Toccoa ARC will hold the 7th Annual Lake Hartwell Hamfest at the Lake Hartwell Group Camp, located on Highway 29, four miles north of Hartwell. Features include free admission, free camping and free flea-market space. Activities include a leftfooted CW contest, horseshoes and many other activities for the whole family. Fishing, swimming and camping are available on the site. The campground opens at 6 PM on Fri. Talk-in on 146.19/79, 147.93/33 and 146.895/295. For further information, contact Merrick A. Counsell, W1BNS, 215 Nottingham Way, Anderson, SC 29621.

Illinois (Cicero)—May 18: The 900 MHz Users Group is sponsoring a hamfest at Palace Hall, Central and Cermak St. Doors open 7 AM. Tickets \$3 per person. Tables \$5 each (we supply!) All inside. Air conditioned. Coffee, rolls and food available. Talk-in on 52. For further information, write to the 900 MHz Users Group, 2747 N Spaulding, Chicago, IL 60647.

Illinois (Kankakee)—May 4: The annual Kankakee Hamfest sponsored by the Kankakee ARS will be held at the Kankakee County Fairgrounds, 8 AM-4 PM.

FCC and ARRL booths. Free flea-market tables (limited) and many exhibitors. Free parking. Food and drinks available. Admission \$2.50 in advance, \$3 at the door. Setup May 3 6 PM-8 PM, and May 4 6 AM-8 AM. Talk-in on 146.34/94. More info, contact KARS, c/o Don Kerouac, K9NR, 1377 Circle Dr NW, Kankakee, IL 60901, tel 815-932-3111 after 5 PM CST or 815-937-2750 before 5 PM CST.

Illinois (Knoxville)—May 18: The Knox County ARC is sponsoring their 4th annual hamfest at the Knox County Fairgrounds, exit 51 off I-74. Camping area available. Large, well organized flea-market area. Large commercial-vendor building. Excellent food sponsored by the Knox County Pork Producers Assn. Gate opens at 7. Commercial building at 9. Donations \$4 at the gate, \$3 in advance. Contact Stuart Schrodt, RR2, LS 19, Avon, IL 61415, 309-465-3107.

Illinois (Princeton)—Jun 1: The Starved Rock Radio Club is sponsoring their SRRCC Hamfest at the Bureau County Fairgrounds. Admission \$2.50 before May 20, \$3 at the door. Open all day. Activities include ARRL Seminar conducted by ARRL Central Division Director Edmond A. Metzger, W9PRN, and Vice Director Howard S. Huntington, K9KML. New equipment dealers, manufacturers and their representatives are invited to display and sell their line of amateur gear. Talk-in on 147.12/72, 146.07/67, 52, or W9MDS/repeater. Clean, modern buildings and facilities with excellent parking and access from Rte 80 and Rte 6. Nominal fee for campers and trailers. Food and free swap areas. Free coffee and doughnuts for registrants at 8 AM. For further information, write to SRRCC, RFD 1, Oglesby, IL 61348, tel. 815-665-4614.

Illinois (Quincy)—May 18: The Western Illinois ARC will hold its 1986 Tri-State Swapfest in conjunction with a Fly-In Breakfast sponsored by the Experimental Aircraft Assn. The Swapfest and Fly-In breakfast will be held at Haert Field in Taylor, Missouri (five miles west of Quincy at the junction of State Routes 61 and 24). The Swapfest will open at 9 AM and close at 3 PM. General admission tickets are \$1 each (six for \$5) and can be purchased at the gate. Tailgate flea-market spaces are \$2 in advance, \$3 at the gate. VEC exams will be offered for all license classes. Talk-in on the 147.03 repeater. For more information, contact the Western Illinois ARC, PO Box 3132, Quincy, IL 62301.

Illinois (Willow Springs)—Jun 8: The Six Meter Club of Chicago is sponsoring their 29th Annual Six Meter Club Hamfest at Santa Fe Park, 91st and Wolf Rd (SW

of Chicago). Gates open 6 AM-4 PM. Admission \$2 advance, \$3 at the door. Activities include swap and shop, displays in the pavilion, ARRL and FCC representatives, MARS meeting. Refreshments available. Talk-in on 52 and 146.37/97. For more information, contact Val Hellwig, K9ZVW, 3420 S 60th Ct, Cicero, IL 60650.

Illinois (Titon)—May 18: The Illiana Repeater System 17th annual hamfest will be held at UAW Civic Center. Talk-in on 22/82. Amateur testing available. No preregistration. Address all inquiries c/o Barbara Tolson, WD9AFF, PO Box G, Catlin, IL 61817, or call 217-662-8948.

Indiana (Darmstadt)—May 18: The 39th Annual Evansville TARS Hamfest will be held at Bauer's Grove. Doors open 6 AM CDT. Admission \$3. Flea-market. Indoor tables \$7.50, outdoors \$3.

Indiana (Terre Haute)—Jun 1: The 40th Annual Wabash Valley Amateur Radio hamfest will be held at the Vigo County Fairgrounds located on US 41, half mile south of I-70. Open Sat for overnight campers (\$5 fee), open Sun 8 AM. Free covered outdoor flea market, \$3 for 12 x 12 space. Some ac and tables available on first-come basis. Food and refreshments, giant shopping mall nearby. Advance tickets \$2, \$3 at the gate or 3 for \$5, under 12 free. Talk-in on 147.69/99 and 52. FCC exams at 9 AM at the Red Cross Bldg in Terre Haute. For tickets and information, send SASE to WVARA Hamfest, PO Box 81, Terre Haute, IN 47808.

Indiana (Wabash)—May 18: The Wabash County ARC 18th annual WCARC Hamfest will be at the Wabash County 4-H Fairgrounds, 6 AM-4 PM. Admission \$2.75 in advance, \$3.25 at the door. Activities include Packet seminar, amateur exams for Tech through Extra Class and flea market. Tables available. Set-up time Sat afternoon and evening. Food available. Talk-in on 147.63/03, 52, and 94. Free overnight parking. More info, contact Don Spangler, 235 Southwood Dr, Wabash, IN 46992, or call 219-563-5564.

Kansas (Pittsburg)—May 17: The Pittsburg Repeater Organization will hold their 1986 Hamfest in the Lincoln Park Pavilion, 10 AM-8 PM. Free tables. Covered-dish dinner at 6 PM. Chicken and drink furnished by the club. Talk-in on 34/94 or 84/24. For further information, contact Ken Johnston, PO Box 1303, Pittsburg, KS 66726.

Kansas (Salina)—Jun 1: The Central Kansas ARC will hold their CKARC Hamfest at the 4-H Building, Kenwood Park, 8 AM-4 PM. Admission \$2. Activities include ARRL meeting, free flea market, covered-dish noon meal. Talk-in on 147.63/03. For info, call or write Jim McKim, W0CY, 1616 S 10th, Salina, KS 65401, tel 913-827-2927.

Kentucky (Endanger)—Jun 7-8: The Northern Kentucky ARC announces "Ham-O-Rama '86" to be held at the Best Western Vegas Convention Center, located I-75 to exit 184B (Rte 236 west, 8 miles south of Cincinnati, OH). Completely indoors, air conditioned and free parking. Major vendor indoor spaces selling for \$10 each. Maximum of eight spaces, please note: A deposit of \$10 per major vendor is required no later than May 31 to guarantee space in the hall; setup after 8 PM. Flea-market setup after 8 AM both Sat and Sun. Open to the public at 8 AM. Greatly expanded flea market with indoor or outdoor spaces available. Food and drink available. Admission \$5 both days, children under 13 free. Contact AF4Y or WD4PBF at the gate for flea-market space and prices. Talk-in on 147.855/255, 147.975/375. Contact Joe Dunnett, WA4WNF, at 606-371-2255 for additional information, or write to NKARC, PO Box 1062, Covington, KY 41012. Best-Western Motel, tel 606-342-6201, offers reduced room rates if Ham-O-Rama is mentioned at time of reservation.

Maryland (Harmans)—May 25: The Maryland FM Assn annual Hamfest will be held at the Howard County Fairgrounds, West Friendship, 1-70, 30 miles west of Baltimore. Gate open 8 AM-4 PM. Inside tables \$7 by advance registration, \$10 at the door, if available. Donation \$3. Talk-in on 146.16/76, 222.16/223.76 or 449.1/444.1 MHz. For tables or information, Michael Cresap, W3IP, 1921 Pomotacom Dr, Hanover, MD 21076, tel 301-551-3567 (6-10 PM).

Massachusetts (Dalton)—May 18: The Northern Berkshire ARC announces their annual spring flea market to be held at the Dalton American Legion, Rte 9. Starts at sunrise. Admission \$1. XYLs, YLs and kids free. Refreshments by NOBARC.

Massachusetts (Wilbraham)—May 4: The Hampden County Radio Assn will hold its annual flea market, rain or shine, at the West Springfield Elks Lodge covered pavilion on Morgan Rd, 9 AM-3 PM. Admission \$1. Tables \$5 each. Dealers may display from vehicles at \$5 per vehicle. Food and refreshments available. Directions: Mass Pike to West Springfield, Exit 4, travel about 1/2 mile south on Rte 4. At Abdw's Restaurant, turn right onto Morgan Rd; Elks Lodge

is 1/4 mile on the left. For more info, contact Steve Nelson, WA1EYF, at 413-596-8216.

Michigan (Cadillac)—May 17: The Waxauke ARA is sponsoring its 26th annual Swap Shop to be held at the Wexford Civic Arena, jet of N Mitchell (US 131) and 13th St. Talk-in on 97/37. Hours 8 AM-2:30 PM. Admission \$2.50. Food. For further info, write Waxauke ARA, PO Box 163, Cadillac, MI 49601.

Minnesota (Bemidji)—May 3: Hamfest opens 9 AM at the Bemidji Middle School. Talk-in on 146.73. For more info, SASE to Bemidji ARC, PO Box 524, Bemidji, MN 56601.

Minnesota (St Paul)—Jun 7-8: The North Area Repeater Assn is having an Amateur Fair at the East Building of Grandstand, Minnesota State Fairgrounds. Commercial starts at 8 AM. Flea market 6 AM-4 PM Sat, Sun til 3 PM. Admission \$4, \$5 at the door, under 12 free. Activities are flea market, exhibition and sales. Local club activities also. Info: PO Box 857, Hopkins, MN 55344, 612-566-4000.

Nebraska (Omaha)—May 18: The AK-SAR-BEN ARC hosts its annual auction at the Radial Social Hall, 1516 Northwest Radial Highway. Equipment check-in at 8 AM. Auction at 9:15 AM. Food and beverages on the premises. No admission charge. Talk-in 146.34/94. Auction inquiries to N0BTN (Greg) at 402-895-5219.

New Hampshire (Nashua)—May 16-18: The 12th Annual Eastern VHF/UHF Conference will be held at the Rivier College. The program features a Fri night hospitality room, technical talks by well-known VHFers on Sat, "rap sessions" on the various VHF/UHF bands, noise-figure and antenna-gain measurements on Sun, and other activities. A new feature of this year's conference will be a series of tutorial presentations for the newcomer to VHF/UHF. To preregister, send \$13.50 to David Knight, KA1DT, 15 Oakdale Ave, Nashua, NH 03062 before May 5. Registration at the door is \$20. The Sat night banquet is \$14, also payable before May 5. This year a special registration rate of \$10 is available for any first-time attendee. Housing will be available in dormitory rooms at the college at a modest fee. (The exact fee was not known at press time; contact the registration chairman for registration forms and fee information. Please include an SASE.) Those wishing accommodations in the dormitory must include payment at the time of preregistration. Make all checks payable to "Eastern VHF/UHF Conference." For those wishing to make their own housing arrangements, there are numerous hotels and motels nearby. A map of the area will be available. For more info, contact Lewis D. Collins, W1GXT, 10 Marshall Ter, Wayland, MA 01778, tel 617-358-2854 (6 PM-10 PM EST).

New Jersey (Ridgewood)—May 18: The Bergen ARA is holding a ham Swap N Sell at the Bergen Community College, 400 Paramus Rd, 8 AM-4 PM. Tailgating only. Bring your own tables. Sellers \$5, buyers free. Thousand of spaces. Amateur license examinations. Talk-in on 79/19 and 52. For more info, contact Jim Greer, KK2U, 444 Berkshire Rd Ridgewood, NJ 07450, tel 201-445-2855 nights only.

New Jersey (Willingboro)—May 18: The Willingboro, NJ Repeater Group will hold its Annual Hamfest 8 AM-3 PM at Holiday Lakes, Rte 130 and Creek Rd. Admission \$3, \$2 in advance. Table space/taigate \$5. Setup 6 AM. Outdoor only. Refreshments available. Talk-in on 146.925, 224.860, 52. More info, write to Jack Engel, K2KLM, PO Box 31, Rancocas, NJ 08073, tel 609-877-5249 after 6 PM.

New York (Corona)—Jun 8: The Hall of Science ARC hamfest will be held at the Hall of Science parking lot, Flushing Meadow Park, 47-01 11th St, 9 AM-3 PM. Admission for buyers \$3, sellers \$5. Talk-in on 144.300 simplex link 223.600 repeater, 445.225 repeater. Further info, John Powers, KA2AHJ, tel 718-847-8007, or Arnie Schiffman, WB2YXB, tel 718-343-0172.

New York (Melville)—May 4: Suffolk County Radio Club Indoor-Outdoor Electronic Flea Market will be held 8 AM-3 PM at the Republic Lodge 1987, 585 Broadhollow Rd (Rte 110). There will be a refreshment stand on the premises and plenty of free parking. General admission \$2 (wives and children under 12 free). Indoor sellers tables \$7, outdoor space \$5, each includes one admission. Talk-in on 144.61/145.21 and 52. For more info, contact Bill Sullivan, N2ETG, 516-689-9871 evenings.

New York (Westbury)—May 18: The Long Island Mobile ARC is sponsoring their Long Island hamfair at the New York Institute of Technology on Northern Blvd, east of Glen Cove Rd. Starts 8 AM for sellers, 9 AM for buyers. Admission \$3. Activities include VHF tuneup clinic, ARRL information table. Food and refreshments available. Talk-in on 146.25/85. For more info, contact Hank Wener, WB2ALW, 516-484-4322, or call LIMARC info line 516-796-2366.

North Carolina (Durham)—May 24: The Durham FM Assn will hold its annual hamfest and computerfest at the lower level of South Square Mall, 8 AM-4 PM. The flea market will be held under a covered parking deck.

Talk-in will be on 147.825/225. Free parking. Tables available, and FCC exams are planned. Admission \$4 at the gate. For further info, contact DFMA, PO Box 8651, Durham, NC 27707, or Mick, W4ZUS, at 919-544-3556.

Ohio (Athens)—May 18: The Athens County ARA seventh annual Hamfest will focus on the use of computer technology in ham radio. Special feature includes a demonstration of packet radio. The event will be held in the City Recreation Center on East State St, 8 AM-3 PM. Admission \$3 in advance, \$4 at the gate. License examinations will be offered at all levels. Those wishing to take exams should complete an FCC Form 610 (new version) and a \$4.25 check payable to ARRL/VEC. Exams will be at the Lawhead Press, across E State St from the hamfest site. Free paved outdoor flea-market space adjacent to building for tailgaters and those bringing own tables can be claimed the day of the event. Indoor space available by advanced registration. To reserve space, contact Sam Stewart, KA8NIE, 116 Franklin Ave, Athens, OH 45701 tel 614-592-5330. Talk-in on 146.34/94. For further information or advance tickets, write to Carl J. Denbow KA8JXG, 63 Morris Ave, Athens, OH 45701.

Ohio (Fremont)—May 18: The Sandusky Valley ARC Annual Hamfest will be held at the American Legion Home, 2000 Buckland Ave, southwest edge of Fremont. Advance tickets \$2.50, \$3 at the door. Table space 8 ft/\$6. Ample free trunk space, free parking. Talk-in on 52 or 146.31/91. For tickets or more info, send SASE to Pat D. Keating, W8SKWD, 615 Lime St, Fremont, OH 43420.

Ohio (Medina)—May 11: Medina County Hamfest, sponsored by the Medina Two Meter Group, to be held at the Medina County Community Center Building, 735 Lafayette Rd (State Rte 42 SW). Doors open 8 AM-2 PM. Building and flea-market setup at 6 AM. Refreshments and free parking available. Tickets \$3.50, in advance \$4 at the door. Tables \$6, flea-market space \$4. Talk-in on 147.63/03. For table reservations and advance tickets, write PO Box 452, Medina, OH 44258, or phone 216-725-4492 or 216-769-3033.

Ohio (Monroe Falls)—May 18: The Portage ARC will hold their Portage Hamfair for radio amateurs and computer hobbyists at the Randolph Fairgrounds (8 miles due south of Ravenna, on Rte 44). Food, coffee and soft drinks available. Gates open 6 AM for dealers, 7:30 AM for the public. Indoor and outdoor flea markets with table rentals available. ARES, ARRL, DX, packet and computer forums. Mobile check-in and information on 144.79/145.39. Tickets \$3 in advance, \$3.50 at the gate. For tickets, send check and SASE to PARC, c/o Joanne Solak, KJ30/8, 9971 Diagonal Rd, Mantua, OH 44255. For information, call 216-274-8240.

Ontario (Renfrew)—May 10: The Smiths Falls ARC is hosting their second annual flea market in Smiths Falls. The site will be the RCAF Hall, Abbott St, 8 AM-12 PM (7 AM for vendors). There will be commercial exhibits, Tables \$5 each. Contact Baxter Smith, VE3BFX, 8 St. Lawrence St, Smiths Falls, ON, tel 613-283-7852.

Ontario (Waterloo)—Jun 7: The 12th Annual Central Ontario Amateur Radio Flea Market and Computerfest will be held at the Col John McRae Legion Hall, 8 AM-2 PM. Doors open to vendors 6 AM (vendors prepaid registrations required). General admission is \$2, under 12 free. Inside vendors, \$8/8-ft space (3-x 8-ft table included). Outside vendors, \$3 per space. Refreshments available. For further info, contact Paul Modray, 519-579-3057; Andy MacIntosh, 519-884-8212; Greg Hollinger, 519-886-8569; Eric Enns, 519-885-5216; or write to the Kitchener-Waterloo ARC, PO Box 812, Kitchener, ON N2J 4C2.

Pennsylvania (Milton)—Jun 8: MARC will host its 12th annual hamfest from 8 AM til 4 PM at the Winfield Firemen's Fairgrounds, 4 miles south of Lewisburg. Admission \$3, children and women free. Plenty of food and drink. Transceiver clinic, contests and auction. Talk-in on 146.37/97 or 146.025/625. Plenty of indoor space in case of rain. Send SASE for advance reservations to Jerry Williamson, WA3SXQ, 10 Old Farm La, Milton, PA 17847, or call 717-742-3027.

Pennsylvania (Pittsburgh)—Jun 1: The 32nd Annual Breezeshooters Hamfest will be held 9 AM-5 PM at the White Swan Amusement Park, Rte 60 (Parkway West) near the Greater Pittsburgh International Airport. Free admission and flea market; family amusement park. Registration \$2 each, 3 for \$5, and 7 for \$10. Under-roof vendors by advance registration. Talk-in on 28/88 and 29.000 MHz. For more info, call William J. Hall, K3VSL, 3103 Wainbell Ave, Pittsburgh, PA 15216, tel 412-531-4827.

Pennsylvania (Drexel Hill)—Jun 8: The Delaware County ARA, is sponsoring their 7th annual hamfest at the Drexel Hill Middle School, State Rd and Penn Ave (5 miles SW of Philadelphia). Doors open 8 AM. Setup at 7 AM. Admission \$3. Commercial distributors

and dealers. Indoor tables with electricity available by reservation at \$3 per space. Outdoor tailgating on a first come, first served basis at no extra charge. ARRL/VEC Amateur Radio License Exams (Novice through Extra) starting at 10 AM sharp. Food, refreshments available. Talk-in on 147.96/36, 224.5 MHz and 146.52. For advanced registration and information, write to Hamfest, DCARA, PO Box 236, Springfield, PA 19064, or contact Barbara, N3DLG, 215-535-1616.

Pennsylvania (Tamaqua)—May 18: The annual Tamaqua Hamboree sponsored by the Tamaqua Transmitting Society and the Anthracite Repeater Assn will be held 9 AM-4 PM at the New England Fire Company, one mile southwest of Tamaqua. The Volunteer Examiner Team will be giving FCC exams 9 AM-12 PM. Vendors and tailgaters admitted 8 AM. Additional information, SASE to A. Breiner, Jr, K3NYX, 127 Market St, Tamaqua, PA 18252.

Quebec (Tracy)—May 25: Provincial Hamfest will be held at the Tracy Curling Club, Admission \$4. Outdoor tables \$6, indoor \$8. Limited quantity. Please reserve before May 20. Open 9 AM (8 AM for exhibitors). For more information, write to Sorel Tracy ARC, PO Box 533, Sorel, PQ J3P 5N6.

Rhode Island (Woonsocket)—May 17: The RI Amateur FM Repeater Service will hold their annual Spring Flea Market and Auction at the American Legion Fairmount Post 85, 870 River St. Flea market opens 9 AM, spaces \$5 each. Some spaces under the pavillion are available on a first come, first served basis. Auction begins 12 PM, continuing to about 5 PM. Admission free. Food and beverages available. Talk-in on 34/94 and 52. For further info, contact Rick Fairweather, K1KYI, Box 591, Harrisville, RI 02830, or call 401-568-3468, 7-9 PM.

South Carolina (Greenville)—May 3-4: The Blue

Ridge ARS proudly sponsors the 47th annual Greenville hamfest and electronic flea market at the American Legion Fairgrounds, 1 mile north of I-85 on Hwy 25. VEC walk-in exams, dealer displays, indoor and outdoor electronic and computer electronic and computer flea market, food, beverages, snacks and camping. Packet and AMSAT demonstrations, SC SSB NET, QCWA, ARRL, SCARDS, ARES. Early dealer/flea-market setups with advance registration. Hours are Sat 8 AM-5 PM, Sun 8 AM-3 PM. Admission \$3.50 in advance, \$5 at the gate. Talk-in on 146.01/61 primary, 146.22/82 backup. For advance tickets and VEC exam info, write Blue Ridge ARS, PO Box 6751, Greenville, SC 29606.

Tennessee (Humboldt)—Jun 1: The Humboldt ARC will sponsor its annual hamfest 8 AM-4 PM at the Bailey Park, 22nd Ave. Admission \$1. Flea market, women's activities, parking for RVs. Talk-in on 37/97. Food and refreshments available. For further information, contact Ed Holmes, W4IGW, 501 N 18th Ave, Humboldt, TN 38343.

Tennessee (Knoxville)—May 24-25: The Radio Amateur Club of Knoxville presents their 20th Anniversary Hamfest and Computer Fair, to be held in the Shrine Temple, downtown Knoxville. One-and-a-half-acre flea-market area at \$3 per space per day or \$5 both days. Inside dealers \$10 per day per table or \$18 both days. Talk-in on 90/30, with a backup frequency of 145.37. Also monitored will be 146.52 simplex. For more information or advanced reservations, contact Rick Slover, ND4F, 2700 Waverly St, No. 4, Knoxville, TN 37921.

Texas (Abilene)—May 17: The Key City ARC will hold their Fly-In/Drive-In Swap Fest at the Abilene Municipal Airport. For more information, call W. K. Wiggins, 915-673-1332.

Texas (Arlington)—Jun 6-8: Ham-Com, Inc, will

hold their hamfest at the Arlington Convention Center. For more information, write to John Fleet, WA5PHG, Box 25028, Dallas, TX 75225, tel 214-521-9430.

Texas (Brenham)—May 17-18: The Brenham ARC will sponsor the Brenham Springfest at the Washington County Fairgrounds. Doors open 10 AM-6 PM Sat, 8 AM-4 PM Sun. Free admission. Table rental \$5 each. Events include a fox hunt on both days. No exotic DF equipment. Talk-in on 147.86/26. For further info, contact J. McDermott, PO Box 162, Brenham, TX 77833, tel 409-289-3600 (7 AM-3 PM Central).

Virginia (Manassas)—Jun 1: The Old Virginia Hams will hold their Manassas Hamfest at the Prince William County Fairgrounds, 8 AM-4 PM. Admission \$4. Activities include YL Program, CW Proficiency, ARRL Booth. Breakfast and lunch will be offered. Talk-in on 146.37/97, 52. For more info, contact Mike Feher, N4FS, 703-361-8318.

Virginia (Roanoke)—May 25: The Roanoke Valley ARC is sponsoring their Mayfest '86 at the Roanoke Civic Center Exhibit Hall, 8 AM-5 PM. Admission \$3.50 in advance, \$4 at the door. Registration fee also. Activities for women and children, including flower arranging. Exams for upgrading licenses beginning at 8. Code-proficiency tests and inside/outside flea markets. Talk-in on 146.385/985, 52. Food available. For info, contact Bill Johnson, W4NLC, 5129-D Overland Dr, Roanoke, VA 24014, tel 703-343-0319 or 703-989-5374.

[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.]

Moved and Seconded . . .

(continued from page 53)

8. On motion of Mr. Butler, the following clubs were affiliated with the ARRL, all in Category I except where noted:

Bay Area Amateur Radio Society, Pasadena, MD
Carolina DX Association, Rock Hill, SC
Chesapeake Amateur Radio Service, Chesapeake, VA
Coastal Carolina Community College Communications Club, Jacksonville, NC (Category III)
Connecticut Valley F.M. Association, Springfield, VT
Corona Norco Amateur Radio Club, Corona, CA
Fannin County Amateur Radio Club, Bonham, TX
Fist & Mouth Contest Company, Downsville, LA
Frontier Amateur Radio Society, Las Vegas, NV
Green County Amateur Radio Association,

Albany, WI
Hatford Amateur Radio Emergency Mgt. Team, Belair, MD

Junior High School 22 ARC, New York, NY (Category III)

Lodi Amateur Radio Club, Lodi, CA
Mountain Amateur Radio Club, Woodland Park, CO

Natick High School Radio Club, Natick, MA (Category III)

Navajo County Amateur Radio Club, Holbrook, AZ
North Providence ARC, North Providence, RI
Northwest Amateur Radio Society, Spring, TX
Ohio Valley Repeater Club, Inc., Wheelersburg, OH

Packeteers of Long Island, Holbrook, NY
RCA Amateur Radio Club, Camden, NJ
Republic of the Rio Grande ARC, Laredo, TX
Rogers County Wireless Association, Claremore, OK
Southern Appalachian Wireless Society, Inc., Delbarton, WV

Spare Time Amateur Radio Society, Grand Rapids, MI
Twin Cities Repeater Club, Bloomington, MN
Willingboro Area Repeater Club, Willingboro, NJ
Yucaipa Valley ARC, Yucaipa, CA

With this action, the League has the following number of active affiliated clubs: Category I, 1,768; Category II, 12; Category III, 159.

9. Convention matters:
9.1. On motion of Mr. Grauer, the following conventions were approved:

Arkansas State April 12-13, 1986 North Little Rock, AR

Alabama State	May 17-18, 1986	Birmingham, AL
Oregon State	June 6-8, 1986	Seaside, OR
West Virginia State	July 5-6, 1986	Weston, WV
West Gulf Division	August 1-3, 1986	Oklahoma City, OK
Delta Division	August 9-10, 1986	Shreveport, LA
Colorado State	August 10, 1986	Denver, CO
South Florida Section	October 18-19, 1986	St. Petersburg, FL
Illinois State	November 16, 1986	Rockford, IL

9.2. The committee discussed various National Convention matters; no formal action was required.

10. On motion of Mr. Wilson, the Treasurer was authorized to open an account at the Andover (Massachusetts) Savings Bank. On further motion of Mr. Wilson, Paul Rinaldo, W4RL, was authorized to sign checks on behalf of the Executive Vice President.

11. The next meeting of the Executive Committee was tentatively scheduled for June 13, in Portland, Oregon.

12. The Executive Committee reviewed and affirmed existing advertising policy. There being no further business, the Committee adjourned at 5:05 P.M.

Respectfully submitted:
Perry Williams, W1UED
Secretary

Life Members Elected March 22, 1986

Michael L. Baker, N4LSP; Gary L. Becker, KA8MKZ; R. Braathen; James K. Breakall, WA3FET; D. R. Clark, K7JRA; John H. Coonly; H. J. Crosthwaite, NE8Q; Pauline Eaton, K0HIN; Ann R. Elliott, N4NK1; Ed L. Fowler, Jr, W5CML; Daniel C. Fuson, KA8UCO; Andrew H. Gardner, WA5GYM; Marc Gilchrist, NC7P; J. Speed Gray; Ladonna M. Green, KA6VLL; Ralph C. Gregg, Jr, K7GNV; John M. Henderson, W7JH; Helen Y. Hussey, KH6OQ; Joly Hideo Kambayashi, JH3XCU; Virginia A. Macrie, KA2ZZA; Robert P. McCormick, KA1KPH; Shawn M. McCormick, NC1B; Arthur L. McGinley, N4BVW; Peter S. Meeks, WB7CHQ; Joy Middleton, KB4OMU; Clifford P. Miller, KA3LJM; Leroy Milner, K7TV; Rodney Moag, W0NDS; Rebecca B. Nathanson, K8NFP; Teresa C. Patterson, KA4SHI; Michael Peters, WA2JKE; Craig D. Pritts, KA4HO; J. H. Reynolds, W7FPX; Rod Roderique, WA0QIL; Robert L. Rosell, WB8KWC; Earl H. Russell, Jr, WK4O; Allen E. Shupe, WA7AMJ; Cheryl L. Sowers-Clift, K4LXI; Marlene Thornburg, WD6FB; Robert Owen Thornburg, WB6JPI; Dana D. Tramba, N0FYQ; Max E. Treece, W64Z; Alan Van Buren, K7CA; Elaine

Wessel, KA8RNR; Gerald L. Wessel, KA8MBK; Gary C. Wilson, WB2BOO; Timothy S. Witt, N4IMD; Jerry W. Wright, KA4RSN.

Strays



HAMS ACROSS AMERICA

Some ideas are larger than life. This was certainly true of last year's "We Are the World" project, in which something like a billion people worldwide saw benefit concerts staged simultaneously on both sides of the Atlantic to raise tens of millions of dollars for African famine relief.

The same team of organizers has an even more ambitious project in mind for Sunday, May 25, to focus attention on the hungry and homeless in America: "Hands Across America," a 4100-mile human chain with six million links from New York City to Los Angeles. They envision a need for good communications to ensure the safety and security of the participants, and so have turned to Amateur Radio. Charlie Kosman, WB2NQQ, a veteran of the 1984 Summer Olympic Games Torch Run extravaganza, is looking for more than 4000 volunteer hams to man every mile of the route.

Interested? Contact the Section Manager in one of the following sections, as listed on page 8: New York City-Long Island, Eastern New York, Northern and Southern New Jersey, Delaware, Maryland-DC, Eastern and Western Pennsylvania, Ohio, Indiana, Illinois, Kentucky, Tennessee, Missouri, Arkansas, Northern Texas, New Mexico, Arizona, Orange and Los Angeles. Or, drop a line to: Hands Across America, PO Box 308, Quakertown, NJ 08868.

Full Utilization of a Repeater

The following story of a fully utilized repeater is contributed by Joel Elston, K9TBD (3601 Southwood Dr, Easton, PA 18042).

About seven years ago, a group of us built another repeater in the Lehigh Valley (Pennsylvania). The reasoning behind another repeater was that the local repeaters only supported voice, and our group members were RTTY enthusiasts. Those funny tones were not welcome on voice repeaters. The original charter for the new repeater was not only to allow and encourage RTTY activity, but to welcome any legal mode of transmission. In effect, it was to be the Experimental Amateur Repeater (EAR), where tweaking and tuning would be promoted. (Because of our local terrain, simplex communications proved to be impossible for the stations who wished to play with experimental modes of transmission.)

The repeater (146.775/175—entrusted to Ron, K3LPR) has functioned well over the seven years of duty. It consists of RCA strips, homebrewed cavities, and a few odds and ends of homemade stuff. Originally, mechanical machines battled each weekend,

sending pictures back and forth. Also, RTTY nets were held and ARRL bulletins sent. CW (F2A) was used to encourage and train Technicians to upgrade. It has also been used for a backup for our emergency voice repeater (W3OK, 146.70/10). When mailboxes first showed up, we tried a bunch of them and had three different mailboxes on simultaneously. I found out that I could open two mailboxes up at the same time and, as intermediary control, pass files back and forth between them. This was the only way, at that time, that I had to translate files from ASCII to Baudot. Digital activities waned for a year when the primary mailbox computer died.

In November of last year, the club (W3OK) "volunteered" me to put up another mailbox on the 775 repeater. After about a month of hard work by a bunch of enthusiasts, the mailbox was functional, running in my basement using a quarter-wave magnetic-mount antenna on a metallic "Smurf" serving tray.

It all came together one day when the packeteers wondered if they could operate packet successfully on this "normal" repeater. Sure, let's give it a try. Clarence,

W3PYF, and Randy, N3ET, cranked packet through the repeater, while Hub, W3PTM, and Joel, K9TBD, cranked RTTY. In addition, the RTTYers also turned on the mailbox. After the timers were set properly on the packet terminal node controllers, packets were not transmitted on top of the RTTY transmissions. Both QSOs coexisted, with no hits on packet and only occasional bursts of garbage characters on RTTY. The mailbox system did not false at all!

While all this testing was going on, two voice stations jumped on the repeater, wondering what was going on. By chatting on a voice repeater at the same time, the packeteers and the RTTYers found that if you leave a 5- to 10-second break for the packeteers in between RTTY transmissions, both QSOs had the same throughput.

This may not be a first, or on the cutting edge of technology, but certainly it shows that a limited resource can really be used effectively. The repeater had the most information throughput during that hour's test—voice, RTTY, mailbox, packet—all happening concurrently.

DAYTON WORKSHOPS

VHF/UHF repeater coordination and spectrum-management workshops will be conducted throughout the upcoming Dayton HamVention®. A meeting room has been set aside for the entire convention to be used for these workshops. Tentatively, the following topics have been proposed for discussion: (1) packet-radio band plan considerations, (2) construction and maintenance of the National Repeater and Spectrum Management Database, (3) 15- versus 20-kHz channelization on 2 meters, (4) 10-meter repeater expansion, (5) 6-meter band plan consolidation and (6) 902-928 and 1240-1300 MHz band plan disagreements.

These topics cover a lot of territory and affect a lot of us in different ways, so if you are attending the HamVention this year and are interested in any of these topics (if you are reading this column, you should be interested), check the workshop schedule. See you there.

VERMONT NOT PART OF NEW ENGLAND

No, this is not a belated April Fool's joke. Before Vermont became a state, it was part of New York. In that tradition, Vermont repeater operators (at least 15 out of 18 of them) signed a petition that resulted in the formation of the Vermont Independent Repeater Coordination Committee (VIRCC), which is independent of any effort to coordinate the New England states en masse (à la the New England Spectrum Management Council). VIRCC Secretary Mitch Stern, WB2JSJ, explains: "We feel that a council who sits 250 miles away (in the Boston-Hartford corridor)

would be very ill-equipped to handle the unique problems we have up here." So, if you want Vermont repeater coordination, look to the VIRCC (PO Box 99, Essex, VT 05451).

REPEATER LOG

According to reports received in January, repeaters were involved in the following public-service events: 208 vehicular emergencies, 18 medical emergencies, 15 drills/alerts, 6 fire emergencies, 5 weather emergencies, 3 public-safety events and 1 power failure.

The following repeaters were involved (followed by the number of events): WA1DGW 16, W2UL 22, WA2ZWP 8, WD4JWO 2, WA4SWF 3, WA6BJY 1, W6FNO 191, KH6H 1, K8DDG 6, WD8IEL 5, WB0BLK 1.

- Frank Lester, W4AMJ, of Englewood, Florida
- Frederick Gilchrist, W1PDV, of Glens Falls, New York

I would like to get in touch with...

- US Navy radiomen or anyone attached to the confiscated Sampan fleet converted to submarine chasers in 1941-42. Art Lee, WF6P, 106 Western Ct, Santa Cruz, CA 95060.
- hams belonging to the Amateur Radio Pilots Assn. Contact Sal Lagonia, N2EQM, Box 348, Millwood, NY 10546.
- anyone interested in a slow-speed CW training net, Thursdays at 0115 UTC on 28,150 kHz. Leonard Bauman, Sr., K9RMN, 1312 Dorothy St, Rhinelander, WI 54501.

- hams who are chiropractors and would like to form a net. Contact Dr Gary Smith, KA1J, 112 N Landry, New Iberia, LA 70560.

- anyone interested in exchanging ham radio stamps. Angel Padin de Pazos, Apartado Postal 351, 26080 Logrono (La Rioja), Spain.

- anyone with *Callbooks* for 1940-1942. Gene Koll, Sr, KA6AHL, 44 Cordelia Dr, Petaluma, CA 94952.

- hams who are school-administration PhDs interested in forming a net. Steve Lutz, KA8TIA, 50467 Baytown, New Baltimore, MI 48047.

- hams who served in the 101st Signal Bttn, HQ or B Companies, in the Pacific during WWII. Donald Weaver, KØJPW, 1409 Brown, PO Box 443, Osawatomie, KS 66064.

Strays

QST congratulates...

- the following radio amateurs on 50 years as ARRL members:
 - Ben Relf, W5HDK, of Longview, Texas
 - Harold Fox, W3AA, of Plymouth Meeting, Pennsylvania
 - Nathan Shuman, W3CNP, of Philadelphia, Pennsylvania
 - Robert Ellis, W7FNA, of Seattle, Washington

Hurricane Kate and Her Evil Friends, The Tornadoes

Hurricane Kate, a very direct, no-nonsense lady, shouldered her way into the Gulf of Mexico last November and took aim at the general area of the Capital District of northern Florida. On schedule, she eyed the beaches of Gulf County and smashed the little coastal fishing villages of Franklin County with winds above 100 knots. Then she turned northeasterly, scourging the state's capital city, Tallahassee, with a snarling swarm of violent wind cells and small tornadoes that flattened thousands of trees and wiped out electric service for more than 90 percent of the residents in a three-county area.

Remarkably few casualties resulted! Kate, like her Labor Day Weekend predecessor, Elena, were classified as Category 1 storms—minimal hurricanes—but they gave Capital District ARES members all the practice they needed to test the District's newly formulated emergency-communications plan.

Tallahassee, roughly in the middle of the 11-county area between the Suwannee River on the east and the Apalachicola River on the west, has about 80 percent of all the amateurs in the entire district. Damage was more severe than that delivered by any storm since November 1941 when a Gulf hurricane swept through the town in similar fashion, taking out power and communications for over a week. W4GAA, with 50 watts on 160-meter AM phone, was the city's sole outlet to the world. He also helped with communications in Kate, making him probably the only ham to be involved in both storms. But in Kate, he was not alone. He was aided by more than 60 members of the Northern Florida Amateur Radio Emergency Service (ARES).

Kate confronted Leon County (Tallahassee) EC KC4N with two problems: (1) a need to provide communications for local Red Cross, Civil Defense and other local agencies and (2) a commitment under the new emergency plan to provide assistance teams (SPORTs: Special Purpose Operator Response Teams) to other counties in the district, including Franklin and Wakulla counties on the Gulf Coast, directly in the path of the storm.

Franklin County's population of less than 8,000 is strewn along the coast in a string of tiny fishing villages, from the county seat, Apalachicola, at the mouth of the Apalachicola River, to Eastpoint, across the river, to Carrabelle, Lanark Village and Alligator Point. Over 90 percent of the people live within hand-held simplex distance of the sandy beaches, closely paralleled by US 98. Apalachicola and Eastpoint are sheltered from the ocean Gulf by 40-mile-long St George Island with nearly 1,000 permanent residents.

Getting effective help to these towns means sending in SPORTs ahead of any anticipated storm to avoid roads blocked by fallen trees and wires or washed out by furious storm tides. The job was simplified by 100 percent evacuation of St George Island and Alligator Point. During the storm we had operators in Apalachicola, Carrabelle and Lanark Village. After the storm, some areas could not be reached by road for many hours, and even if they could have been reached, Kate's unex-

pected knock-out blow at Tallahassee put a serious strain on our supply of operators. KC4N's work commitments and the unavailability of operators who had their own jobs and hurricane problems made his job even more difficult.

In our post-mortem discussions of Hurricane Elena in September, the Leon County/Capital District EC committee decided that communicators in Red Cross evacuation shelters were probably under-utilized and might be more usefully shifted to other assignments when the personnel became scarce. This change in procedure was tried during Kate, but lack of Amateur Radio communicators at the shelters proved to be a serious handicap. Incoming calls swamped phone lines at Red Cross headquarters during peak operation. When power fails, as it did at every shelter, you can't tell whether the phones are ringing. When the lines are jammed at headquarters, you can't get through from a shelter.

Aside from local Red Cross communications and Leon County Civil Defense, most of the Leon County ARES efforts directly or indirectly supported the coastal areas of the Capital District, specifically Wakulla and Franklin counties. Many duty stations, such as state CD EOC and the National Weather Service (NWS) station, served the whole area, including Leon County.

In neighboring Wakulla County, immediately south of Tallahassee, EC K4CV staffed both the sheriff's office in the courthouse, which also served as headquarters for the Wakulla County CD Director, and the shelter at Wakulla County High School. Responding to a request from the weather service, KC4N assigned KA4YLU to the weather station in Tallahassee, and immediately observations began to come in from amateurs along the coast. The weather-station amateur used a permanent ground-plane antenna installed on the airport control tower several years previously, with the feed line terminating in a vacant office.

KA4RDB filed the first weather report from Shell Point, a small retirement village in Wakulla County, and continued reporting updates at frequent intervals until he had to evacuate to avoid being trapped by rising tides.

Franklin County

With Kate still at sea but threatening landfall near Apalachicola or Port St Joe, W4MLE appointed W1XO Acting EC for Franklin County, substituting for KF4TO, who was stranded away from home and was unavailable. W1XO's instructions were to go to Apalachicola, about 75 miles southeast of Tallahassee, as quickly as possible with KC4RS, contact the Franklin County CD Director and establish 2-meter communications with Tallahassee on the District ARES Net on the Tallahassee WR4Z repeater. Meanwhile, per prior planning, W4WEB, EC for Gulf County, just west of Franklin, sent an operator to the NWS station in Apalachicola. He was to communicate through the Port St Joe repeater. In Tallahassee, N4JEL, with a

450-MHz hand-held radio at the weather station, worked the St Joe repeater through the AE4S remote base, with its antenna about 500 feet above mean sea level (MSL).

Besides 2-meter rigs, W1XO and KC4RS took with them a mobile HF station, a 1.5-kW gasoline generator and a heavy-duty marine deep-cycle storage battery, an 11-element beam for 2 meters, tools, spare feed line and spare parts. For the next three days they lived in the Apalach courthouse, and maintained contact with Tallahassee and Port St Joe on 2 meters.

"By midnight Thursday," W1XO reported, "things were getting violent. I attached stay ropes to the end of the antenna boom to keep it from windmilling. By this time, we were handling an appreciable amount of traffic.

"By 5:00 PM Thursday, the storm was near hurricane force in Apalachicola. At some point after that, long distance and local phone service ceased. We handled several messages before the wind snapped a sturdy 1.25-inch wooden mast and toppled the beam. The storm was in full chorus, with winds estimated at over 100 knots. As soon as they died below hurricane force, I climbed out onto the roof far enough to stick a 5/8-wave mag-mount antenna there. We could then get into the Port St Joe repeater which was, remarkably, still on the air."

The fallen beam had provided direct access to Tallahassee on the WR4Z repeater. By early Friday morning, W1XO and KC4RS had reinstalled the beam and replaced the coax, which had been wind-whipped until the center conductor parted. By this time, though, the WR4Z repeater was down because of power failure and lack of a backup supply, so Apalachicola moved over to the AE4S repeater, where the District ARES Net had also moved.

All day Friday, W1XO reported, he and KC4RS stayed busy with traffic for Civil Defense, Red Cross and Baptist Relief Services. But the Gorrie Bridge, linking Apalachicola to Eastpoint on US 98, had a huge washout at the eastern end. Communication with Eastpoint and Carrabelle, 30 miles east of Apalachicola on US 98, was almost nonexistent. Around 1500 Friday, N4WA and K9RXG flew into the Apalach airstrip in N4WA's plane. N4WA stayed at the weather station at the airport, relieving the Port St Joe operator. K9RXG went to the courthouse to assist W1XO and KC4RS.

A couple of hours later, WA2GIN, N4KMT, WB4QBW, K4VID, W4JV and KB4JO arrived from Pensacola with 2-meter gear, one or two HF stations, emergency power and a portable repeater. The repeater on top of the courthouse provided local communications around the Apalach, St George Island and Eastpoint areas, taking some of the load off the St Joe machine and permitting better local communications with hand-helds and low-powered mobiles. Late Friday, W4TKE and W4NG arrived in Eastpoint from Gainesville, Florida.

They "camped" overnight with a swarm of mosquitoes in W4TKE's van, and early next morning sought out the temporary Red

Cross headquarters where they hooked up their generator and found a bank of 15 telephones, some of which actually worked.

But apparently no Red Cross people were there, and people were clamoring for eyeglasses, prescriptions, food, medical care for a child with a fever and dental care for a man with a toothache. Red Cross food supplies were slow and skimpy coming in, W4TKE reported. Attempts to open a school to serve as a shelter failed because the caretaker, who had the only keys, had been evacuated! About mid-afternoon, a Red Cross van arrived, but it turned out to be a damage-assessment team with no food aboard.

"During all this time," W4TKE reported, "there was no city or county official on duty at our EOC."

Eventually, W4TKE asked to be relieved. "We had 15 working telephones, power was on and water was on and the Red Cross van with AA4US had arrived."

"During the operation from Wednesday night to Saturday afternoon," W1XO reported, "KC4RS and I handled 37 formal priority messages. More were handled by WA2GIN and perhaps K9RXG. We handled a few health-and-welfare messages and innumerable interamateur informal communications. N4WA and K9RXG, both experienced traffic handlers, provided much-welcomed relief.

"The whole operation demonstrated the importance of handling all third-party traffic in formal message form," W1XO said. "If we had not done so, several important messages would have been lost or misdirected. Every amateur with any idea of doing public-service work should be familiar with message form."

Leon County

Throughout the operation, Leon County amateurs kept stations going at Red Cross headquarters and at some key shelters, at the NWS station, at State CD EOC, at the Leon County CD and, at various times, at the city utility department and various other locations. Most of these headquarters locations had emergency power, but a few did not. Several operators operated their home stations using banks of heavy-duty lead-acid storage batteries acquired from the local telephone company under an agreement with the Tallahassee Amateur Radio Society (TARS). Others had their own gasoline generators or used solid-electrolyte batteries procured for just this purpose. Many operated 2-meter mobiles or hand-held radios.

The TARS repeater, WA4DSW, floats on a 12-volt battery that is good for about 24 hours of continuous service at full output, key-down. This repeater, on 146.91, served as the Leon County local net. The W4GAA repeater on 146.715 also floats on a heavy-duty battery system and served as a side-channel for ARES leadership conferences. The AE4S repeater, with an antenna about 800 feet above MSL, has automatic switchover to a propane fueled generator. It served as backup or alternate channel for the District ARES net which normally uses WR4Z/R. The WR4Z repeater has its antenna about 900 feet above MSL on the Channel 40 TV tower, but requires a gasoline generator to be trucked to the site for emergency power operation. It was out of service for several hours because fallen trees had blocked the access roads. The other

area repeaters never missed a beat.

National Weather Service

As usual in weather-related emergencies, the National Weather Service (NWS) was one of our most important client agencies. Our service to them in Kate began when we staffed the Tallahassee station with KA4YLU about 4 PM Wednesday, and almost at once observations began to flow in from the coast, reported by KA5RDB, W4MWW, AA4JR, AA4JS, W4GOV, WD4CJI, W1XO, KC4RS, N4FHO, KA4UFM and others. These observations went immediately to the National Hurricane Center in Miami over weather-service circuits.

In Apalachicola, by prior arrangement, the Gulf County EC provided a radio operator for the weather station and installed a permanent antenna on the roof of the building. This operator provided weather information to Port St Joe and Panama City and received weather observations from them. It also sent observations to the Tallahassee weather station on 2 meters because their phone lines and HF SSB radio antenna were among the first casualties of the storm.

At the height of the storm, WB2WHI, in Wakulla County, got a phone call from a ham in South Florida who said it was "very important" that some station in the storm area, preferably in Apalachicola, get on 20 meters to provide the net with weather information. This ham, WB4WHI said, told her flatly that the request came direct from Dr Neil Frank, Director of the National Hurricane Center, and the information was urgently needed.

Weeks later, TARS was contacted by W5RJK, a Franklin County ham who had been inactive for years until he set up his HF station at a church in Lanark Village, near Carrabelle. Unaware of the extensive 2-meter operation in the county, he tried to send a batch of outgoing welfare traffic on that same 20-meter net. After several unsuccessful attempts to break into the big signal operations on the net, this HF station in the storm area—just where the net wanted a member—had to give up. He finally got his traffic off successfully, relaying through a station in Venezuela!

That episode seemed ample ratification of the wisdom of staying on VHF and UHF, thereby avoiding the nightmares that may attend HF operations in emergencies.

Welfare Traffic

Not much incoming welfare traffic developed, despite intensive network TV news coverage of the storm. A major factor certainly was the absence of any significant number of storm casualties. Another factor was the astonishing speed with which local and long-distance telephone service was restored, even in the hardest hit areas. Because most city lines were underground, Tallahassee lost less than 10 percent of its phones, most of them in outlying areas of the city.

But a third factor was arrangements made by W4MLE and the Northern Florida Phone Net (NFPN) on 3950 kHz, through Section Emergency Coordinator Rudy Hubbard, WA4PUP. As operations were getting started, W4MLE advised WA4PUP that Capital District operators would not accept any informal third-party traffic of any kind for delivery in the district. WA4PUP agreed

readily to another request: that all welfare inquiries offered the net be taken by some station outside the storm area and held until Capital District stations could find the time and operators to take them.

Northern Florida Phone Net

Tallahassee kept a presence on Northern Florida Phone Net mostly in the person of WN4IIV, who was running on emergency power at his home station with one end of his antenna lying on the ground. This HF circuit was used for liaison between WA4PUP, WA4FJE as District Emergency Coordinator Panhandle District and W4MLE. They used this circuit to organize relief teams to Franklin County as well as to discuss welfare-traffic policy and other urgent matters. W4MLE was busy primarily on 2 meters, and WN4IIV served as his ears on the HF net. Traffic, he said, was generally light.

A few inevitable checkins came from out-of-state stations who simply wanted to let the world know that in case we had emergency traffic for East Over-Montana, they stood ready to give their all—if they happened to be still listening at that time.

Some other observations by WN4IIV: Having a net-control station in the disaster zone created problems (low power, poor antennas, scarce operators). Some "termites" (who were obviously not familiar with net procedures or formal traffic-handling) came out of the woodwork and appeared on the net. When net controls asked for "priority or emergency traffic," more often than not they got calls from stations with welfare inquiries, many of them not in message form. Many just wanted general information about damage and conditions in the storm area.

Recruiting Problems

Recruiting proved too difficult because Kate blew in at mid-week and attacked Tallahassee directly, forcing many potential operators to tend to their jobs or to look after their own property and families. Recruiting required virtually full-time efforts by KC4N and one or two assistants working the phones. While the Leon County EC committee is still looking for answers, one answer is obvious: Hams should *not* wait to be called on the phone. They would have saved hours of precious time if they had turned on their 2-meter rigs and checked in on the air. Some ARES appointees had to be called on the landline after days of hourly newscasts about a big, dangerous storm in the Gulf. Incredible!

Doing It Better Next Time

Those who do not heed history are condemned to relive it. Next time, we expect to have:

- 1) improved recruiting methods, including self-recruiting;
- 2) a portable repeater, which has already been acquired, complete with four-cavity duplexer and battery;
- 3) at least three crew members for situations like Apalachicola because two operators just aren't enough; and
- 4) a high-performance 2-meter station with emergency ac power or with some other means to rotate a beam if power fails. Such situations were needed in Kate, but most were useless because beams wouldn't rotate without ac.—George Thurston, W4MLE, DEC Capital District

Field Organization Reports February 1986

ARRL Section Emergency Coordinator Reports

Thirty-five SEC reports were received, denoting a total ARES membership of 18,424. Sections reporting were: AB, CO, EMA, EPA, ENY, GA, IA, ID, KS, LAX, MDC, MI, MN, NFL, NLI, NNJ, NV, OH, ONT, PAC, SC, SCV, SD, SFG, SFL, SJV, SK, SNJ, VA, WA, WI, WMA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	97	86.6	575	1136
TCC Central	76	88.0	326	692
TCC Pacific	106	94.6	630	975
Summary	279	89.7	1531	2803
Cycle Four				
TCC Eastern*	172	87.8	738	1506
TCC Central	54	96.4	367	748
TCC Pacific	106	95.0	623	1196
Summary	334	93.4	1728	3448

*TCC Eastern operates both cycles 3 and 4. TCC Certificates issued: K1EIR, VE3FAS.

TCC Roster

N1BHH W1CE N1DMU W1EFW K1EIR W1A1FCD K1GRP W1HSO KN1K K1T1Q W1OYY K1A1T W1A1TBY K1W1U AK1W W2AET W2FJ W2FR W2GKZ KB2HM N2IC WA2SPL W2XD N2XJ VE3AWE N3COY K2GF VE3FAS VE3GSO W2GZU W2PQ K0BT KB3UD AA4AT WA4CCG N4EXD WD4FTK N4GHI W4JL WA4JTE K4JST N4KB WD4OCW W4RPNY W4UHCH W4UJL K4ZK N5AMK N5BB N5BT W5CIC W5CIZ N5DFO W5GHP K5GM W5JOW W5KLV K5SK Q5RC K5OAF N5ST N5TC W5TFB K5TL W5TNT K5SV K5VW K5XW W5YDD V6C1HK K1GD W6EOT W6INH K6LL W6G K6JYK W6VZT W7FE K7FE WYGT K7L W7LG W7LYA K7MUL K7OVK K7R W7TGU W7VSE W8BO K8CPS W8PMJ W8QHB AF8W N8XX W8YDZ W9FC KW9J W9JW W9SUYU AD8A N8JB K8EPP K8EZ K9JG W9HI ND8A K9OU W9QYI

National Traffic System

Net	Sess	Tlc	Avg Rate	% Rep	% Rep to Area
Cycle Two					
Area Nets					
EA	28	1133	46.6	0.809	95.2
CAN	28	997	25.80	0.701	100.0
PAN*	56	538	10.35	0.509	90.5
Region Nets					
1RN	56	866	15.50	0.510	100.0
2RN	50	436	8.70	0.428	76.8
3RN	28	386	13.80	0.600	99.0
4RN	56	1077	19.00	0.679	79.3
5RN	56	1004	17.90	0.628	90.8
6RN	45	207	4.60	0.382	100.0
7RN	54	422	7.80	0.358	87.8
8RN	56	375	6.82	0.340	96.0
9RN	55	542	10.00	0.456	92.0
ECN					100.0
TEN					100.0
TWN	54	315	5.83	0.348	85.0
TCC					
TCC Eastern	97	1136			
TCC Central	76	692			
TCC Pacific	106	975			
Cycle Three					
Area Net					
EA					
Region Net					
1RN	26	199	7.11	0.420	86.0
2RN	27	294	10.90	0.549	85.7
3RN	25	30	1.20	0.169	82.7
4RN					100.0
8RN					
ECN					
Cycle Four					
Area Nets					
EA	28	931	33.25	1.133	100.0
CAN	28	750	26.80	0.844	99.4
Region Nets					
1RN	49	449	9.20	0.490	86.0
2RN	54	198	3.70	0.285	77.8
3RN	53	160	3.02	0.311	93.7
4RN					100.0

RN5	48	556	11.58	0.576	83.3	100.0
RN6	56	465	8.30	0.580	100.0	100.0
RN7	56	280	5.00	0.501	78.8	100.0
8RN	52	296	5.69	0.338	88.0	
9RN	56	522	9.32	0.507	92.8	100.0
TEN	56	404	7.20	0.438	82.8	100.0
ECN	52	161	2.80	0.361	66.7	
TWN	54	275	5.09	0.344	88.3	98.2
TCC						
TCC Eastern	172	1506				
TCC Central	54	748				
TCC Pacific	108	1196				

*PAN operates both cycles one and two. TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AB, AL, AR, AZ, CT, DE, EMA, GA, HI, KS, MDC, ME, MI, MN, MO, NC, ND, NFL, NH, NJ, NTX, OH, OK, ONT, OR, ORG, RI, SB, SC, SD, SFL, SJV, STX, TN, UT, VA, VT, WA, WMA, WNY, WPA, WV, WY.

NM8I	K3NNI	WB6QBZ	KB9LT
69	K5UPN	NG5O	KA0FSM
N2FIS	N25U	NT4S	W1YOL
WB8WVKQ	K4ZN	N4DOM	KC8UZ
K3RXK	65	KF7R	58
W4HCN	KB4LB		KA6HUKT
KA1MKJ	K6YD	NAJOA	51
68	W0FRC	WB9PFZ	N2EVG/T
KATMUL	K4AERP	WB6CBZ	49
WD8KBW	K5EVI	KASQV	KA1HPO/T
67	W8EK	KA1LH	48
VE2FMQ	K8ND	K8CMR	VE2EDO
A100	84	WB8KW	KD8RD
KC2AF	KQ3T	61	KA9RNY/T
KA9RI	KK1E	68	46
W5VMP	KA7AID	W0PCK	WB4HXS/T
K8GJV	N2EQM	N3CZW	43
66	KABKH	KB4JN	WA2MGV/T
AB0Y	W4FMZ	KA0CB	40
KA4YHS	WB7VVD	60	KA2COX/T
WB4TZR	KT1Q	NALST	
WA6QCA	63	K4SUN	
WA3UNX	W2UYE	K2SWN	
	N2FIZ	W2GJ	

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 50 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public service event, 5 points, no max.

This listing is available to Novices and Technicians who achieve a total of 40 points or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

314	WB2OWO	93	WA1TBY
KC9CJ	NN2H	K0SI	W7GHT
242	WF4X	N3EMD	KC2TF
K5CXCP	105	WA4CCK	80
170	KA4RSC	92	WB0WNJ
K4SCL	W3YVQ	KB4OGR	KG2D
158	WB7WOW	K4YV	KASSPT
KK3F	KB7FE	KV5X	W0KK
136	AF8V	VE3DPO	N4EXQ
K43DL	104	NO8A	WB1CBP
137	W2MTA	W2PKY	79
N4GHI	N9EWT	91	AA4MP
134	WA4EJC	KA4TLC	K4JUM
K8CPS	KD8CL	K80DQ	NFB
131	WA2FJ	K80RP	78
K2YQK	W80YH	K4VWK	WA5ME
125	WDBKOC	A5E1	WB4KWB
WB4RUJ	KB1AF	N5DFO	N1BGW
121	N4PL	90	WBBSYA
WA2ERT	W9JL	AA4HT	KU3R
120	KT5Y	N4KSO	77
119	WB8RFB	89	N0CLS
KN1K	W9FZ	K0GP	VE4RO
118	N1DMU	VE3GT	NZ5J
K4NLK	WD8LDY	88	N7BGW
KA0EY	101	KB4ADL	K7MUL
117	W6INH	KA8TNT/T	KK3F
116	K4JST	WA4RUE	WF6O
115	KB5UL	W0UO	WB0WVJ
114	KB8VOZ	W7JMH	K4SCL
113	N9CT	NG8JO	2
112	K2ZVJ	75	233
N0GCG	WA7VTD	N6AWH	20
KB4WT	W4TAT	245	233
WB1CMQ	W12MCO	WA9WSY	10
111	W8JMD	VE2FMQ	7
110	KZ8Q		224
109	100		
108	N3AZW		
107	WB1HIH		
106	K6UYK		
105	KA1GWE		
104	N1AKS		
103	AG9G		
102	W9DM		
101	KJ9J		
100	WB5YDD		
99	WA1FCD		
98	W4ANK		
97	AA4AT		
96	W7VSE		
95	KA2MYJ		
94	N5AMK		
93	KC4VK		
92	N9BDL		
91	KA9FFO		
90	N4EXQ		
89	KT1Q		
88	N8EFB		
87	96		
86	WB4HRR		
85	W9CBE		
84	W0IKT		
83	108		
82	WA4PFK		
81	KD7ME		
80	107		
79	WA1GJ		
78	KW1U		
77	KA1QJ		
76	WB2VUK		
75	106		
74	N4KFU		
73	94		
72	KA4GUS		
71	N00N		
70	WB5SRX		
69	81		
68	WD4ALY		
67	K3JL		
66	70		
65	WA8WJZ		
64	KB5EK		
63	VE4IX		

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
W4DUG	3177	83	3187	3	6450
W3VR	213	1019	1102	14	2348
W3CUL	638	2112	2412	69	5229
N0BOP	29	1176	57	707	1969
WA8HJZ	0	734	27	434	1195
W3EGK	0	598	584	5	1187
KT1Q	4	572	535	9	1120
WB9YYP	0	606	43	388	1037
W9JWJ	0	503	486	1	990
W0BMA	24	442	450	16	932
N4PL	143	275	394	48	860
K8CPS	26	407	330	74	837
W9HLX					812
WD4JO	360	42	360	42	804
KC9CJ	6	419	126	213	764
N4EXQ	19	360	337	46	762
KA9FEZ					739
N4GHI	49	337	304	31	721
W4NFK	9	338	343	7	697
K6UYK	118	305	262	10	693
WA4CCK	2	339	339	9	689
N3AZW	19	317	304	46	686
WB2ID8	27	310	267	63	667
WB4KWB	1	336	324	4	665
N1BGW	0	343	293	18	654
KW1U	2	368	273	6	649
WX4H	0	325	305	3	633
WB4ADL	26	308	265	29	628
WB5YDD	8	308	282	29	627
W8BO	0	293	220	2	615
K0RXK	0	291	302	11	604
N1DMU	4	271	319	6	600
WF4X	10	310	251	22	593
KA7MUL	1	276	268	14	559
KK3F	14	266	201	65	546
WF6O	4	275	251	13	543
WB0WVJ	2	253	250	16	521
K4SCL	2	239	234	44	519
WB2OWO	22	233	245	17	518
AA4AT	30	245	233	10	518
WA9WSY	10	234	236	22	502
VE2FMQ	7	224	267	3	501

BPL for 100 or more originations plus deliveries:

K5CXP	164
WB2UVB	130
K6JAN	106
WB4RUJ	102

Independent Nets

Net Name	Sess	Tlc	Check-ins
Amateur Radio Telegraph Society	52	1094	413
Central Gulf Coast Hurricane Net			

Field Day Rules

1) **Eligibility:** Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and NWT). Foreign stations may be contacted for credit, but are not eligible to compete.

2) **Object:** To work as many stations as possible and, in so doing, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed on skills and equipment developed to meet the challenge of emergency preparedness and to acquaint the public with the capabilities of Amateur Radio.

3) **Dates:** June 28-29, 1986.

4) **Field Day Period:** From 1800 UTC Saturday until 2100 UTC Sunday. Class A and Class B (see below) stations who do not begin setting up until 1800 UTC Saturday may operate the entire FD period of 27 hours. Others must begin their setup no earlier than 1800 UTC Friday, and may operate no more than 24 consecutive hours; ie, once on-the-air FD operation has started, it must end 24 hours from that point.

5) **Entry Categories:** Field Day entries are classified according to the maximum number of simultaneous transmitted signals, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purposes of determining transmitter class. Switching devices prohibited.

(Class A) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for FD use. Stations must be operated under one call sign (except when the Novice/Technician position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for one reason or another, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

Any Class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician operating position (Novice bands only) without changing its basic entry classification. This station (including antennas) should be set up and operated by Novice and Technician licensees and should use the call sign of one of the Novice/Technician operators.

(Class B) One- or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A. One- and two-person Class B entries will be listed separately in the results.

(Class C) Mobile: Stations in vehicles capable of operation while in motion and normally operated in this manner, including antenna. This includes maritime and aeronautical mobiles.

(Class D) Home station: Stations operating from permanent or licensed station locations using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points.

(Class E) Home stations—emergency power: Same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D and E.

6) **Exchange:** Stations in any ARRL Section will exchange their Field Day operating class and ARRL

Send for Your FD Package

Send HQ a 9- x 12-inch self-addressed envelope with 4 units of First Class US postage or 4 IRCs for the official Field Day Entry Package. This package includes 1 Publicity Kit, 1 Field Day Summary Sheet, 1 large dupe sheet with instructions and a check list to ensure that your entry is complete. If you require more dupe sheets, indicate so in your request and affix 1 unit of additional First Class postage to your SASE for each two additional dupe sheets requested.

Section (see page 8 in any QST). For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." Foreign stations send RS(T) and QTH.

7) Miscellaneous Rules:

A) Operators participating in FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated.

B) A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. Family stations are exempted.

C) Each phone and each CW segment is considered as a separate band. All voice contacts are equivalent, and RTTY/ASCII is counted as CW. A station may be worked once on each band. Cross-band contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. No repeater contacts.

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.

8) **Scoring:** Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts count one point each, and CW contacts count two points each. Power multipliers: If all contacts are made using an output power of 5 W or less and if a power source other than commercial mains or motor-driven generator is used (eg, batteries, solar cells, water-driven generators), multiply by 5. If any or all contacts are made using an output power of 150 W or less, multiply by 2. Multiply by 1 if any or all contacts are made using an output power over 150 watts. Batteries may be charged while in use for Class C entries only. For other classes, batteries charged during the FD period must be charged from a power source independent of the commercial mains.

A) **Bonus Points:** The following bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Just check the box on the Field Day summary sheet to indicate that you qualify for the bonus, and attach the necessary proof.

Note: An additional 100 points may be earned for making one or more contacts on packet radio (see number 8, below, for details).

1) **100% emergency power:** 100 points per transmitter for 100% emergency power. All equipment and facilities at the FD site must be operated from a source independent of the commercial mains. Example: A club operating in Class 3A, using 100%

emergency power, may claim 300 bonus points.

2) **Public relations:** 100 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation conducted from a public place (example: a shopping center). Evidence must be submitted in the form of a clipping, a memo from a BC/TV station stating that publicity was given or a copy of material that was sent to news media for publicity purposes.

3) **Message origination:** 100 points for origination of a message by the club president or other FD leader, addressed to the SM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the FD period, and a fully serviced copy of it must be included with the FD report. The message must be in standard ARRL message form or no credit will be given.

4) **Message relay:** 10 points for each message received and relayed during the FD period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the FD report.

5) **Satellite QSO:** 100 points can be earned by completing at least one QSO via satellite during the FD period. The repeater provision of Rule 7C is waived for satellite QSOs. A satellite station does not count as an additional transmitter. On the summary sheet, show satellite QSOs as a separate "band."


6) **Natural power:** FD groups making a minimum of five QSOs without using power from commercial mains or petroleum derivatives can earn 100 points. Intuitively, this means an "alternate" energy source of power such as solar, wind, methane or grain alcohol. This includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not wish to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate list of natural-power QSOs should be enclosed with your entry.

7) **WIAW message:** A bonus of 100 points will be earned by copying a special ARRL FD bulletin sent over WIAW on its regularly announced frequencies just before and during FD. See League Lines, this issue, and April QST, for FD Bulletin Schedule. This message can be received directly from WIAW or by any relay method. An accurate copy of the received message should be included in your FD report.

8) **Packet Radio:** 100 points can be earned by completing at least one QSO on packet radio during the FD period. The repeater provision of Rule 7C is waived for packet radio QSOs. A packet station does not count as an additional transmitter. On the summary sheet, show packet radio QSOs as a separate "band."

9) **Reporting:** Entries must be postmarked by July 30, 1986. No late entries can be accepted. A complete entry consists of a summary sheet and a list of stations worked on each band/mode during FD, plus bonus proof. The list of stations worked on each band or mode may take the form of official ARRL dupe sheets or an alphanumeric listing of call signs worked per band and mode. This list may be computer-generated. Incomplete or illegible entries will be classified as checklogs. A copy of FD logs should be kept by your FD group, but should not be sent in unless specifically requested later by ARRL.

10) **Condition of Entry:** Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) **Disqualifications:** See January 1986 QST, page 94. 

Results, 52nd ARRL November Sweepstakes

Over 1600 amateurs played in Amateur Radio's most popular stateside contest. Were you one of them?

By Mike Kaczynski, W1OD
Contest Manager, ARRL HQ

and Billy Lunt, KR1R
Assistant Contest Manager, ARRL HQ

The months of October and November are unquestionably the busiest time of the year for contesters. In a five-week period, four are occupied by major operating events. What's a contester to do? That's easy. (1) Stock the fridge; (2) Send the family to visit the in-laws; (3) Pull up a chair, turn on the rig and enter the November Sweepstakes!

Since the first running over half a century ago, November SS has remained a challenging first-rate event, a tribute to the League's traffic-handling beginnings. How *couldn't* Sweepstakes be a challenge—even the name sounds exciting!

Why did you enter? Was it to run that new killer antenna to blow away the station that beat you by 3 QSOs last year? Or maybe to check out your new \$25 wonderbargain transceiver? Perhaps to work those few final states for WAS? Whatever the reason, the 1625 participants who added their entries to the 11-foot-high pile of Sweepstakes logs on the ARRL Contest Desk had one thing in common: to have a good time with one of Amateur Radio's most popular stateside events.

CW Sweepstakes has traditionally been a single-operator, low-power event, and 1985 proved no different. The droves of single operators in the "A" (<150-W output) category outnumbered the high-power entrants by a margin of almost 2 to 1 (464 to 265).

The popular low-power top position was decided easily this year, with K4JPD (operated by N4ZZ) making a clean sweep and breaking the 1050-QSO mark to surpass runner-up KZ6E by 23,000 points. That's where the easy decisions ended, however. N6ND finished third, with 132 k, less than 2 k behind. N16W and N7TT



A well-stocked fridge is the first step in a successful SS operation. (N9FIV photo)

complete the low-power top five.

As was expected, the high-power top slot was the most sought after. Less than 5,000 points separated the top 5. It took K6LL an all-out effort to muster the 174,196 points necessary to top the list. Second through fifth were even tougher to call, as just 500 points separated numbers 2 and 3 (K4VX and N5JJ). Only the width of a spark gap separated fourth-place W5WMU (K5GA, opr) from Arizona's KY7M. What a fight!

Did someone say clean sweep? CW entrants were treated with outstanding conditions, especially on 160, 80 and 40. Of the 772 brass pounders who graced the airwaves on November 2-3, 108 managed to work all 74 ARRL Sections. A whopping 146 out of 832 phone entrants managed the same just two weeks later. Congratulations to the 41 stations who worked a sweep on both modes. Good work!

The phone portion of the contest, held on November 16-17, brought in 832 logs. As on CW, the low-power single-operator class was the most popular, with 399 entries checked in by the HQ Contest Desk.

North Texan KE5CV topped the list, working 1164, with a clean sweep in the process. Illinois' K2PLF fell only 1 Q short of the 1100-mark, to snag second place. A photo finish was needed to call the race for third spot, with KM5H edging out KY2P by less than 500 points. K8SCM was number 5.

Only 339 phone operators decided to use the "big rig" this time out. Of the high-power top five, only one, second-place N6BV, wasn't a hired gun. The 275 kilopoints earned by W6OAT at WA7NIN was plenty to gain Rusty single-op honors. KQ2M played at N2IC to the tune of 269 k for number 3. Chip, K7JA, operated K6NA to beat out KR0Y (skipper of K4VX) for fourth.

A total of 137 stations entered the multi-operator category: 43 on CW and 94 on phone. On CW, AA5B and the gang edged out KJ9D and crew by just over a thousand points. With consistency the key, and the ops at AA5B have it, topping the multiop phone top ten as well, holding off a rush from the ops at NSKW and WB8JBM,

Division Leaders—CW

Division	High Power	Low Power	Multioperator
Atlantic	W3LPL	K2ZJ	W2CXM
Canada	VE7CC	VE7IN	—
Central	K9KM	K9UJY	KJ9D
Dakota	K09F	K3WT	W8AA
Delta	W5WMU (K5GA)	KM5G	—
Great Lakes	WD8IXE	N4TY	W8LT
Hudson	W2RQ	KW2D	KW2D
Midwest	K4VX	K8SCM	K0WA
New England	K5ZD/1	KM1C (W1PH)	KS1N
Northwestern	N6TR/7	N7TT	K7LXC
Pacific	WA7NIN (W6OAT)	N6GG	—
Roanoke	N8II (KC8C)	WC4B	W4RV
Rocky Mountain	KC0D	W0IJR (K0EU)	AA5B
Southeastern	N4WW (K0LUZ)	K4JPD (N4ZZ)	N4KG
Southwestern	K6LL	KZ6E	WA8FSF
West Gulf	N5JJ	N5JB	K5CG

Division Leaders—Phone

Division	High Power	Low Power	Multioperator
Atlantic	K3ZO	WA3EKL	W3GNQ
Canada	VG3XN	VE7IN	VE3GAS
Central	AC9C	K2PLF	KK9V
Dakota	WA3PWL	K0TT	K0VVY
Delta	K5GO (KM5G)	K5FUV	W5EW
Great Lakes	WD9INF	W8BMGQ	WB8JBM
Hudson	W2XL	KY2P	K5NA
Midwest	K4VX (KR0Y)	K8SCM	AB0S
New England	W1WEF	W1FM	N1AU
Northwestern	N7TT	W7YAQ	NK7U
Pacific	WA7NIN (W6OAT)	N6EK	W6BIP
Roanoke	N4ZC (WA8MAZ)	W3YY	KC4DY
Rocky Mountain	N2IC (KQ2M)	KS0E	AA5B
Southeastern	N4KG (KC4ZV)	WC4E	N4WW
Southwestern	K6NA (K7JA)	WA8FGV	KF8OG
West Gulf	WS4Q	KE5CV	N5KW

Affiliated Club Competition

Unlimited Category				Medium Category				Local Category			
Score	Entries	Phone Winner	CW Winner	Score	Entries	Phone Winner	CW Winner	Score	Entries	Phone Winner	CW Winner
Unlimited Category Society of Midwest Contesters 3,648,960 51 AC9C K9KM				Medium Category North Texas Contest Club 3,919,474 40 N5AU N5AU Potomac Valley Radio Club 3,260,736 40 K3ZO W3LPL Texas DX Society 2,970,908 25 N6DU K6LZO Yankee Clipper Contest Club 2,777,368 40 KM1C W2RQ Northern California Contest Club 2,663,989 23 WA7NIN WA7NIN Minnesota Wireless Assn 2,613,870 37 N0AT K6SR Murphy's Marauders 2,145,072 30 W1WEF W1WEF Mad River Radio Club 1,792,234 21 N8CXX WD8IXE Colorado Contest Conspiracy 1,670,330 18 K5GE KC8D Central Arizona DX Assn 1,182,136 10 K7OX KY7M South Jersey Radio Assn 812,752 35 ND2P W2LYL Southern California Contest Club 794,042 10 N8BJQ/6 W6AQ Frankford Radio Club 758,316 8 N2MM KY2P Central Michigan ARC 600,778 20 KC8CY W8SH Radio Club of Tacoma 452,272 13 W7BUN W7BUN Northrop Radio Club 308,892 13 N6BLH WA6BIL Long Island Mobile ARC 289,134 12 W82DIN W2DX Falmouth ARA 274,696 5 K5MA K5MA Valley RC of Eugene 95,688 3 AF7W K7DBV OH-KY-IN ARS 57,658 4 KD8TE KF4AV				Local Category Rubber Circle Contest Club 1,015,564 8 N7TT K87G Overlook Mountain ARC 850,276 9 W2XL K6NA Albuquerque DX Assn 680,164 5 N6DVY AA5B Kansas City DX Club 676,400 8 KU8G KM0L Willamette Valley DX Club 634,826 7 A17B K5MM/7 River City Contesters 563,766 7 KV8H N8GG Hoosier Contesters 526,084 8 KK9V W9JCO Dixie DXers 508,794 6 K4BAI K4BAI Mississippi Valley DX/CC 473,456 8 W0HBH W0HBH			
Western Washington DX Club 423,730 9 KE7C K7WA Central Florida DX Assn 423,582 3 N4SA N4SA Rockford ARA 423,040 9 K9IKP K9UIY Rochester (NY) DX Assn 414,962 6 W2HPF W2TZ Eastern Michigan ARC 408,150 9 WD9INF K8DD Fox River Radio League 380,092 6 K9LUW K9LUW Reading Radio Club 369,608 5 WA3SPJ K53F Salt City DX Assn 329,600 7 KU2X K2ZJ Zyo ARC 328,814 9 KA1MWX W1ECH Arkansas DX Assn 306,579 4 K5FUJ W9OBF Murgas ARC 296,664 7 WB3EMG K83JK Eastern Iowa DX Assn 279,108 3 W0EJ W0EJ Lincoln ARC 264,416 3 K8SCM K6SCM Saginaw Valley ARA 248,608 4 K8DO WBQM IBM Owego ARC 219,896 4 N2NW N2NW Fort Wayne Radio Club 216,690 3 N18L K9FW Rip Van Winkle ARS 202,204 4 W2DW W2DW Lynchburg ARC 191,052 5 WB4ZPF AA4FF Four Lakes ARC 186,248 4 NB9C NB9C Grand Mesa Contesters 176,394 3 --- KJ0J Utica ARC 169,334 6 NA2A NA2Q Northern Florida ARS 168,820 4 NU4Y NU4Y Schenectady ARA 165,294 4 K2UF K2UF West Park Radiops 155,618 7 WD8AJF W8IDM Kettle Moraine Radio Amateurs 133,145 5 N9KS K9EZ Athens Co ARA 126,006 4 NC8V --- Ventura Co ARC 123,416 3 K6VMN --- Western Pennsylvania DX Assn 107,706 4 ADBJ3 ADBJ3 Northern New Mexico ARC 105,678 3 N5EPA N5EPA/m Wichita ARC 104,844 3 N10S W0AWP Dauberville DX Assn 80,990 3 N3CHL N3CHL L'anse Creuse ARC 76,138 4 N8ESK WA8VEB South Jersey DX Group 69,582 3 NC2V K2JF Western New York DX Assn 32,800 3 WB2ABD WB2YQH Burlington Co Radio Club 31,508 3 N2VW --- Lockport ARA 26,256 3 WA2WPI ---											

Single Op Top Ten

Phone	Score	CW	Score
WA7NIN (W6OAT)	275,132	K6LL	174,196
N6BV	271,580	K4VX	172,716
N2IC (K02M)	268,768	N5LJ	172,272
K6NA	265,808	W5WUMU (K5GA)	170,348
(K7JA)		KY7M	170,052
K4VX	263,736	K6LZO	168,276
(KR0Y)		W6AQ	167,388
WS4Q	260,480	(WA6OTU)	
N5AU (WB5VZL)	256,632	K6GO	166,500
WC6H	254,708	WA7NIN (W6OAT)	166,204
N6DU	253,524	K5GN	165,760
NR5M	248,640		

Low Power Top Ten

Phone	Score	CW	Score
KE5CV	172,272	K4JPD	157,768
K2PLF	162,652	(N4ZZ)	
KM5H	159,892	K76E	134,088
KY2P	159,248	N6ND	132,312
K8SCM	155,490	N16W	128,908
K50E	152,736	N7TT	126,984
W8BMSG	151,548	W0JLR	126,244
W3YY	151,404	(K8EU)	
KV0I	148,740	KY2P	125,414
N18L	121,472	K7UP	125,356
		KM1C	122,988
		(W1PH)	
		WC4E	122,840
		N5JB	122,840

Multioperator Top Ten

Phone	Score	CW	Score
AA5B	262,848	AA5B	162,504
N5KW	256,484	KJJD	161,468
WB9JBM	255,744	N5CG	153,180
K0GU	244,792	W0AIH	145,336
NK7U	234,728	K7LXC	143,708
KN6M/5	229,992	N4KG	140,896
N10E	225,404	K5RR	139,564
N4WW	217,412	N0IN	134,620
KK9V	213,564	KE7C	131,572
K0VVV	199,208	K0WA	129,210

who finished second and third, respectively.

Affiliated Club Competition took an interesting turn this year, with only one club managing to enter the unlimited category. Congratulations to the Society of Midwest Contesters, who put together 51 entries totaling 3.648 M. Great job! In the medium category, the North Texas Contest Club, the Potomac Valley Radio Club and the Yankee Clipper Contest Club all submitted 40 entries. NTCC had a higher average score, however, and took the gavel. The Overlook Mountain ARC had 9 entries to the Rubber Circle Contest Club's 8 in the local category, but RC 3 had the higher aggregate score, for the second local category gavel in as many years.

Club Secretaries Note: This year, several clubs failed to send the Contest Branch a current roster. Others claimed the "local" category when they in fact did not qualify. Please read "Club Competition Rules and Contest Disqualification Criteria," which appears each year in January QST, before sending in your next roster. Also, be sure to send it in before the mailing deadline for that particular contest. Thanks!

SOAPBOX

Contest was a real disaster for me! (K1XA). Where was



Pull up a chair (KA9FJZ shown here).

everyone? Were band conditions really that bad, or did I have the wrong weekend? (KA1MTK). The flu and RF getting into my computer got the best of me (WB1CNM). Don't know what was harder, the contest or getting up for work Monday (K2IM). Fire flashed out the top of the amp, the house lights dimmed, the plate meter crashed into the peg leaving a quarter-inch stub, and the family came running down the stairs to see what happened (K5NA). My first look at contesting from the East Coast (K0DI). Best SS ever! (N2EY). Shortly before the contest started my rotator ground to a stop (W4BTZ). Somehow I missed VE4 ... dumb dumb dumb. After all those years of puttering with wires, it sure is nice to operate with good antennas. The sweep was easy! Great time! Thanks to N4ZC for letting me play his station (WA8MAZ). Only twice did I receive a serial number lower than the one I sent (N4JEO). Can't understand why 45 WPM with 3 repeats is better than 20 WPM and no fills (KW1K). I worked AL7CQ on 40 CW for number 74 with only 25 minutes left (AA4FF). 'Twas a lot harder to work all 74 than I thought (KA5KWK). It's hard to hold a frequency with A power. In fact it's hard to do anything with A power! Still had fun (K5YN). Enjoyed the contest operating QRP (N4MKK). Worked all 74! (W6JTI). My first SS! Great! (N7DM). Where were all the newcomers? (W7GB). This was my second contest. The first was Novice Roundup. What a difference! (KA8VDX). I fired up my Century 21 and waded among the big guns (N8DGO). Contesters are a very special breed. I salute them (N8DGO). Where were 10 and 15 meters? (K9JU). I must be jinxed (K9JU). Thanks to those who took the time out to wish an Old Timer good luck in response to my check of 23—age 80 in Feb 86 (W0AWP). First contest since signing KG6AQI in the 60s (K0HB). 75% of stations had extra

calls. Where was everyone else? (WA3PWL). No CW filter! Nuff said! (VE4ALO). Guess I must put up a beam. My wire antennas just don't make it! (WIECH). Our team's effort posed no serious threat to the big guns, but we sure enjoyed it (N1DLS). I found the contesting chapter of the ARRL Operating Manual to be a big help in my first Sweepstakes (NICGL). It was a much better contest than last year. Propagation was great. Maybe I will put off retiring from the SS for a few years (WB1GQR). I had a lot of fun, but how do you contest and keep track of a 14-month-old? (WA1TBV). After years of indoor antennas, barefoot rigs and straight keys, my new QTH brought beams, amps and keyboards. I miss the old challenge and hate the TV! Lots of fun (WA2ASQ). Working 43 states in 12 hours was a thrill (KA3OAX). First Sweepstakes in over 6 years, now I remember the fun I've been missing (WB3JFS). Great fun but how do you hold out for 24 hours? (KB4LSE). I learned a whole bunch about contesting! (KB4AMA). Boy! Have all the call signs changed since my last SS in '79! (WA2MZE). WA7ZZY had a tough time sorting out K3JT and N3JT when both called him simultaneously! (N3JT). First 2 hours on phone and CW yielded 477 QSOs and 103 multipliers (AA5B). Murphy hit halfway through the contest. I finished barefoot (N5DD). Sure didn't think



Saskatchewan's own VE5GF worked 349 QSOs from this well-equipped station.

I would be on 20 until after midnight! (KM5H). I think Sweepstakes is a great contest (K6VMN). It was an interesting contest and I am glad it's over for a year (W6OAT). Great short skip on the higher bands Saturday night (KW8N). This was my best ever SS phone using low power (K2PLF). What fun! What TV! Damn those poor TVs! (KA9IMX). My first clean sweep in 20 years of SS! (W9JOO). Funny how being ignored and trampled on could be so much fun! (KA0RVX). My 3-year-old son ran around all weekend yelling "CC!" (WB0VFW). A lot of fun was had by all and once we got the antennas to resonate where they were supposed to, we were off to the races (VE3NAR).

FEEDBACK

Please refer to May 1985 QST, pages 74-80, for the following corrections. On phone, in the Northern Texas Section, K5RR's line score should have read 241,536-1632-74. N5AU's score was 241,092-1629-74. This places them fourth and fifth nationally.

On CW, in Eastern Pennsylvania, add K3WGR 45,158-337-67-10-A. Kentucky low-power winner was K3PL. In Montana, K6PP/7 was also a low-power entry. In Ohio, both N8CSI and K8DB were operated by K8MR.

Scores

CW scores are listed first, followed by phone. Within each call area, scores are listed by ARRL sections. Within each section, single-operator scores are listed first in descending numerical order, followed by multioperator scores. Each line score lists call sign, final score, number of QSOs, number of sections worked, hours operated and output power used (A = 150 watts or less, B = more than 150 watts). Example: in Connecticut, W1WFEF worked 1008 stations in 74 sections for a final score of 149,184 points. He operated for 24 hours and used more than 150 watts.



CW

Connecticut				
W1WFEF	149,184	1008	74	24-B
K8HVT	113,812	768	74	24-B
K1KA	112,850	773	73	20-B
N1CC	95,164	649	74	22-A
W1EHC	92,304	641	72	23-A
W1GNR	89,272	613	72	22-B
K1NFK	83,212	586	71	24-B
W1BIB	77,526	531	73	12-B
K1IN	74,430	573	65	18-B
K1BV	73,830	535	69	14-B
K1DM	70,588	477	74	12-B
K1DWD	70,000	500	70	18-A
KG1D	61,740	441	70	17-A
W1LWW	61,608	453	68	20-B
K1WA	60,956	446	68	14-A
W1NLD	51,912	412	63	22-A
K1DM	45,628	342	67	15-B
N1WJ	34,616	272	64	9-A
W1PMR	23,744	224	53	11-A
K1CC	18,856	172	49	2-B
W1TKG	12,890	141	45	15-A
W1DQT	11,280	120	47	10-A
AAZZ	7,730	98	41	2-B
K1ZZ	7,140	85	42	2-B
K1MWM	6,318	61	39	16-A
K1MVC	5,148	78	33	5-A
K1MTK	300	15	11	10-A
Eastern Massachusetts				
K5MA	124,246	851	73	23-B
W1FM	86,544	601	72	23-A
W1AX	75,776	519	74	19-B
NA1R	61,488	433	71	21-A
W1KEE	58,752	408	72	24-A
W1KCNM	55,884	374	68	16-B
K1UT	38,400	300	64	8-A
W1PS	25,852	247	58	9-A
W1JHN	20,644	217	66	8-B
K1SEC	17,730	235	59	10-B
A1SE	25,544	206	62	11-A
K1NTR	21,924	203	54	12-A
KT1O	20,196	187	54	7-A
K1FI	11,712	122	48	4-B
W1PLJ	9,444	115	44	12-B
W1ZHV	7,992	111	36	8-A
N1AU	5,824	81	32	7-B
W1SR	5,040	70	36	4-A
KT1A	4,984	73	34	1-B
W1TUM	768	24	16	2-A
W1HNU	339	15	11	2-A
W1MX (K1M0X, K1K1H, K1G2S, W1Z1CY, ops)	24,852	218	57	10-B
Maine				
N1SW	88,440	660	67	20-B
K1OE	49,236	373	66	17-A
K1OR	32,450	275	59	22-B
K1MZB	32,128	251	64	13-A

W1GGLH	19,468	157	62	13-A
W1GJK	14,798	151	49	9-B
New Hampshire				
K6ZDH	156,880	1050	74	24-B
KM1C (W1PH, ops)				
	122,988	831	74	22-A
K1TR	104,488	757	69	20-B
K1KE	17,328	152	57	6-A
W1END	10,560	110	48	6-A
K1HL (+ net)	31,752	252	63	9-B
Rhode Island				
K1IU	113,150	775	73	21-B
K1UX	87,380	624	70	20-B
K1AGW	87,620	483	70	19-B
K1VJS	23,520	196	60	10-A
N4XR	14,058	99	71	8-A
W1RFQ	9,180	90	51	10-A
W1OP	42,498	332	64	24-A
Vermont				
W1GQR	118,854	837	71	24-B
W1LIR	100,110	705	71	22-B
W3SOH	53,900	400	67	19-A
W1KRV	49,266	357	69	16-A
W1HJX	8,800	100	44	7-A
W1GLV	1,160	29	20	1-A
Western Massachusetts				
KB1W	100,940	721	70	19-A
K21M	62,754	442	71	21-A
W1ZAM	17,052	147	58	10-B
KV1W	14,768	142	52	12-A
NC1B	7,488	96	39	24-A
K1KPH	4,668	71	33	3-A
KS1N (+WB1s EYL, H1H)	79,660	569	70	19-B
2				
Eastern New York				
K1ZM	153,328	1036	74	24-B
KS1A	132,276	906	73	24-B
W1ZSTM	88,480	632	70	22-A
K2JUF	60,582	439	69	20-A
W1ZD	53,992	397	65	18-B
N1JZL	53,868	422	67	18-A
K2EK	52,528	404	65	8-B
K2PTF	34,320	298	60	10-A
K1QY	28,320	236	60	9-B
AA2Q	19,482	191	51	8-A
W1ZSPN	7,800	100	39	9-A
W1NFD	7,008	75	48	12-A
K1PD	494	19	13	8-B
W1ZD (+KA2RLH, KC2KK)	76,986	534	72	21-A
W1ZUKP (+W1Z1CK)	24,600	205	60	16-B
New York City & Long Island				
K2SX	104,390	715	73	17-B
KA2AU	93,878	643	73	20-B
KA2LJH	54,284	487	66	22-B
K2VGM	25,080	209	60	6-A
W2KTF	12,498	142	44	4-A
K2HVM	11,000	110	50	3-A
W2DX	10,742	131	41	7-B
N2FV	7,752	102	36	18-A
W2EAV	672	24	14	2-A
W2TNI	30	5	3	2-A
N2FIG	2	1	1	1-A
Northern New Jersey				
W2RQ	154,956	1047	74	24-B

KY2P	125,414	859	73	24-A
KBDI	78,820	563	70	20-B
KQ2O	75,458	524	72	19-B
KY2H	73,984	544	68	23-A
W2FUE	64,680	490	66	23-A
W2ASQ	53,620	383	70	23-B
KW4E	44,928	351	64	12-A
AA2U	37,520	280	67	14-A
W2KWW	26,780	206	65	10-A
W2TI	17,888	172	52	10-A
NG2J	12,760	110	55	9-A
KT2D	11,750	129	47	7-A
W2HN	9,798	71	69	9-A
K3CJM	7,410	95	59	7-A
W1ZUDT	1,804	41	22	1-A
N2DUB	112	8	7	2-A
K2sQ (W2GR, W2As JSR, MVZ, N1WV, N1WV, K2As EYH, H1H, N1WE, RSH, USU, ZMP, WB2GJE, ops)				
	18,354	181	57	22-B
Southern New Jersey				
N2MM	123,824	879	71	19-B
A82E	88,194	607	71	10-B
W2LYL	78,024	559	68	20-A
W2LBT	65,968	424	65	22-A
W2EA	49,864	338	64	20-A
K2HFV	41,580	315	66	14-A
K2HY	40,920	341	60	8-B
W2U2V	40,170	309	65	17-A
N2CUB	38,430	305	63	16-A
N2RF	38,114	323	59	15-A
K2OSV	34,944	273	64	13-B
W2PAJ	33,668	249	67	9-B
W2FOU	31,960	264	60	22-A
N2DP	19,722	173	57	15-A
K2JF	19,152	168	57	11-A
W2QNH	14,892	146	51	5-A
N2EZ	11,712	122	48	10-A
W2DIN	9,554	91	47	7-B
W2BLV	8,134	85	49	4-A
W2PAZ	2,900	50	29	6-A
K2BML	1,440	30	24	13-A
K2COX	6	3	1	1-A
N8BDR	6	3	1	1-A
W1ZMGV	6	3	1	1-A
Western New York				
K2ZJ	108,478	743	73	24-A
K1U2X	67,716	513	66	17-A
N2N1W	66,866	499	67	24-A
W2TZ	66,792	506	65	11-A
K2M0Y	64,170	485	69	22-A
W2QJ	55,020	393	70	14-A
K2K2K	52,480	410	64	15-A
W2HPF	44,880	330	68	8-B
W1ZEA	38,400	304	64	18-A
N1M2J	32,308	258	63	22-B
N2W1	30,306	243	64	10-A
NA2Q	24,980	208	60	7-A
W2YOH	14,200	200	71	13-A
W1VU	10,706	101	53	4-A
W1ZABD	8,400	100	42	3-A
N2E1A	8,148	87	42	14-A
N2T1W	8,112	104	39	4-A
N2GU	7,800	190	39	5-A
KK2B	5,254	71	37	4-A
KA2MXX	1,056	33	16	15-A
W2CXM (AG1M, N1AEP, W2LJK, ops)	96,768	672	72	24-B
W2COW (KA2IE, K2K2W, KD2SB, N2s CTC, HR, N2ZW, N1ZT, N81N, ops)	91,494	663	69	22-B
KW2J (+W21MO)	54,648	396	69	24-A

3				
Delaware				
W8JRU	80,640	576	70	23-A
KQ5G	62,172	471	66	21-B
K3HBP	18,854	159	53	8-A
Eastern Pennsylvania				
K3RR	114,376	841	69	22-B
KS3F	92,072	677	69	24-B
KC3M	70,880	507	70	20-A
K3DTD	67,206	467	69	19-B
W1ZGLX	67,080	479	70	18-A
N2EY	62,042	463	67	20-A
W1ZJLD	60,996	442	69	19-A
K3MQH	60,032	460	64	24-A
K3XTX	55,200	409	89	18-B
KA3KOL	44,850	345	65	23-A
W1Z3W	36,668	291	63	14-A
K3BJK	22,388	193	58	14-B
N3CHL	15,120	140	54	14-A
K3VW	11,970	133	45	3-B
AG3G	10,500	125	42	7-A
KR3I	7,052	86	41	5-A
K3BGL	5,760			

KX4V	45,298-	319	71-	23-A	N6HC	104,682-	717	73	22-B	Nevada		K08TE	5,628-	67	42-	15-A	AC6S	104,192-	704	74-	19-B					
K4FFD	43,168-	304	71-	16-A	N6AA	61,320-	420	73	8-B	WA7NIN (WBOAT, opr)		KABSGB	5,490-	75	36-	17-A	ADDO	90,280-	610	74-	24-A					
K4AD	39,898-	277	72-	8-B	W6B8IL	53,818-	379	71	24-A		168,204-1124	74-	24-B	N08N	2,842-	48-	29-	7-A	W1XE	83,952-	583	72-	23-A			
AA4ZH	37,400-	278	68-	13-A	W6GGDS	52,820-	378	70	24-A	NC7K	168,204-1124	74-	24-B	W8VZE	2,160-	40-	27-	3-A	K4KU	83,804-	574	73-	16-A			
K4MT	36,720-	270	68-	9-B	NE6I	47,428-	334	71-	6-B	Oregon	168,204-1124	74-	24-B	W8LTL (NZ4K, KD8NS, oprs)	99,718-	683	73-	21-B	K8SE	68,310-	495	69-	24-A			
W4DELJ	36,400-	260	70	15-A	W6KYR	14,008-	149	47-	13-A	N8TR7	162,386-1087	74-	24-B	W8UMD (KD8NU, N9AG, opr)	60,852-	461-	66-	12-B	N1RE	64,446-	467	69-	11-B			
N3DIT	10,368-	72	72-	6-B	W6B8C	11,300-	113	50-	13-B	N8M77	159,544-1078	74-	23-B	W8EAF (+ N8FLQ)	3,224-	52-	31-	9-B	W6CP	58,940-	438	65	10-A			
K4DHS	72-	6	6	1-A	W6JUN	3,040-	40	38-	7-A	W7WFO	104,784-708	74-	24-A	N8EKS (+ K88PYE)	2,700-	50-	27-	11-A	K9TTK	49,404-	364	69	14-A			
W4RV (+ K1FR, K6EJ)	55,750-	410	68-	19-A	W6HQS	2,652-	51-	28-	8-A	W7WFO	89,688-606	74-	22-A					NEK	98,000-	293	65	18-B				
Arkansas					W6GFSF (+ W6NJJJE)	72,846-	513	71-	20-B	Utah								W6OSK	52,860-	265	62	12-B				
K5GO	166,500-	1125-	74	24-B	Orange					K76E	134,088-	908	74	21-A	West Virginia				W6QCR	93,256-	252	64	18-B			
KM5G	99,774-	723	69-	24-B	K72E	24,976-	223	56	22-A	K7BDP	41,885-	308	68	12-A	Nest (KC8C, opr)	154,905-1081	73-	24-B	K8GU	29,972-	254	59	9-B			
W6OBP	67,620-	490	69	18-A	N8XB	20,708-	167	62-	20-A	K7DOB	14,444-	157	46-	7-A	W4NWR	77,864	534	73-	15-A	K8ZX	29,832-	224	66	5-B		
K6FUV	14,995-	153	49	5-A	K6MJ	19,880-	142	70-	11-A	K7DVB	29,524-	240	61-	12-A	KD8G	42,478	317	67-	7-B	N8FFZ	21,080-	185	57	17-A		
K5UH	2,900-	50	26	7-A	W86YPX (W6MH, opr)	13,500-	150	45-	10-A	N7ENJ	25,906-	217	53-	19-A	NJBN	23,600-	200	58-	10-B	G4AMJ/W8	9,400-	100	45	6-A		
Louisiana					K7JA	10,952-	74	74	7-A	K7KJM	81,938-	832	72	19-B	W8JWX	11,270-	115	49	5-A	N00B	4,884	57	27	12-A		
W5WMMU (K5GA, opr)	170,348-	1151-	74	24-B	W6BGR	10,340-	110	47	7-A	W7TC	65,889-	493	68	22-A	K8BJX	154,905-1081	73-	24-B	W1VAV	988	29	17	6-A			
K3ZMI/5	87,616-	592	74	23-A	KABSA	8,280-	92	45	18-A	K7BOP	41,885-	308	68	12-A	W8JWX	11,270-	115	49	5-A	W0YR	704	22	16	1-B		
K2SD	79,424-	544	73	20-A	W6BAAJ	3,948-	57	32-	8-A	K7DVB	29,524-	240	61-	12-A												
K5MC	75,824-	513	74	20-A	N6MNV	2,106-	39	27	2-A	W7WFO	89,688-606	74-	22-A													
KASB	71,540-	490	73	24-A						W7WFO	89,688-606	74-	22-A													
N7SG	18,912-	151	56	13-A	Pacific					N7ETC	27,378-	236	58	18-A												
W8R9FA	9,200-	100	46	10-A	KH6RS (AH6AZ, opr)	87,408-	607	72	18-B	W7G8	20,160-	168	60	4-B												
Mississippi					KH6CP	1,344-	32	21	19-A	W7KJ	11,700-	117	50	6-A												
KC4WQ	60,996-	442	69-	15-A	Santa Barbara					KE7JR	1,718	36	22	4-A												
KA5H	42,504-	308	69	15-A	W7C8B	70,128-	487	72	9-B	K7YR	1,020	30	17	8-A												
KA5KX	38,984	268	69	14-A	W6VGI/6	51,264-	356	72	22-B	N7EPD	312-	12	1	1-A												
W6A5OYU	3,534-	57	31	3-B	W6TKF	23,800-	200	59	6-A	K7LXC (+ K7HBN)	143,708-	971	74	24-B												
W6A5OYU	2,352-	56	42	4-A	W6QMC	16,524-	153	54	18-B	KE7C (+ W670U)	131,572-	889	74	24-B												
W6A5OYU	2,352-	56	42	4-A	W6QMC	16,524-	153	54	18-B	W7M8U	79,520-	668	70	19-B												
New Mexico					W6CUL	4,032-	56	36	3-A	K7WA	54,848	396	69	15-A												
K7UP	125,356-	847	74	23-A	Santa Clara Valley					K7SS	44,220	330	67	9-A												
A18X	120,672-	834	72	24-B	NGFN	150,812-	1018	74	24-B	N7GSG	37,210	305	61	13-B												
K7KX	104,112-	723	70	24-A	K4LY (K6EJ, opr)	129,648-	876	74	24-B	N7DMD	32,814	283	62	17-A												
N2JUB5	67,592-	497	69	24-A	N6KV	87,600-	600	73	24-A	N7ETC	27,378-	236	58	18-A												
K3L	44,568	314	71	9-A	ALJ6	85,118	583	73	12-B	W7G8	20,160-	168	60	4-B												
K6CS0	43,290	333	65	20-A	N6KR	52,836	357	74	16-A	W7KJ	11,700-	117	50	6-A												
N5DVY	41,984	328	64	21-B	N6RF	48,824	358	68	12-A	KE7JR	1,718	36	22	4-A												
N6PFAIM	10,656	111	48	6-A	N6SV	28,800	240	60	9-A	N7EPD	312-	12	1	1-A												
N6EZA	2,958	51	29	7-A	W6EPV	35,712	212	63	14-B	K7LXC (+ K7HBN)	143,708-	971	74	24-B												
AASB (+ K5TA)	162,504	1088	74	24-B	ADSE	20,532	174	59	7-B	W7WFO	89,688-606	74-	22-A													
Northern Texas					W6IO	10,952	74	74	16-A	W6RFB	40,870	305	67	11-A												
N5AU (N5RZ, opr)	163,392	1104	74	24-B	N6YE	6,408	89	38	7-A	K8BJX	154,905-1081	73-	24-B													
K5MR	150,368	1016	74	24-B	W8OKK	4,012	60	34	2-A	K8BTR	39,468	259	66	11-A												
K5NW	135,272	914	74	24-B	K8BTR	39,468	259	66	11-A	K9Y	20,298	199	51	9-B												
N5UB	122,840	830	74	24-A	San Diego					K9ZTK	20,298	199	51	9-B												
N5RM	115,144	779	74	17-B	K8NA	158,656	1072	74	24-B	K9ZTK	20,298	199	51	9-B												
K5FH	110,852	749	74	18-B	N6NO	132,312	894	74	24-B	K9ZTK	20,298	199	51	9-B												
K5D5C	90,576	629	70	19-B	N5W	128,908	871	74	24-B	K9ZTK	20,298	199	51	9-B												
N4Q3	80,790	577	70	17-A	AA8EE	56,942	401	71	12-A	K9ZTK	20,298	199	51	9-B												
K5M5R	74,658	541	69	12-B	W6BFHK	32,890	253	65	19-B	W6BAM	88,340	631	70	24-A												
K5Y5N	68,728	484	71	15-A	W6LXA	17,898	158	58	7-A	K8RMW	88,184	604	73	23-A												
N5DD (W09HFV, opr)	60,309	437	69	9-B	N4MKK/6	13,970	127	55	10-A	NE8O	76,664	518	74	21-A												
K5WVXZ	37,672	277	58	15-B	San Francisco					W8TJQ	71,686	491	73	23-A												
W5WMM	33,864	249	68	18-B	W6B1P	102,120	690	74	16-B	W8TJQ	71,686	491	73	23-A												
K4B5GSK	33,634	251	67	10-A	W6JTI	101,380	685	74	24-A	W8TJQ	71,686	491	73	23-A												
K4W5	33,448	226	74	10-A	K8LRN	66,304	448	74	18-A	W8WPC	60,912	423	72	20-A												
K5L5P	24,282	213	57	10-B	W6JRB/6	9,900	100	49	6-A	W8WPC	60,912	423	72	20-A												
K65UL	10,082	71	71	18-B	W68LLY	7,600	75	60	7-A	K9JIM	55,080	405	68	19-A												
K5X5R	5,928	76	39	8-A	San Joaquin Valley					K9DO	41,540	335	62	15-B												
N5KR (KT5V, N5HD, NR5K, oprs)	139,564	943	74	24-B	W6CB	146,584	1004	73	24-B	NMBX	40,664	299	68	22-A												
N5W5E (+ N5WF, N5Y5B)	113,368	766	74	24-B	N8B1Q/6	62,300	445	70	18-A	W6BVB	39,204	297	66	15-B												
Oklahoma					Sacramento Valley					K8OT	33,500	255	67	16-B												
K5M5H	113,516	767	74	24-A	N6GG	104,044	703	74	23-A	AC8W	32,640	255	64	11-A												
K5ASJDL	242	11	11	2-A	N6BG	98,420	665	74	20-B	K8SIA	32,330	305	53	9-B												
N5W5G (+ K5CM, N5KW)	153,180	1035	74	23-B	W6NKR	63,196	427	74	18-B	N8COA	28,520	230	62	20-A												
N5JN (+ W3AS)	134,820	915	74	24-B	KV6H	40,768	309	66	9-B	K8NS	24,824	214	58	7-B												
Southern Texas					W6EGB	37,950	275																			

South Dakota WA0NSY 6,120-85-35-16-A K0VVY (KBQBA, KD0GV, N0FLZ, WD0CXU, oprs) (19,298-808-74-24-B)

VE Maritime-Newfoundland VE1FH 71,576-543-66-16-B VE1BEI 24,476-211-58-13-A

Quebec VE2AQP 54,648-398-89-21-B

Ontario VE3ART 109,752-807-68-20-B VE3GFN 39,090-293-65-12-B VE3NBE 22,560-188-80-13-A VE3GG 4,402-71-31-2-A VE3ST 3,498-53-33-1-A VE3NVT 2,164-52-21-8-A

Manitoba VE4ALO 64,938-471-69-20-B VE4AEX 23,058-189-61-17-A

Saskatchewan VE5LUF 99,134-679-73-23-B VE5VP 25,200-225-56-16-A

Alberta VE6ADK 33,512-284-59-23-A

British Columbia VE7CC 148,224-988-74-23-B VE7IN 56,486-428-69-19-A VE7GDX 54,020-365-74-23-A VE7IQ 32,004-254-63-16-B

Yukon-NWT VE8QST (KW5P, opr) 55,790-384-70-23-B VE8GD 7,134-67-41-11-A

NIAFC 9,504-132-36-4-A KA1OR (+KB1CV) 84,206-693-71-23-B

New Hampshire KM1C (WB89TH, opr) 176,564-1193-74-24-B

AF1T 64,534-679-73-14-B AK1K 60,112-442-88-23-A KU2WJ 41,540-310-67-18-A AC1J 20,304-188-54-10-A

Rhode Island K1IU 114,700-775-74-14-B KM1X 113,458-799-71-18-B K1VSJ 101,084-883-74-20-B K9SB1/1 11,818-157-37-5-B K2MM 2,632-47-28-4-A

Vermont WB1GOR 206,312-1394-74-24-B W2SOH 27,032-218-62-9-A KD2EN 12,144-132-46-10-A WA1TBV 11,300-113-50-6-A K2IQ1 (K2OZV, KA2s CFH, MTB, KD2EE, Kk2s B, G, WA1LLC, WA2AZA, oprs) 48,872-372-63-21-A

Western Massachusetts K1NWE 129,626-881-73-18-B KY1H 114,756-786-73-20-B W1YK (KM1P, opr) 54,384-412-68-11-B WA1ZAM 52,260-402-65-13-B K21M 39,168-306-64-17-A KV1V 37,800-300-63-16-A K1KNO 13,344-139-48-3-A WB1EYL (+K91N) 67,820-483-70-15-B KB1VC (+KB1RB) 35,632-282-63-19-A

N2VW 21,204-188-57-8-B WA2RCB 19,610-185-53-9-A W2EA 13,100-131-50-9-A K2JF 12,000-120-50-9-A KA2MSM 9,546-111-43-10-A KD2TD 9,152-104-44-3-B KD2AE 8,624-98-44-7-B K2K3PO 7,740-90-43-12-A N2BDR 6,052-89-34-5-B W2EKB 5,235-77-34-6-B K2L0 3,660-61-30-6-A WA2AWS 2,300-50-23-5-A N2AWC 1,974-47-21-7-A WA2OZQ 1,152-32-18-4-A

Western New York W2HPF 136,308-921-74-16-B AF2K 89,318-629-71-24-B N2NW 81,060-578-70-24-A NA2A 65,380-467-70-22-B KQ2X 60,102-477-63-15-A KB2NU 56,884-383-74-13-B NM2J 47,472-344-69-23-B AJ3K 47,058-341-69-12-A N2FSE 33,306-273-61-20-A WA2WPI 22,230-195-57-12-A KD2CC 20,384-182-56-12-A KQ2PX 20,088-182-62-11-B K2QVAJ 19,552-188-52-12-A K2XU 14,478-127-57-3-B K2ZJ 14,104-172-41-4-A NA2Q 12,890-105-59-4-A N2MF 12,064-147-41-2-B W2PQ 11,074-113-49-6-A WB2ABD 10,200-100-51-4-A KA2JQV 8,400-100-42-10-A KA2MXX 2,970-55-27-8-A N2EIA 2,352-49-24-6-A W2CW (N2HR, N6IN, N1ZT, NK2H, NN2K, oprs) 118,890-810-74-20-B ND2R (+KC2P, WB2s OXB, OXG, OIF) 90,300-645-70-24-B K2JD (K1JUL, N2BXA, oprs) 69,552-504-69-22-B

Georgia K4BAI 182,632-1234-74-24-B KAJPD (WA4OZI, opr) 148,482-1017-73-16-B WD4LAM 58,344-442-66-20-B KA4C 30,418-227-67-23-B K4GKV 19,490-154-60-14-A W4R 8,560-107-40-3-A

Kentucky ND4Y 156,084-1092-71-24-B AA4RX 151,840-1040-73-24-B K4AAMA 26,718-219-61-14-A KF4AV 3,300-55-30-1-A K148V 2,970-55-27-8-A K14DC 2,800-50-28-2-B

North Carolina N4ZC (WB8MAZ, opr) 185,000-1250-74-23-B N4AA 148,000-1000-74-21-B N6DR 48,020-343-70-10-A K1PLR 23,430-216-55-5-A N4BTW 19,352-164-58-15-A

Northern Florida K4XS 210,388-1441-73-24-B N4EEB 187,890-1270-74-24-B NJ4Y 86,112-624-69-12-B N4SA 83,822-591-71-9-A WC4E 81,360-585-72-11-A AA4J 30,686-229-67-22-A N4WV (+WY4A) 217,412-1469-74-24-B KF4GZ (+KF4HA) 29,824-233-64-23-A

South Carolina KD4RH 62,424-459-60-9-B KF4PP 31,458-321-48-15-A WA4JZ 23,350-195-65-9-A

Southern Florida N4BP 114,188-804-71-12-B WA2MZE 31,628-251-63-19-A AA4GS 30,098-264-87-12-A WA4JM 18,352-148-62-5-B WK4F 13,780-108-65-10-B NSFIY (+NSFUS) 23,424-192-61-19-A

Tennessee W4AZ 84,908-571-74-19-A AA4MN 49,968-347-72-14-B N12N 22,440-165-88-17-B K4XG 720-20-16-1-A

Virginia N3JT 189,312-1144-74-22-B W3YU 151,404-1023-74-23-A K3Z1J 70,448-476-74-20-B W4YE 40,800-300-68-10-A WA3RGH 40,864-299-68-10-A AA4HD 29,760-240-62-14-B WA4NN 27,376-232-59-19-B N4FTM 23,760-198-60-14-A NA4GK 22,680-189-60-14-A N4XD 22,578-213-53-5-B K4BAM 17,100-150-57-6-A W4BZP 17,018-127-67-13-A WD4ELJ 15,228-129-59-6-B N4LJZ 12,510-139-45-12-A KBEI 12,400-124-50-7-B WA4JLS 8,200-100-41-8-A WA4CYR 3,800-50-35-3-A K34DY (+AB4U, KB4PW, N4s GNN, JED, VJ) 123,840-880-72-23-B

Northern Texas N5AU (WB5VZL, opr) 258,632-1734-74-24-B K5RR (NSRZ, opr) 240,500-1825-74-24-B K5RX 222,889-1508-74-24-B N5DD (WB9HFV, opr) 192,685-1302-74-23-B K5MR 176,712-1194-74-20-B K5CV 172,372-1184-74-24-A K5VUD/5 140,304-948-74-24-B NTVS 116,070-785-73-21-A W5LMG 84,828-587-78-21-B K5NW 78,100-550-71-9-B N5JB 59,184-411-78-17-A N5TR (NSAU, opr) 48,376-341-68-5-A N5CR 45,696-357-64-5-B N5UA 41,952-304-69-18-B K5WZX 37,672-277-68-10-B W5LPZ 37,488-284-71-16-B NSAW 28,588-224-66-8-A NR5K 17,408-136-64-7-A K5LP 15,732-139-57-7-B K5CEA 15,480-128-60-4-A W5DSYF 13,208-127-52-7-A K5FSA 10,400-102-52-11-A K5SDX 10,300-103-50-6-B W5JD 9,900-110-45-5-B K5SPV 6,515-88-37-7-A K5XVH 2,184-39-28-4-A KN6M/5 (+KM5Q) 229,982-1554-74-24-B K5QY (+KM5J) 188,442-1277-73-24-B KA5W (+KM5R) 184,704-1248-74-24-B N5WE (+N5WF, N5YB) 148,296-1002-74-24-B W5AH (+W5BM) 79,056-549-72-12-B N25G (KD5XH, KO9Y, N5s GUY, HOY, WA2JOM, oprs) 45,890-353-85-15-A

PHONE 1 Connecticut W1WEF 223,036-1507-74-24-B K1WA 158,702-1087-73-22-B K1NPK 127,132-859-74-21-B KA1VC 118,408-811-73-18-B KBHVT 94,608-648-73-14-B K2RFR 85,658-621-69-15-B K1EYI 79,824-538-74-13-H W1GNR 75,628-534-71-22-B N1CC 73,130-515-71-16-A K1DM 71,260-509-70-18-B WA1VLW 70,148-494-71-19-B K1IN 65,100-465-70-19-B N1JW 53,900-388-70-11-B KB1HY 50,544-351-72-10-B KA1MXX 42,504-308-69-17-A K1DI 39,000-300-65-10-A WA2WIP 37,950-275-68-8-A K1EM 35,380-260-68-6-B W1ECH 34,892-281-81-10-A WB1NLD 33,440-304-55-17-A WB1DOT 32,574-287-61-14-A K1BV 27,860-233-60-5-B K1RM 24,192-224-54-4-B W1TKG 22,780-215-53-16-A KA1JTH 20,088-186-54-14-B K1K 17,800-203-44-2-B W1PWR 17,172-162-53-10-A W1BH 16,280-110-74-14-B K1FB 10,290-130-42-15-A K1DD 10,398-113-46-3-A N1DS 8,536-85-36-6-A N1DRS 5,644-77-36-6-A K1NGL 360-15-12-1-A K1DW (+K1NCD) 83,620-585-74-17-B N1DL5 (+ opr) 13,462-127-53-22-A

Eastern New York W2XL 141,264-981-72-23-B WA2STM 118,698-813-73-24-A KC2AG 95,760-666-72-20-B K2UF 68,400-475-72-20-A K2UR 48,506-337-68-10-B WB2SPN 28,512-264-54-14-A K2EK 23,406-249-47-4-B KY2L 22,272-174-64-15-A W2WZ 21,948-177-62-6-B N2BZP 11,562-141-41-5-B W2NRD 8,500-85-50-15-A WA3AF5 4,800-50-48-4-B WB2NVR 5,632-45-33-8-A K9NA (+KU2Q) 161,764-1093-74-24-B WA2UQP (+WA2JJK) 140,160-960-73-24-B KY2J (+KA2TIP) 102,620-733-70-24-B KC2KK (+KA2RLH, WA2JNM) 49,368-363-68-20-A

New York City & Long Island K2YGM 69,800-470-73-20-B W2DHY 60,172-494-69-15-B K2SZ 59,243-450-68-19-A K2AU 51,552-358-72-19-B K2RYT 23,246-197-59-13-B W2KTF 18,632-154-54-5-A K2HVN 9,800-70-70-5-A W2DX 9,752-108-49-6-B W2GKZ 8,800-100-44-6-B AC2P 8,874-31-48-7-A WA2SUH 8,120-118-35-9-A KA2WVU 6,864-88-39-2-A WB2AYS 2,394-57-21-2-B N2EMG 1,376-45-18-5-A NK2 588-21-14-4-A W2TNI 340-17-10-4-A

Delaware AC3T (KA2B, opr) 24,840-207-60-5-B K3HP 20,978-184-67-5-A W3LF 2,180-40-27-2-A

Eastern Pennsylvania WA3SPJ 163,098-1102-74-24-B WB3EMG 103,952-712-73-23-B WB3FAA 70,992-522-68-16-B W3IGS 67,340-455-74-19-A KB3VJ 57,546-417-69-22-A K3TX 54,404-408-67-20-B K3WV 45,584-308-74-10-B N3CHL 41,208-303-68-10-B WA3YCN 31,800-300-53-15-A K3JLC 30,978-242-84-16-B K3KJ 30,720-256-83-14-B K3SF 27,524-207-88-12-A K3KJLA 24,862-209-95-15-A N3AVZ 22,862-197-53-14-B WA3KWH 18,810-181-55-13-B WK3K 15,930-177-46-15-A KC3CS 12,232-133-48-15-A W3HMR 4,824-68-34-7-B KA3JAX (+W3FTG) 24,898-211-58-12-A

Maryland-DC K3ZO 217,264-1468-74-24-B W3LPL (KC3B, opr) 42,904-345-62-11-B K1RZ 163,772-1059-74-23-B K3ZZ 141,120-980-72-24-B WA3EKL 101,032-662-73-24-A NS3CEY 90,724-613-74-23-A KC3EK 71,568-504-71-13-B W3BRF 42,904-345-62-11-B W3PWO 19,840-155-64-11-A W3FE 19,600-188-50-10-A W3AXX 13,974-137-51-9-B W3FCR 8,712-58-66-16-A K3SA 6,218-84-37-2-B W3EE 5,828-78-38-5-A N3CW 5,400-75-38-4-B N3EBR 4,370-95-23-2-B W3EVQ 3,780-63-30-7-A K3KU 5,200-64-25-1-A W3WPF 1,850-37-25-1-A W3QFE 32-4-4-1-A W3GNO (+KA3NAJ, KF3P) 162,800-1100-74-24-B K3R2 (+KA3FGV, KB2R, K14YN, WA3BTA, W3PFTG) 49,980-357-70-24-A

West Indies O1A/KP2 11,448-106-54-20-B

5 Arkansas K5GO (KM5G, opr) 271,580-1835-74-24-B N8BV 115,194-789-73-17-B N6EK 54,800-390-70-20-A WE6G 49,580-354-70-21-A KN5S 26,928-139-68-10-B WA6BO 21,840-182-60-5-B N8RO 5,832-88-46-1-B K5SQ 5,328-72-37-4-B

Louisiana K5LW 15,510-141-65-15-A W5CD 420-15-14-1-A W5EW (+KM5C, NS5HO) 155,104-1048-74-22-B

Mississippi W5OYU 54,600-390-70-22-A A5SH 39,888-277-72-11-A NSGRU 26,108-214-61-14-A K5KWX 19,080-159-60-10-A W5MUE 284-12-11-2-A

New Mexico K3L 190,032-1284-74-24-B NSDVY 58,324-622-71-18-B N5EPA 54,288-377-72-1-A A19X 45,816-352-69-7-B NSACP 40,734-279-73-18-A W5BTKJ 34,894-259-73-18-A N5EJA 25,830-205-63-10-A N2JB/5 6,800-75-44-2-A W5SX 1,824-38-24-1-B AA5B (+K5TA) 382,848-1776-74-24-B

Oklahoma K5JH 159,892-1079-74-24-A KF5DA 88,580-815-72-64-B N5DW 42,112-329-60-13-B KF5FM 38,468-298-66-8-A K5RQ 15,400-140-54-8-A N5KW (+K5CM, NS5G) 258,484-1733-74-24-B

Southern Texas W5AQ 280,480-1760-74-24-B N5DU 255,524-1713-74-24-B N5RSM 248,640-1680-74-24-B K5LZO 221,918-1587-74-24-B KE5FI 188,256-1278-74-24-B K5L11 138,116-948-73-22-B KC5CP 133,348-901-74-24-B K5DX 112,292-779-74-10-B K5UCV 91,770-435-71-18-B W5SIX 57,270-415-68-19-A K5FLU 56,304-318-69-9-A N8BH 52,398-369-71-16-A KE5TF 44,988-328-69-16-B W9AGH 11,088-77-72-21-B K5NH 10,888-73-73-10-B K5NWB 6,848-94-46-11-B K5RVK (+K5CM, W5ASP) 169,272-1132-73-24-B K5GB (+K5QAA) 136,800-950-72-24-B W5PWG (KA5s FJS, GEB, OEC, RZU, K3RZE, WA3KMA, oprs) 68,978-479-72-24-A W5XD (+WA3SWG) 12,578-131-48-9-A

Eastern Massachusetts K1YUT 169,016-1142-74-24-B K5MA 131,868-891-74-15-B W1FM 84,048-618-68-22-A W1RM 68,616-462-64-12-A K2TEKR 30,812-324-69-16-A KB1KM 29,620-210-71-20-A KB1GN 28,860-222-65-14-A N1CGL 28,236-253-58-14-A KQ1F 23,300-235-60-7-B KB1EW 27,849-236-59-10-A W1AX 18,129-112-72-4-A KA1OR 18,552-162-48-5-A K1XM 11,528-131-44-5-A W1PLJ 11,430-127-45-12-B K2ID 11,200-112-50-11-A W1HWU 2,700-30-27-3-A W1HNI 2,500-30-25-1-A W1ATYS 1,820-36-28-4-A K01F 2-1-1-1-B N1AU (+K01F) 100,268-687-72-21-B W1MX (KX1Z, K2GS, N7EPR, oprs) 64,188-478-67-19-B

Northern New Jersey K2YP 159,248-1076-74-24-A K6DI 70,840-508-70-20-B W2RQ 40,200-300-67-4-A WB2ZG 36,226-307-59-8-A KBNC 13,190-101-85-13-B K2ZNF 10,810-115-47-13-A KB2ZQ 9,204-118-39-6-A K4WE 6,270-85-33-4-A K2MFF (KA2s PFM, FRR, VGH, N2s DID, DSV, FVN, FWI, W2VY, oprs) 79,988-588-68-24-B K2GQ (W2OR, WA2s USB, MYZ, NKW, VFF, KA2s EYH, HJH, NWE, RSH, USU, ZMP, WB2GJE, oprs) 56,304-414-68-22-B WA2ASO (+KR2J) 44,352-338-66-22-B

Southern New Jersey N2MM 187,240-1130-74-20-B AB2E 129,944-878-74-20-B K2ZI 95,460-645-74-24-A WB2DIN 68,890-505-69-16-B K8XR 64,860-482-70-23-A ND2P 63,512-487-68-23-A WA2LBT 49,982-373-67-20-A W2PWL 48,374-361-67-17-A WB2UVB 48,920-340-69-16-B W2FGY 48,490-332-70-22-B W2ORA 40,664-239-68-15-A W2PAU 33,020-254-65-9-A N2DN 27,530-215-64-10-B K2YV 25,424-227-56-3-B W2FDJ 21,240-177-60-12-A

Western Pennsylvania K3LWM 127,428-861-74-24-B K3TB 103,104-716-72-21-B WA3WAW 42,986-341-63-11-B WB3JFS 37,642-319-59-15-B ADRJ/3 31,350-285-55-8-A K3SF 8,170-95-43-4-A K3RY 7,400-100-37-4-A K3UA 8,072-92-33-2-B WA3PCX 644-23-14-2-B

Alabama N4KG (KC4ZV, opr) 211,492-1429-74-24-B KC4GS 27,192-206-88-19-A KB4LSE 6,624-74-38-5-B

Los Angeles N8HC 158,880-1060-74-22-B WA6LOW 62,540-370-71-24-A W6NOL 50,120-358-70-18-A W6RGS 47,742-327-73-21-A W6BDS 42,280-302-70-24-A KE6K 38,778-281-68-19-B W6BRXP 18,818-168-58-14-B W6EE 17,518-151-58-6-B W6BNFO 17,100-150-57-13-A KE6A 16,200-150-54-11-A W6CN 6,508-98-56-7-A W6CES 2,800-50-28-4-B W6X05 2,064-43-24-2-A W6RNN 340-21-20-1-A K6KH 440-20-11-1-A W6VPZ (11 oprs) 73,558-497-74-21-B W6BJE (+WA6FSF) 70,004-473-74-20-B

Orange K7EW 48,292-326-71-15-A W6TCO 33,642-267-63-12-A W6HDK 33,120-240-69-21-A W6RFR 27,470-205-67-18-A K6EYC 28,220-202-56-18-A N6IGUM 14,712-178-56-13-A

NX6M WBA6J KF60A (+ NV6K, W6AOWM) 147,752-1012-73-24-B WB6YPC (KJ6G, WM6H, oprs) 110,704-748-74-23-B	13,600-136-50-19-A 2,610-45-28-2-A 147,752-1012-73-24-B 110,704-748-74-23-B	W7MLJ W7GUR WB60SM K7GDN NK7U (+ N17T) 234,728-1586-74-24-B WB71XM (KA7s PGB, STQ, WHA, WB7NML, oprs) 50,688-396-64-24-B	38,360-274-70-19-A 24,400-161-61-12-B 17,214-151-57-19-A 9,604-98-49-8-A 234,728-1586-74-24-B 50,688-396-64-24-B	KCBPQ WBFN N8AK K8BL K8RD N8LL K8MR K8FU K8FK K8MMG N8CB N8DDL N80N K8DSM W8DAJF N8FEF K8S8K K8D8E K88JZ K8ANDC W8ARNC K8JDMG K8BYH K8UBE AF8C W8NHQ K8BO K8BVC W8ABMF W8DIXE K8BNI W8BDM K8BNEK W8VZE W8MIF W8B8KT W8B8JM (K8CMK, K8BM, K8BN, N8s ATR, D.CJ, DMH, W8DJU, oprs) W88JRK (+ W88s CCL, MZZ) W8BJL (+ W88s 080-1070-74-23-B W8BJ (10 oprs) 77,552-524-74-24-A W8BBTO (+ W88s MIP, PIY, ZYD) 144,200-925-68-10-B W8BADF (+ N88VGR, N88M, KA8UHH) 18,430-155-53-15-A	128,788-870-74-22-B 118,848-801-74-20-B 109,984-743-74-20-B 93,024-646-72-17-A 90,380-856-69-20-A 60,702-453-67-20-B 59,200-400-74-6-B 58,846-401-73-15-B 57,820-413-70-23-A 49,536-344-72-16-B 45,016-331-68-14-A 44,890-325-89-17-A 44,744-329-68-23-A 37,922-283-67-14-B 36,270-279-65-24-B 35,912-268-67-17-A 33,880-242-70-13-B 30,380-230-66-18-A 29,346-219-67-10-A 26,112-204-64-11-A 25,000-200-65-8-B 23,808-188-64-8-A 23,712-208-57-19-A 22,632-211-56-3-A 21,910-163-85-8-A 20,768-176-59-18-A 18,178-142-64-18-B 16,422-161-51-9-A 15,200-150-56-16-A 10,952-74-74-14-A 10,028-109-46-9-A 9,662-59-59-6-A 5,336-58-46-7-A 5,200-65-40-3-A 2,632-47-28-4-A 1,760-40-22-2-A W8B8JM (K8CMK, K8BM, K8BN, N8s ATR, D.CJ, DMH, W8DJU, oprs) W88JRK (+ W88s CCL, MZZ) W8BJL (+ W88s 080-1070-74-23-B W8BJ (10 oprs) 77,552-524-74-24-A W8BBTO (+ W88s MIP, PIY, ZYD) 144,200-925-68-10-B W8BADF (+ N88VGR, N88M, KA8UHH) 18,430-155-53-15-A	KK9V (+ KJ9D, KM9R) 213,564-1443-74-24-B NC9L (+ AJ9C, KE9J) 141,368-957-74-24-B W8REK (K8LYA, KA8IH, K8G9L, WA8s CGN, SMO, W89JUS, oprs) 46,080-322-70-24-A	103,368-708-73-19-B 82,868-554-71-14-B N8CBE 89,498-613-73-10-B AC9W 87,892-602-73-24-A K8FZG 80,582-562-73-24-A W8BYUC 78,192-543-72-14-B K8KX 65,820-520-63-7-B K8ST 47,058-341-69-14-A W88DHS 43,188-304-71-18-B W8ZZ 36,600-300-81-8-A K8BRX 32,930-251-85-14-A W8WDD 32,488-262-62-6-B N8ETU 30,240-240-63-16-A W8TFB 24,444-184-63-4-B W8BTU 24,156-198-61-7-A W8BZUR 23,908-192-62-9-A K8MHP 23,482-199-69-5-A K8BZC 21,576-186-58-7-A K8TO 18,800-140-60-5-A K8WT 14,872-143-52-3-A K8BC 14,152-125-58-17-B W8YHE 13,624-131-62-6-A N8BG 10,520-110-48-2-B W8WVW 9,900-100-48-3-A W8N6G 9,270-103-45-8-A W8WVW 4,080-58-35-4-A	WA2HF0 K8MNHJ N8CBE AC9W K8FZG W8BYUC K8KX K8ST W88DHS W8ZZ K8BRX W8WDD N8ETU W8TFB W8BTU W8BZUR K8MHP K8BZC K8TO K8WT K8BC W8YHE N8BG W8WVW W8N6G W8WVW	103,368-708-73-19-B 82,868-554-71-14-B 89,498-613-73-10-B 87,892-602-73-24-A 80,582-562-73-24-A 78,192-543-72-14-B 65,820-520-63-7-B 47,058-341-69-14-A 43,188-304-71-18-B 36,600-300-81-8-A 32,930-251-85-14-A 32,488-262-62-6-B 30,240-240-63-16-A 24,444-184-63-4-B 24,156-198-61-7-A 23,908-192-62-9-A 23,482-199-69-5-A 21,576-186-58-7-A 18,800-140-60-5-A 14,872-143-52-3-A 14,152-125-58-17-B 13,624-131-62-6-A 10,520-110-48-2-B 9,900-100-48-3-A 9,270-103-45-8-A 4,080-58-35-4-A	Wisconsin W1LUJ 99,504-891-72-24-A K8R8 87,984-811-72-19-B W24F9 87,780-827-70-9-B N89C 87,472-619-71-12-B N8K5 72,520-490-74-16-B K8QSH 71,280-540-68-20-B W8NA 54,800-403-88-10-A N8AKC 52,114-367-71-19-B N8AV 50,232-364-89-8-B N89L 48,508-362-67-15-A K1TMM 41,976-318-66-17-A K8R8 41,216-322-64-14-B W8B9HO 36,156-262-69-9-B W89YSO 30,200-275-64-21-A W8XT 31,476-258-61-5-B W89NKC 31,110-255-61-13-A N8AM 29,272-228-62-12-A W8UC9 23,598-171-69-6-B N8DMG 22,554-179-63-19-A K8B9D 16,432-158-52-6-A W8KHK 14,706-129-57-6-A K8B9D 12,700-120-53-8-A W84TW8 12,200-122-50-4-A W8VTL 9,506-97-49-11-B W89ZC 4,984-64-38-7-A K8ARW 476-17-14-2-A W8A8H (K8DFV, KM8O, W8ONL, W8ARW, oprs) 168,128-1136-74-24-B K89S (+ K10F) 150,380-1030-73-24-B W8YT (9 oprs) 147,312-1023-72-24-B N89U (KA8s OTD, TLY, K8SFW, K89NV, N89FO, N89U, oprs) 83,916-567-74-24-B	WA2HF0 K8MNHJ N8CBE AC9W K8FZG W8BYUC K8KX K8ST W88DHS W8ZZ K8BRX W8WDD N8ETU W8TFB W8BTU W8BZUR K8MHP K8BZC K8TO K8WT K8BC W8YHE N8BG W8WVW W8N6G W8WVW	Missouri K8KX (K8BY, opr) 269,736-1782-74-24-B KM8L 169,840-1080-74-24-B W8BHB 114,995-777-74-21-A K8UG 78,292-529-74-23-A W8BLU 46,472-314-74-19-A AC8N 39,900-285-70-8-B K8B8O 19,070-137-65-7-A K8OCU 14,280-119-60-6-A W8NTU 12,800-200-64-13-B K8PF 4,420-55-34-4-A W8EE (KA8s JJK, RBL, K8JON, N8USV, W8DEEL, oprs) 111,024-771-72-22-B KM8P (+ KM8R) 30,200-450-68-9-B	Nebraska K8SCM 155,490-1085-73-24-A K8VI 148,740-1005-74-24-A W88SYV 46,374-361-67-15-A N8GSO 38,080-272-70-21-B K85W 18,416-144-57-6-A	North Dakota W83PWL 208,124-1413-74-24-B K8BM 54,316-367-74-20-A K8BT 45,696-336-68-9-A K8OYN 29,618-251-59-17-A N8GCU 13,568-134-51-10-A W88DS (+ K8REP, N8FE, W8AOCU, W8BTE), oprs 113,864-768-74-24-B	South Dakota W8MWJ 155,052-1082-73-22-B K8VY (K8B8A, N8FLZ, W8BHF, oprs) 119,088-827-72-16-B	VE Maritime- Newfoundland VE1BEI 31,150-255-65-14-A VO1QST (VO1AW, opr) 8,800-100-44-8-A VE1AGE 7,524-99-38-8-B	Quebec VE2YU 35,915-246-73-24-B VE2DR 18,150-165-55-14-A VE2XL 15,860-174-45-13-A VE2MAB (12 oprs) 35,840-280-64-24-A	Ontario Y83XN 116,624-788-74-13-B Y83NYT 13,440-120-68-16-A Y83NE 1,536-42-19-4-A N8M3VES 40-5-4-1-A VE3GAS (+ VE3QB) 144,000-1000-72-16-B VE3NAR (16 oprs) 30,972-267-58-24-A	Manitoba VE4ALD 113,516-787-74-24-B VE4KN 48,512-379-64-16-A VE4GN 30,888-234-68-16-A VE4MC 13,200-120-55-7-A	Saskatchewan VE5GF 47,464-349-69-8-B VE5AG 29,078-217-67-20-B	Alberta VE6ATT 48,750-378-65-16-A	British Columbia VE7IN 108,770-745-73-18-A VE7AV 35,184-298-59-4-B VE7MS 11,132-121-48-9-A	Yukon-NWT VE8CM 28,760-223-60-16-B
---	--	---	---	--	--	---	---	---	--	---	---	---	---	--	--	--	---	--	---	---	---	--	--

Results, Ninth ARRL International EME Competition

By Michael B. Kaczynski, W1OD
Contest Manager, ARRL HQ

More and more amateurs are seriously gearing up for EME. Perigee is no longer the detriment it was several years ago. Although conditions weren't optimum for the ninth running of the ARRL International EME Contest, 138 participants gave it their best shot and entered the world's most popular EME operating activity. That's only 12 entries down from 1984's 150, when conditions were much more favorable. In late 1985, lunar perigee (the part of the lunar orbit where the moon is closest to the earth) just happened to line up with the new moon. Scheduling a contest on one of these weekends would cause participants to fight high sky noise. Optimum weekends with respect to low sky noise coincided with apogee (the point where the moon is the farthest from the earth, therefore the greatest path loss occurs). Toss in the necessary northern declination for a signal path between Europe and North America to further complicate the date selection process. Even our panel of EME enthusiasts who help us select the contest weekends couldn't agree on the "right" weekends.

Eighty-five 2-meter single-operator entries were submitted in 1985. This year's big score was turned in by one of moonbounce's superstations, W5UN. With 32 Yagis, Dave contacted 200 stations and 45 multipliers to turn in the contest's largest score, a record 900,000 points! KB8RQ reportedly took up mud wrestling to keep his new 32-Yagi array running. The effort proved worthwhile, as Gary went to the showers with 611k, for the contest's second largest score. YU3WV, WA1JXN/7 and OH7PI rounded out the single-op top five.

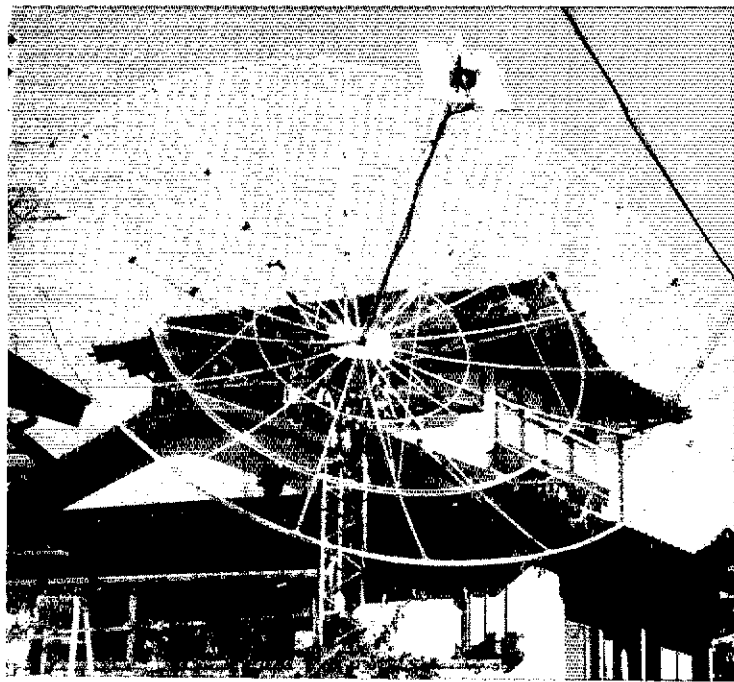
On 432, DL9KR was on top, with 86 QSOs and 32 multipliers, for a total of 275k. The race for second spot was close, with WA1RWU, F9FT (F5SE, opr) and K1FO within 7 QSOs of one another. JA6CZD worked 48 stations for number 5.

Action was also on the increase on 1296, with DK0UKW (DL9GS, opr) topping the charts with 23 QSOs and 20 multipliers for 46,000 points. Three other stations went single band 1296: OK1KIR (OK1DAI, opr), OE9FKI and OE5JFL.

The multioperator top five skipped back and forth across the Atlantic. DL8DAT and crew worked 144 stations and 42 multipliers for top honors. F6BSJ and crew collected 40 multipliers and 100 QSOs on 144 MHz for runner-up status. K2UYH (with K2TXB and WB2KMY) had equipment trouble, but nevertheless managed to work a total of 81 QSOs and 34 multipliers on 432 and 1296 for third position. G4EZN and gang were close behind, operating 144 and 432 MHz to the tune of 269 kilopoints. WA6MGZ rounded out the top five.

Thanks to all for sending in the great pictures and soapbox comments. We used as many as we could—too bad we couldn't print them all!

The next running of this contest will be held



JA4BLC used this antenna to work 26 stations on 432 MHz.

on October 25-26 and November 22-23, 1986. The International EME Competition is celebrating its 10th birthday in 1986. Why not help us celebrate by giving moonbounce a try? All you need to hear the big guns is a good ear, one Yagi and a multimode transceiver. Even if you don't manage to work anyone, reception reports are more than welcome. CU then!

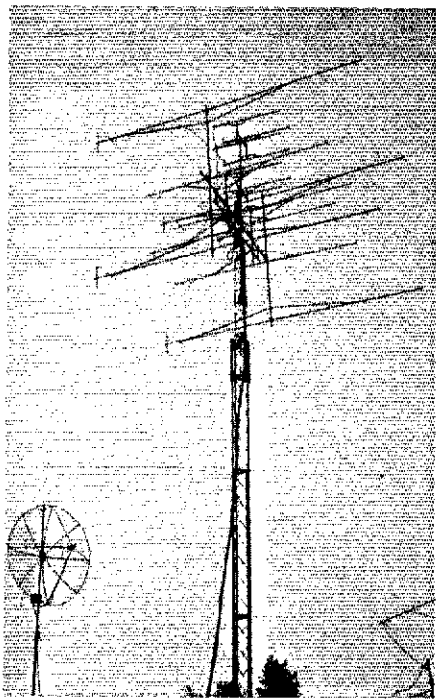
SOAPBOX

Conditions on 1296 were good, but I was disappointed not to find any Ws on for the last session.



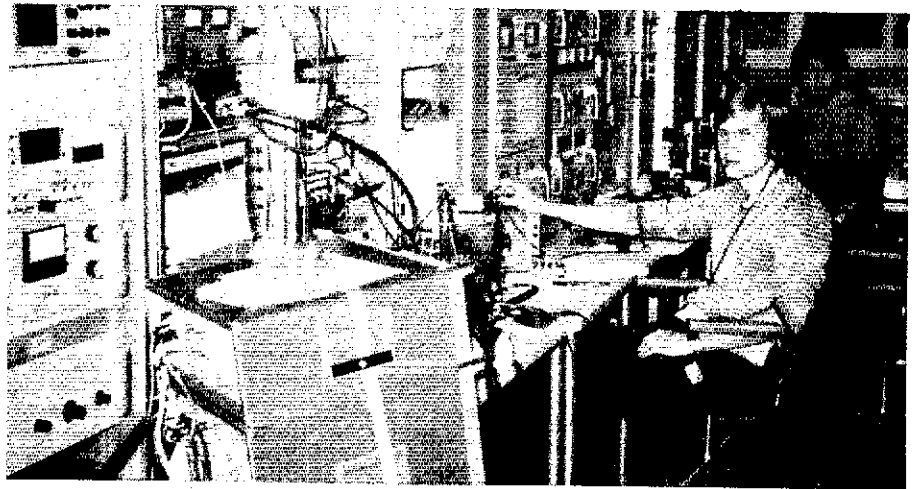
The operators of first-place multiop DL8DAT. From left to right are DK2PH, DF9CY, DL8DAT and DF7DJ.

I lost about 3 multipliers that way over last year. Condx on 432 were variable with strong polarization spreading 2000-2300 on the 23rd. Overall, activity seemed to be a little less than in '84 with several prominent calls missing (G3LTF). DL9KR on 432 and OE9XXI on 1296 are acting as very good beacons. They are active all the time and can even be heard several minutes before the end of the contest, doing a very good job (SM0PYP). Thanks for another FB contest! (DJ8QL). My apologies to all the stations calling that I could not copy due to conditions, which have generally been poor all fall. They were the worst that I have experienced during any of the EME contests over the last 4 years. My biggest thrill was working some of the smaller stations on random calls (W5UN). I was still working on the new array the day of the contest. I worked outside in the rain and mud to keep it running. The antenna system performed great, but there were mechanical bugs to work out. Conditions were poor, but there were a lot of new stations on. I worked about 45 new stations, but missed a lot of the other ones (KB8RQ). We had strong QRM from the Marconi CW Test on the second weekend (DL8DAT). I had bad luck this year with the rain and snow on my open-wire phasing system (YU3WV). It is nice to be back again after moving into a new QTH. My antenna is now a 35-ft dish 0.45fd. CU on the moon. I am now QRV on 70 cm. 73 (SM4IVE). I'm the new kid on the block, and my first contest started with a thunderstorm. After a couple of hours it quieted down and conditions were good. Then it was hard to tell who was calling whom. For the most part conditions were bad, but now I feel that I can send QRZ faster than anyone (N5BLZ). A good example of poor condx was when the 2-m beacon (W5UN) completely disappeared for hours, and then reappeared with very weak signals. After the contest ended, I was able to work W5UN and WA1JXN on SSB. Quite a change from earlier conditions (K9MRI). Poor conditions, aurora and



F1FHI used this array to work 63 stations and 50 multipliers for a third-place single-op, multiband finish.

local QRM made QSOs difficult but great fun all the same. Best wishes to all in 1986 (GM4IPK). Either conditions were extremely poor both weekends or my system needs work! I suspect the latter (W5UWB). I worked 3 new stations and 2 new countries (GM4JJJ). I heard much more activity last year as an SWL. I'll be back—I'm hooked! (K9SR). Boy, W5UN sure makes it easy to peak up the array!



This setup afforded the operators of OH2TI a number 7 finish in EME Test number 9. Shown here are OH6DD (foreground) and OH6EH.

(KC4EG). A freak windstorm on 5 November tore the tower and antennas off the roof and dumped them in my yard (yes indeed, the array was big enough!) (W1AIM). I had a fantastic time in this, my first EME contest. I got the EME system running for the first time just before the contest. What an introduction! There were dozens of signals, and people actually answered my CQs. I probably would not have gotten on EME by now if the contest hadn't been such a good incentive (W9IP/2). I hope to have a new antenna up next time. I have already started building it! (DF9CY). We were actually set up to operate 144, 432 and 1296 at the flick of a switch. However, Murphy struck hard this year when it came to the EME Contest. The net result is a score which is less than half of last year's score. There's always next year! (K2UYH). We will be looking forward to next year's contest, when the memory of this year's fades away (G4EZN).

Apogee, high sky noise and Murphy in the PA reduced the score on the first weekend. Again apogee, sky noise and long periods of Faraday lockout bothered us the second weekend (WA6MGZ). We were trying our new amp and didn't hope to do very well. All worked okay (OZ1EME). Enjoyed our first EME contest. Because of terrestrial noise we couldn't utilize low elevation angles. Propagation was favorable at the end of the contest, as we managed to work a few stations on SSB (OH6DD, opr OH2TI). Our QSO with W5UN was just like a local tropo QSO. A kilowatt amplifier is under construction and will probably be finished in the spring of 1986 (LA2REA, opr LA2AB). I could only put 4 hours into the contest with the NASA 26-m dish. The first Sunday on 432 was great. The band sounded like 20 meters. I even had a JA pileup! Next year more time with more power (KL7RA).

Scores

Scores list: call, score, stations heard, stations worked, multipliers, band (A—50 MHz, B—144 MHz, C—220 MHz, D—1296 MHz, E—2304 MHz).

Single Operator, Multiband

HB9SV	270,600-	39- 39-22-B	18- 17-10-D	10- 10- 9-E
N4GJV	173,600-	18- 18-13-B	38- 38-18-D	13- 13- 7-B
F1FHI	125,000-	50- 37-18-D	39- 30-17-D	13- 13- 9-E
G3LTF	111,800-	7- 7- 7-B	23- 23-13-D	11- 11- 9-D
SM3AKW	60,000-	10- 10- 8-E	4- 1- 1-B	22- 16-11-D
F2TU	33,600-	5- 5- 2-D	10- 10- 8-E	5- 5- 2-D
JABJCJ	20,400-	7- 7- 7-E	7- 7- 4-D	6- 6- 6-E
VE7BBG	15,000-	8- 8- 6-D	2- 2- 2-E	
SM8PYP	13,200-			
DJ8QL	13,000-			
K4QIF	8,000-			

Single Operator, 144 MHz

W5UN	900,000-200-200-45-B
KB8RQ	610,900-149-149-41-B
YU3WV	575,400-150-137-42-B
WA1JXN/7	540,000-135-135-40-B
OH7PI	255,000- 75- 75-34-B
SM4IVE	244,200- 74- 74-33-B
SM4GVF	234,600- 89- 89-34-B
KD8SI	162,000- 60- 60-27-B
N5BLZ	142,500- 57- 57-25-B
K9MRI	97,500- 39- 39-25-B
VE1ALQ	78,200- 34- 34-23-B
OK1MS	66,600- 37- 37-18-B
KB7Q	57,000- 30- 30-19-B

OZ4MM	57,000-	30- 30-19-B	WA7LYI	3,000-	6- 6- 5-B
W7FN	56,000-	48- 28-20-B	UA6BDC	2,500-	5- 5- 5-B
UA1ZCL	55,800-	31- 31-18-B	UA6YB	2,500-	5- 5- 5-B
W7HAH	55,800-	44- 31-18-B	WA1OUB	2,500-	10- 5- 5-B
F9HS	52,200-	29- 29-18-B	HG1YA	2,000-	5- 5- 4-B
DJ7UD	47,600-	34- 28-17-B	EA3DXU	1,800-	4- 4- 4-B
DK2PH	44,200-	28- 28-17-B	KC4EG	1,800-	4- 4- 4-B
SM5CFS	39,000-	26- 25-15-B	DL2LAH	900-	3- 3- 3-B
WDSAGO	37,500-	26- 25-15-B	WA6VJB	900-	4- 3- 3-B
OZ1GFX	37,400-	22- 22-17-B	WA7PDC	900-	3- 3- 3-B
Y2ZME	36,800-	23- 23-16-B	WB4WTC	900-	4- 3- 3-B
W5SUS	34,500-	23- 23-15-B	WA3TTS	800-	4- 3- 2-B
VE1UT	30,000-	20- 20-15-B	AF1T	400-	2- 2- 2-B
GM4IPK	28,500-	33- 19-15-B	DF7F	400-	2- 2- 2-B
WA1VTA	25,200-	18- 18-14-B	DL2OM	400-	2- 2- 2-B
WSUWU	24,700-	19- 19-13-B	N1BO	400-	3- 2- 2-B
UA3TCF	23,400-	24- 18-13-B	SP5CJT	400-	2- 2- 2-B
WD4DGF	22,800-	19- 19-12-B	N8BJN	100-	1- 1- 1-B
WB8QMN	22,100-	20- 17-13-B	VE3EQO	100-	1- 1- 1-B
W8RWH	21,800-	18- 18-12-B	W1AIM	100-	11- 1- 1-B
GM4JJJ	20,800-	27- 16-13-B	WB8VVM	100-	1- 1- 1-B
SM5DGS	20,800-	16- 16-13-B	WA7JJO	100-	1- 1- 1-B
SM5CPD	18,000-	15- 15-12-B	WA7KYM	100-	1- 1- 1-B
KG6DX	17,800-	16- 16-11-B	WB9MSV	100-	7- 1- 1-B
EA2LU	16,800-	23- 14-12-B			
DK9IP	13,000-	13- 13-10-B			
SM3LBN	12,000-	12- 12-10-B			
UA6LJV	9,000-	10- 10- 9-B			
ZS9ALE	8,100-	9- 9- 9-B			
K6CH	7,000-	10- 10- 7-B			
DL3SAS	6,400-	8- 8- 8-B			
WB8V	5,400-	8- 8- 8-B			
WB8ART	6,300-	9- 9- 7-B			
I2FAK	5,600-	13- 8- 7-B			
K9SR	5,400-	9- 9- 6-B			
KC3LZ	4,900-	7- 7- 7-B			
H9BNI	4,200-	18- 7- 6-B			
WB9BZ	4,000-	6- 5- 8-B			
SM6DHD	3,600-	6- 6- 6-B			
YU1POA	3,800-	14- 6- 6-B			

Single Operator, 432 MHz

DL9KR	275,200-	86- 86-32-D			
WA1RWU	151,200-	89- 63-24-D			
F9FT (FSSE, opr)					
	145,800-	58- 58-26-D			
K1FO	140,300-	61- 61-23-D			
JA6CZD	120,000-	48- 48-25-D			
DJ8MB	111,300-	59- 53-21-D			
DF3RU	76,000-	48- 40-19-D			
F1FEN	76,000-	41- 40-19-D			
JA4BLC	41,600-	26- 26-16-D			
VK75A (VK3UM, opr)					
	40,300-	31- 31-13-D			
ISMSH (IS7DJ, opr)					
	27,600-	23- 23-12-D			

W9IP/2	19,200-	16- 16-12-D			
OH2GD	15,000-	15- 15-10-D			
W8RAP	15,000-	15- 15-10-D			
DJ9BV	12,800-	14- 14- 9-D			
WB5AFV	11,000-	22- 11-10-D			
EA6KF	7,700-	16- 11- 7-D			
DL2CJ	6,600-	11- 11- 6-D			
W8IDU	6,300-	11- 7- 9-D			
JR4AEP	4,000-	8- 8- 5-D			
DF7VX	3,500-	13- 7- 5-D			
DF9CY	3,000-	6- 6- 5-D			
JA8BOH	3,000-	14- 6- 5-D			
K8KE	2,000-	9- 5- 4-D			
OK1UV	1,800-	4- 4- 4-D			

Single Operator, 1296 MHz

DK8JKW (DL9GS, opr)	48,000-	23- 23-20-E			
OK1KIR (OK1DAI, opr)	19,200-				
	18,000-	18- 16-12-E			
		1- 0- 0-F			
OES9FKJ	10,000-	10- 10-10-E			
OESJFL	2,500-	7- 5- 5-E			

Multioperator

DL8DAT (+ DK2PH, DF9CY, DF7DJ)	582,200-	141-141-42-B			
F8BSJ (+ F8s GBY, HLC, HYE)	400,000-	100-100-40-B			
K2UYH (+ K2TXB, WR2KMY)	275,400-	71- 71-27-D			
		10- 10- 7-E			
G4EZN (+ G3s CWL, IOR, GBVLL)	268,800-	10- 10- 9-B			
		66- 63-25-D			
WA6MGZ (+ KR5F)	165,300-	82- 57-29-B			
OZ1EME (OZs 1FTU, 2GZ, 5IQ, oprs)	110,000-	44- 44-25-B			

OH2TI (OH1s EU, QC, ZAA, OH2BGN, OH6s DD, EH, oprs)	38,000-	67- 49-20-D			
WB8DRL (NB0s WA8TKJ, oprs)	32,000-	41- 41-20-B			
W8SD (+ WB8s PJB, TEM)	62,000-	31- 31-20-D			
FIELL (+ FD1HTBI)	25,200-	21- 21-12-D			
EA3MM (EA3s AGJ, APN, BTZ, DBQ, EHQ, LL, MD, RU, EB3SYT, oprs)	24,700-	33- 19-13-B			
HG1W (HG1s WF, YA, YU, oprs)	19,800-	18- 18-11-B			
I2COR (+ I2s TFI, YID, IW2ATM)	17,000-	17- 17-10-D			
H89BM (H89s BGN, MZQ, VI, oprs)	18,800-	14- 14-12-E			
KF8M (+ KB8DW, KC8J, N8FUJ, WA8VJF)	15,000-	15- 15-10-B			
4U1TU (G3NAO, H89CUY, oprs)	4,900-	7- 3- 6-B			
JH0YSI (JA8s CZD, HU, HVL, HXV, RWF, JH8s KOE, RWF, UDY, oprs)	4,800-	1- 0- 0-B			
		13- 8- 6-D			
LA2AB (LA2s 2REA, 8KV, 9CY, oprs)	2,500-	15- 5- 5-B			
U28LXN (UA6s LGO, WDN, oprs)	900-	3- 3- 3-B			
CE3AA (CE3s DZ, EDJ, G6J, GUD, IW, oprs)	100-	1- 1- 1-B			

Non-Amateur Equipment

KL7RA	24,700-	26- 19-13-D			
-------	---------	-------------	--	--	--

Rules, June VHF QSO Party

The rules for this year's June VHF QSO Party are similar to last year's, with two exceptions: Rule 7(I) and the mailing deadline, Rule 8. Please read these over carefully before entering.

Multipliers for this year's contest will be grid squares ($2^\circ \times 1^\circ$ Maidenhead grid-square locators) worked *per band*. See Rules 4 and 5. Information on determining your grid-square locator can be found in January 1983 *QST*, beginning on page 49. Grid-square maps are available from ARRL HQ for \$1. Here's a chance for you mountaintoppers to seek out those rare grid squares and be "King of the Hill."

While the Contest Advisory Committee is considering the adoption of a new QRP portable category, would some of you like to give it a trial run in this contest? The idea is to encourage operating from locations difficult to access, such as mountaintops (in rare grid squares). You may even have to backpack to get there. Run no more than 10 watts output, meet the spirit of this category and be sure to tell us about your adventures. For honest efforts we'll even make up some special certificates. Fair deal, eh?

Official summary sheets and log sheets are available from ARRL HQ for an SASE and all entrants should send for a set. Good luck from FN31!

Rules

1) **Object:** To work as many amateur stations in as many different $2^\circ \times 1^\circ$ grid squares as possible using authorized amateur frequencies above 50 MHz.

2) **Contest Period:** Begins 1800 UTC Saturday, June 14 and ends at 0300 UTC Monday, June 16.

3) Categories:

(A) **Single operator:** One person performs all operating and logging functions.

(1) *Multiband.*

(2) **Single-band:** Single-band entries on 50, 144, 220, 432, and 1296-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(B) **Multioperator:** Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Grid square locator (see Jan 1983 *QST*, page 49). Example: W1AW in Newington, CT would send FN31. Exchange of signal reports is optional.

5) Scoring:

(A) **QSO points:** Count one point for each complete 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count three points for each QSO on 902- or 1296-MHz QSO. Count four points for each 2.3-GHz-or-higher QSO.

(B) **Multiplier:** The total number of different grid squares worked *per band*. Each $2^\circ \times 1^\circ$ grid square counts as one multiplier on each band it is worked.

(C) **Final Score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example)

6) Use of FM:

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or

VHF-UHF-EME LOG							log sheet <u>1</u> of <u>2</u>	
CALL USED <u>VE3DCK</u>							ARRL SECTION or COUNTRY <u>Ont.</u>	
<u>6/14/86</u>							Grid square <u>FN03</u>	
50 QSOs per side Number each new multiplier as worked								
FREQ	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE		LIST NEW MULTIPLIERS	POINTS	
				SENT	RCVD			
144	AU43	0145	VE3AQS	FN03	FN03	FN03	1	
		0157	K10XB	"	FN11	FN01	1	
		0257	W2EBS	"	FN12	FN12	1	
		0343	K2GK	"	FN12		1	
		0423	NF2L	"	FN20	FN20	1	
		0428	VE3TBU	"	FN04	FN04	1	
		0443	W2CNS	"	FN13	FN13	1	
		0454	N2LW	"	FN13		1	
		0459	W2IDU	"	FN13	FN13	1	
		0507	K3UNW	"	FN19	FN19	1	
		0735	VE3CEM	"	FN25	FN25	1	

Properly completed sample log sheet.

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (x1)	25	10
144	40 (x1)	40	20
220	10 (x2)	20	5
432	15 (x2)	30	10
1296+	6 (x3)	18	3
Totals	96	133	48

Final score = (QSO points) x (total no. grid squares):
(6384 = 133 x 48).

repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58; and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory*, may be used for contest purposes.

7) Miscellaneous:

(A) Stations may be worked for credit only once per band from any given grid square, regardless of mode. Crossband QSOs do not count. This does not preclude working a station from more than one grid square with the same call sign.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) Fixed, portable or mobile operation under one call from one $2^\circ \times 1^\circ$ grid square only is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1 1/4, etc) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 MHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

(I) 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.

8) **Reporting:** Entries must be received no later than 30 days after the end of the contest (July 16, 1986). No late entries can be accepted.

9) Awards:

(A) Single operator

(1) Top single-operator score in each ARRL Section.

(2) Top single operator on each band (50, 144, 220, 432 and 1296-and-up categories) in each ARRL Section where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WB0TEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single op's, he will earn a certificate for being the single-operator Section leader and endorsement stickers for 50 and 220 MHz.

(B) Top multioperator score in each ARRL Section where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

10) **Condition of Entry:** Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) **Disqualifications:** See January 1986, *QST*, page 94.

MAY

3-4

Florida QSO Party, Apr QST, p 80.
County Hunters SSB Contest, Apr QST, p 80.
Great Armadillo Run, Apr QST, p 73.

7

West Coast Qualifying Run, 10-35 WPM, at 0400Z May 8 (9 PM PDT May 7). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

8

ARRL Spring Sprint, 1296 MHz, Mar QST, p 95.

10-11

A. Volta RTTY DX Contest, Apr QST, p 80.
Southern California 6-Meter Club QSO Party, Apr QST, p 80.

CQ-M Contest (Peace to the World), sponsored by the Krenkel Central Radio Club of the USSR, from 2100Z May 10 until 2100Z May 11. CW and phone, 3.5 through 28 MHz. Amateur satellites count as a separate band if a 144- to 28-MHz mode is used. Work stations once per band, regardless of mode. No cross-mode QSOs. Categories: single op, single band; single op, all band; multiplier, single transmitter (all bands); SWL. Exchange signal report and serial number. Avoid lower 5 kHz of 80/40 meters and lower 10 kHz of 20/15 meters. Count one point per QSO within your continent, 3 points for other continents. QSOs with your own country count for multiplier credit, but have no point value. Multiply total QSO points by the sum of different countries (R-150-S country list) worked per band. The R-150 list is basically the same as the ARRL countries list except for USSR countries. Serious competitors should review the R-150 list. Awards. Mail logs by Jul 1 to CQ-M Contest Committee, PO Box 88, Moscow, USSR.

New York State QSO Party, sponsored by the Salt City DX Assn, from 1600Z May 10 until 0400Z May 11. Work the same station on each band and mode for QSO points. Exchange: RS(T) and QTH, (country for NY stations; state, province or country for others). Count one point for phone QSO, two points for CW QSO and five points for Novice/Tech CW QSO. For the final score, NY stations multiply total QSO points by number of states, provinces and countries worked; others use NY counties for multipliers. Suggested frequencies: phone—3,900 7,250 14,250 21,350 MHz; CW—3,550 7,050 14,050 21,050 MHz; Novice—10 kHz up from lower band edges. Awards. SASE for results. Mail before Jul 15 to John Carioti, K2ZJ, 3720 Dutchman Dr, Baldwinville, NY 13027.

12

WIAW Qualifying Run, 10-35 WPM at 0200Z May 13 (10 PM EDT, May 12). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See May 7 listing for more details.

17

ARRL Spring Sprint, 50 MHz, Mar QST, p 95.

17-18

Armed Forces Day. This year marks the 37th anniversary of communications tests between the Amateur Radio community and the Military Communications System. Special commemorative QSL cards will be issued to amateurs achieving a verified two-way radio contact with any of the participating military radio stations. Those who receive and accurately copy the Armed Forces Day CW and/or RTTY message from the Secretary of Defense will receive a special commemorative certificate.

Cross-band Radio Contacts. The military-to-amateur cross-band operations will be conducted from 1300Z May 17 until 0245Z May 18. Military stations will transmit on military frequencies and will announce the

specific amateur-band frequencies being monitored. Limit contacts to three minutes. The following stations will transmit on the designated frequencies: *AAE*, Fort Sam Houston, TX: LSB—4021.5 kHz, 7309.5 kHz; CW—9990 kHz; USB—20,992.5 kHz; RTTY—9990 kHz. *AAG*, Presidio of San Francisco, CA: LSB—4023.5 kHz; CW—6988 kHz, 13,994.5 kHz; RTTY—13,994.5 kHz. *AIR*, Washington, DC: LSB—4025 kHz, 7315 kHz; CW—6995.5, 13,997.5 kHz; RTTY—7306.5 kHz, 13,986.5 kHz; USB—14,408 kHz. *NAM*, Norfolk, VA: varied emissions—14,400 kHz. *NAV*, Cheltenham, MD: RTTY—7372.5 kHz; SSTV—14,389.5 kHz. *NMH*, Alexandria, VA: CW—4015 kHz; LSB—7346.5 kHz; RTTY—14,440 kHz; USB—20,937.5 kHz. *NAN*, Portsmouth, VA: varied emissions—7393 kHz. *NPG*, Stockton, CA: LSB—4001.5 kHz, 7301.5 kHz; CW—4010 kHz, 6970 kHz, 7365 kHz, 10,259.5 kHz, 13,975.5 kHz, 20,998.5 kHz; RTTY—13,927.5 kHz; USB—14,375 kHz, 21,460 kHz. *NPL*, San Diego, CA: RTTY—7382.5 kHz; SSTV—14,385 kHz. *NZJ*, El Toro, CA: RTTY—7375 kHz; USB—14,480 kHz. *WAR*, Fort Meade, MD: LSB—4018.5 kHz; CW—6997.5 kHz, 13,992.5 kHz; USB—14,403.5 kHz, 20,995.5 kHz; RTTY—13,992.5 kHz.

CW Receiving Test. Conducted at 25 WPM. A 10-minute call-up will begin at 0250Z May 19, followed by the text at 0300Z. The following stations will transmit the message on the indicated frequencies: *AAE*, Fort Sam Houston, TX: 4018.5, 6988 and 9990 kHz. *AAG*, Presidio of San Francisco, CA: 4021.5, 7309.5 and 13,994.5 kHz. *AIR*, Washington, DC: 6995.5 and 13,997.5 kHz. *NAM*, Norfolk, VA: 4005, 7393 and 14,400 kHz. *NAV*, Cheltenham, MD: 7372.5 and 14,389.5 kHz. *NPG*, Stockton, CA: 4010, 7365 and 13,927.5 kHz. *WAR*, Fort Meade, MD: 4028.5, 6997.5 and 14,403.5 kHz.

RTTY Receiving Test. Transmitted at 60 WPM using 170-Hz shift. A 10-minute call-up will begin at 0335Z May 20, followed by the text at 0345Z. Stations and frequencies are the same as for the CW receiving test (see above).

Submit CW and RTTY test messages exactly as received. Indicate time, frequency and call letters of station copied. On the same page as the message text, include your name, call sign and complete mailing address. Entries must be post-marked by May 24. Stations copying *AIR* send entries to Armed Forces Day Test, 2045ISG/DOJM, Andrews AFB, DC 20331-6345. *AAE*, *AAG* or *WAR* entries go to Armed Forces Day Test, Commander, USAISC, ATTN: AS-OPS-OA, Ft. Huachuca, AZ 85613-5000. *NAM*, *NAV* or *NPG* entries go to Armed Forces Day Test, Naval Communication Unit, Washington, DC 20390-5161.

Michigan QSO Party, sponsored by the Oak Park ARC, from 1800Z May 17 until 0300Z May 18 and 1100Z May 18 until 0200Z May 19. Work stations once per band and mode. MI-to-MI QSOs allowed. Work portables/mobiles again as they change county. No repeater QSOs. Exchange signal report, QSO number and QTH (county for MI stations, state or country for others). Suggested frequencies: CW—1,810 3,540 7,125 7,035 7,125 14,035 21,035 21,125 28,035 28,125; phone—1,855 3,905 7,280 14,280 21,380 28,580 50,125 145,025 146,52. Count one point per phone QSO and two points per CW QSO. MI stations multiply by sum of states, countries and MI counties worked (max 85). Others multiply by number of MI counties worked (max 83) QSOs with club station W8MB count five points. VHF-only entrants may add multipliers from each band for total multiplier. Mail logs by Jul 1 to Mark Shaw, K8ED, 3810 Woodman, Troy, MI 48084.

ARI Italian International Contest, sponsored by the Associazione Radioamatori Italiani, from 1600Z May 17 until 1600Z May 18. Work Italian stations including San Marino, Vatican City and SMOM, once per mode and band. Classes: single operator, CW; single operator, SSB; single operator, mixed mode; multiplier, single transmitter; and SWL. Bands: 28 21 14 7 3.5 1.8 MHz. Exchange RS(T) and QSO number starting with 001. Italian stations will send RSCT) and two letter (province). European stations count 2 points per QSO with Italian stations. Non-European stations count 4 points per QSO with Italian stations. Multipliers are Italian provinces. Work once per band. Final score is total of QSO points times total of multipliers. Use separate logs per band. Include summary sheet. Awards. Send logs before 40 days after the

either Giorgio Beretta, I2VXJ, via Sciesa 24, 20135 Milano, Italy or to Contest Manager, c/o ARI, via Seariati 31, 20124 Milano, Italy.

18

Abegweit Award Contest, sponsored by the Prince Edward Island ARA, from 1200Z until 2400Z, May 18. VE1 and VO1 stations must confirm contacts with Prince, Queens and Kings Counties. All other VE/W stations must confirm contact with any three PEI stations, regardless of the county. All DX must confirm contacts with any two PEI stations, regardless of the county. Frequencies will be: CW—3,700 7,100 14,050 21,100; phone—3,800 7,200 14,250 21,300. Awards. Send a copy of your log (certified by two other Amateurs) to PO Box 1232, Charlottetown, Prince Edward Island C1A 7M8, Canada.

24

WIAW Qualifying Run, 10-35 WPM, at 2000Z (4 PM EDT) May 24. See May 7 and 12 listings for more details.

24-25

CQ World Wide Prefix Contest, CW. See Mar QST, p 95, for details.

27-28

CLARA AC/DC "Mystery" Contest, sponsored by the Canadian Ladies ARA, from 1800Z May 27 until 1800Z May 28. Work each CLARA station twice, once on CW and once on phone, or the same mode on two different bands. No cross-mode or repeater contacts. Exchange name, serial number starting with 001, RS(T), QTH and if a CLARA member. Three "mystery" stations will be operating. Suggested frequencies: CW—3,690 7,035 14,035 21,035 28,035; phone—3,900 3,775 7,150 14,280 14,160 21,300 28,588 28,488. CLARA members count 1 point per contact with non members, count 2 points per member contact and count 3 points for CW contacts. Nonmembers work CLARA members only. Count 2 points for each CLARA contact and 3 points for CW contacts. Multiply points by the number of Canadian provinces and territories worked for the total score. The Contest Manager will add 10 points to the base score of each log for every "mystery" station worked. Mail logs to be received before Jul 15 to Muriel Foisy, VE7LQH, RR 1, Pender Island, BC V0N 2M0, Canada.

31-Jun 1

National 6-Meter Invitational Net Activity Day Contest (SIN), from 1400Z May 31 until 2400Z Jun 1. Open to all 6-meter operators. Exchange call, SIN number and grid square. Count 3 points per QSO with SIN member and 2 points per QSO with non-member. Final score is sum of QSO points times number of different grid squares worked. Certificates. Send logs by Jul 1 to Lisa Lowell, KA0NNO, PO Box 249, Ft Lupton, CO 80621.

JUNE

3

West Coast Qualifying Run, 10-35 WPM, at 0400Z Jun 4 (9 PM PDT Jun 3). See May 7 listing for more details.

10

WIAW Qualifying Run, 10-40 WPM, at 0200Z Jun 11 (10 PM EDT June 10). Refer to May listings for more details.

14-15

ARRL June VHF QSO Party, this issue p 88.

All Asian DX Contest, phone.

SMIRK QSO Party

23

WIAW Qualifying Run

28-29

Field Day, this issue, p 79.

Special Events

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

Echols County, Georgia: The South Georgia ARC will operate WA4NKL 1700Z-2300Z May 3 on a special expedition to Echols County for the County Hunters Assn. Operation will be in the lower portions of the General phone and CW bands, also Novice bands. Send QSL and SASE to WA4NKL, Rte 2 Box 317, Quitman, GA 31643.

Rockaway, New York: The Rockaway ARC will operate K2UHD 1500Z May 3 until 2100Z May 4 to commemorate the 300th anniversary of the founding of the Rockaways. Operation will be in the Novice and General phone and CW bands. For certificate send 9- \times 12-in SASE (44 cents) to Rockaways ARC, K2UHD, PO Box 214, Rockaway Park, NY 11694.

Arkansas: Several ARCs in Arkansas will operate special-event stations 1400Z-2400Z May 3 to commemorate the Sesquicentennial. Operation will be 40 and 20 General phone and CW bands, and 40-meter Novice band. Send QSL and SASE to PO Box 1793, N Little Rock, AR 72115.

Spartanburg, South Carolina: The Spartanburg ARC will sponsor the Spartanburg Spring Fling using club call K4JLA. Operation will be 1500Z-2200Z daily, May 3-4. Phone operation will be on 40-15 meters, up 10 kHz from the lower edge of the General bands, and CW on 7.115 MHz. Send a large SASE to Spartanburg ARC, 385 S Spring St, Spartanburg, SC 29301.

Albany, New York: The Albany ARA will operate K2CT and other members calls May 9-11 to celebrate the Tulip Festival and Pinksterfest during the Tricentennial Events. Certificates and awards available. For Special QSL or further information send to Michael Kardos, K2QF, 1 Fiddlers Ln, Rensselaer, NY 12144.

Nijverdal, Netherlands: The Nijverdal hams will operate PA6NYV or PA3CWG/A 1300Z-1900Z May 9-13 to celebrate the 150th anniversary of Nijverdal. Operation will be CW, SSB, RTTY and SSTV in the HF, VHF and UHF bands. Special QSL for a contact plus 1 IRC and certificate for 3 contacts with Nijverdal stations plus 3 IRCs via R Teesselink, PA3CWG, Grote Straat 110, 7443BL Nijverdal, Netherlands.

Hopkinsville, Kentucky: The Pennyroyal ARS will operate a special-event station 1400Z-2200Z May 10 to celebrate the Little River Days Festival. Suggested frequencies: phone—3.940 7.240 14.240; CW—7.110. For certificate send QSL and SASE to PARS, PO Box 1077, Hopkinsville, KY 42240.

Ship Island, Mississippi: The Pearl River ARC will operate W5Y 1500Z May 10 until 0200Z May 11 from Ft Massachusetts. Operation will be 7.280 and 14.295. Certificate for SASE via Rte 6 Box 326A, Picayune, MS 39466.

Fairfield, Connecticut: The Greater Fairfield ARA will operate WB1CQO 1300Z-2200Z May 10 during the 51st annual Dogwood Festival. Frequencies are 3.975 7.235 14.330 21.420. Send SASE for certificate via FARA, PO Box 1364 SM, Fairfield, CT 06430.

Owensboro, Kentucky: The Owensboro ARC will operate K4HY 0000Z May 10 until 0530Z May 11 to celebrate their International BBQ Festival. Operation will be 7.245 phone. Certificate for SASE via N4EKG, 1615 E 23rd St, Owensboro, KY 42301.

Fairmont, West Virginia: The Mountaineer ARA will operate W8SP 0030Z May 10 until 0030Z May 11 in celebration of the Three Rivers Coal Festival. Opera-

tion will be 80-20 meter General and Novice bands. Certificate for QSL and SASE via John Mason, KA8RHJ, 1314 Locust Ave, Fairmont, WV 26554.

Walla Walla, Washington: The Walla Walla ARC will operate W7DP May 12-18 to commemorate Marcus and Narcissa Whitman and their major contribution to the American nation's westward expansion. Frequencies and times: 146.40 FM—1600Z-0800Z; 50.110 USB—around the clock; 14.260—2000Z-0800Z; 7.260—2000Z-0800Z; 3.987—0100Z-1000Z; 3.725—0100Z-1000Z; 1.890—0400Z-0600Z. An 8.5- \times 11-in certificate for SASE and your QSL will be returned using a special commemorative envelope with a 4 cent stagecoach and 11 cent surry stamps with special cancellation. For further information contact W7DP. Send SASE to W7DP, PO Box 321, Walla Walla, WA 99362.

Dubuque, Iowa: The Great River ARC will operate WB0GNV 1600Z-2200Z May 17 to commemorate Dubuque Festival Days. Send QSL for brochure and QSL via WB0GNV, 1795 Hale St, Dubuque, IA 52001.

Omaha, Nebraska: The AKSARBEN ARC will operate W0EQU 1400Z-2300Z May 17 from the Strategic Air Command Museum to celebrate Armed Forces Day. Operation will be in the lower 25 kHz of the 10-80 General bands. Send QSL and SASE to AKSARBEN ARC, W0EQU, Box 291 DTS, Omaha, NE 68101.

Millington, Tennessee: Sailors and Marines will operate W4ODR 1400Z-2200Z May 17 in recognition of the 37th Armed Forces Day. Frequencies: phone—7.230 14.280 21.370 146.52; CW—21.145 28.145. Certificate for a contact. No SASE required. Those not in the *Call Book* should QSL via Military Club Station W4ODR, PO Box 54278, Naval Station Memphis, Millington, TN 38054.

Wilmington, North Carolina: The US Naval Reserve Readiness Command will operate W4NUS 1400Z May 17 until 0200Z May 18 from aboard the battleship USS North Carolina. Frequencies: phone—7.230 14.230; CW—7.030 7.130 14.030. SASE not required. QSL to USS North Carolina, Box 417, Wilmington, NC 28406.

Waterbury, Connecticut: The Waterbury ARC will operate KA1YP during daylight hours May 17-18 from Holy Land, USA. Operation will be 40-15 meters SSB. Send QSL and SASE to Richard Jacovino, KA1YP, 101 Woodbine St, Waterbury, CT 06705.

York, Pennsylvania: The York ARC will operate W3EDU 1400Z-2400Z May 17 and 1400Z-1900Z May 18 from the site of the Colonial Court House to commemorate York as the home of the Continental Congress from Sep 30, 1777 until Jun 27, 1778. Suggested frequencies: 3.875 7.175 14.250 21.350 28.550. For certificate send QSL and 3 stamps to Millard Martin, 2070 Thelon Dr, York, PA 17404.

St Charles, Missouri: The St Charles ARC will operate WBHSH May 17-18, 1300Z-2100Z each day from the annual Lewis and Clark Days Festival. Operation will be near the lower edge of the 40-10 meter General phone bands. For certificate send large SASE to St Charles ARC, PO Box 1429, St Charles, MO 63302.

Saginaw, Michigan: The Saginaw Valley ARA and the Bay Area ARC will operate K8DAC and N8GKM 0000Z May 17 until 2400Z May 18 to commemorate the Zilwaukee Bridge in conjunction with Michigan Week. Operation will be on all bands and modes. A certificate for contacting both stations or a QSL for

contacting either station for a no. 10 SASE via PO Box 1783, Saginaw, MI 48605-1783.

St Louis, Missouri: The Union Electric HRC will operate KA6AWS 1800Z-2300Z May 18 honoring the employees of the Union Electric Co. Operation will be 25 kHz from the lower edges of the 80-20 General bands, 29.620/520 FM and 147.06/66 FM. For certificate send contact no. and 39 cent SASE to Henry Schaper, Sr, KA6AWS, 241 Tapestry Dr, St Louis, MO 63129.

Grandview, Missouri: The Southside ARC will operate N0EWP 1800Z-2400Z May 17, 0001Z-0300Z and 1700Z-2200Z May 18 in honor of President Harry S. Truman's 102nd birthday. Operation will be near the old Truman farm home during the Harry's Haydays celebration. Suggested frequencies are 7.230 and 14.230. For a commemorative certificate send 9- \times 12-in SASE (39¢) to Southside ARC, PO Box 412, Grandview, MO 64030.

Wheeling, West Virginia: The NPARC will operate W8ZQ May 23 to celebrate the 10th annual Elby's Distance Race. Operation will be 7.235 and 14.235. Special QSL for SASE via Joe McCready III, Chase Ave, Bridgeport, OH 43912.

Burlington, North Carolina: The Alamance County ARC will operate K4EG 1400Z-2100Z May 24 and 1700Z-2100Z May 25 from the grounds of the Alamance Co Historical Museum during the annual Fiddlers Picnic. Operation will be in the lower portions of the 40 and 15 meter General phone and CW bands. Certificate for QSL and SASE to K4EG, PO Box 3064, Burlington, NC 27215.

Shetland Islands, UK: The Lerwick ARC will operate GB00S May 24-30 from Housay Island, Out Skerries, Shetland Islands, UK. Operation will be CW, SSB, AM, FM, RTTY, FAX on all HF bands, 50 MHz, 144 MHz and 432 MHz. For further information contact Colin Roberts, GM0AVR, 4 Ladieside, Brac, Shetland Islands, Great Britain, UK.

Charleston, South Carolina: The Trident ARC will operate N4EE May 24-25, May 31-Jun 1 and Jun 7, 1400Z-2400Z each day to commemorate the Piccolo Spoleto Festival. Suggested frequencies: SSB—7.249 14.240 21.340 28.540; CW—7.120 21.120. Certificate for QSL and large SASE to TARC, PO Box 73, Summerville, SC 29484-0073.

New Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by May 1 to make the July issue. Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

QSLing Special-Events Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines: (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- \times 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 you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Strays

QST congratulates...

□ Sam Patterson, N4DRV, of Huntsville, Alabama, for receiving the Employee of the Year award from Boeing's Computer Support Services group.

□ Marvin J. Fischer, N2CKE, of Woodmere, New York, designated 1985 Engineer of the Year by the American Society for Hospital Engineering.

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.

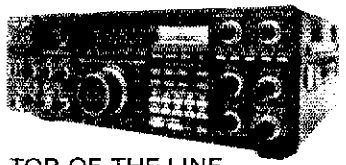
Club Contest Rules	Jan 1986, p 94	License Renewal Information	Jan 1986, p 62
DX Contest Awards Program	Feb 1986, p 83	Major ARRL Operating Events and Conventions—1986	Jan 1986, p 61
Emergency-Traffic Committee	Apr 1986, p 69	MARS Information	Jul 1985, p 46
Frequency/Mode Allocations	Jan 1986, p 62	QSL Bureaus	
Great Armadillo Run of 1986	Apr 1986, p 73	Incoming	Dec 1985, p 73
Hamfest Calendar Rules	Feb 1986, p 72	Outgoing	Mar 1986, p 71
IARU HF Championship Rules	Apr 1986, p 78	Spread-Spectrum Rules	Apr 1986, p 45
		902-MHz Interim Band Plan	Jan 1986, p 74

NOW IN ATLANTA, GEORGIA!
 Opening May 1986 • (404) 263-0700
 6077 Buford Hwy (Doraville, 1 mi. north of I-285)

HAM RADIO OUTLET

6 STORE BUYING POWER

KENWOOD TS-940S



TOP-OF-THE LINE
 HF TRANCEIVER

GREAT PRICES. CALL

KENWOOD HAND-HELDS

TH-21AT/41AT

Compact.
 Only 2.4"W, 4.74"H,
 11"D. Outstanding
 performers in an
 ideal package size.



TR-2600A

Deserves its well-
 earned reputation
 as the leading HT

**CALL FOR LOW,
 LOW PRICE**

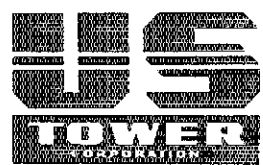


ELH-230D



2 METER
 3 IN/30 OUT

CALL FOR PRICE



MA-40
 40' TUBULAR H.D. MAST
~~\$745~~ **SALE! \$549**

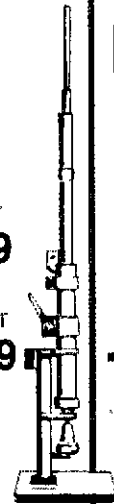
MA-550
 55' TUBULAR H.D. MAST
~~\$1245~~ **SALE! \$899**

- Handles 10 sq. ft. at 50 mph
- Pleases neighbors with tubular streamlined look

TX-455

55' FREESTANDING
 CRANK-UP

- Handles 18 sq. ft. at 50 mph
- No guying required
- Extra-strength Construction
- Can add raising and motor drive accessories



**IN STOCK FOR QUICK DELIVERY
 OTHER MODELS AT GREAT PRICES**



YAESU HANDHELD FT 209R

5 WATT 2M/HT

CALL FOR PRICE

**QUALIFIED PERSONNEL
 FOR IN STORE DEMOS**



IC-R7000



25 MHz-1300 MHz

ORDERS TAKEN FOR FIRST SHIPMENTS



W-51 TOWER SALE

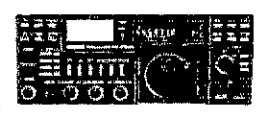
51' CRANK-UP 9 SQ. FT.
 WINDLOADING

\$899

9 Left at this Price



SIMPLEX-REPEATER-SATELLITE



IC-271H

2 Meters
 100 Watts
 All mode

IC-471H

430-450MHz
 74 Watts
 All mode



**GREAT PRICES.
 CALL**



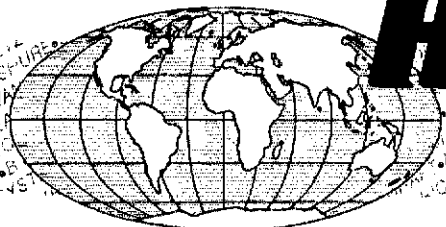
All Major Brands in Stock Now!

CALL TOLL FREE (800) 854-6046



Toll free including Alaska & Hawaii. Phone Hrs: 9:30 a.m. to 5:30 p.m. Pacific Time. California and Arizona customers call or visit nearest store. California and Arizona residents please add sales tax. Prices, specifications, descriptions subject to change without notice.





HAM RADIO OUTLET

NOW IN ATLANTA, GEORGIA!
Opening May 1986 • (404) 263-0700
6071 Buford Hwy (Doraville, 1 mi. north of I-285)

6 STORE BUYING POWER

ICOM IC-R71A



Superior Grade General Coverage Receiver

SALE! CALL FOR PRICE

ICOM IC-37A



IC-27A (25W,2M,FM)

IC-27H (45W,2M,FM)

IC-37A (25W,220MHz,FM)

IC-47A (25W,70cm,FM)

CALL FOR LOW, LOW PRICE

ICOM IC-735



The Latest in ICOM's Long Line of HF Transceivers

CALL FOR LOW, LOW PRICE

ICOM

IC-3200A

DUAL BANDER

Covers Both 2 Meters & 70 cm



LATEST EDITION

ICOM IC-2KL



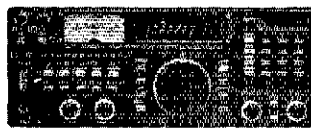
LINEAR AMPLIFIER

- Auto Band Switching
- Broadbanded
- HF 500 Watt Linear

AT GREAT LOW, LOW PRICES

ICOM

IC-R7000



25 MHz-1300 MHz

NOW TAKING ORDERS FOR FIRST SHIPMENT

ICOM

IC-1271A

NEW



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

AT GREAT LOW, LOW PRICES

ICOM

HAND-HELDS



IC-02AT
IC-04AT

VHF/UHF



IC-2AT
IC-4AT



IC-3AT

QUALIFIED PERSONNEL FOR IN STORE DEMOS

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

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; Don, Mgr. N6IPE
Hwy. 17 to 23rd Ave Exit

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900; Glenn, Mgr. K6NA
Hwy. 163 & Claremont Mesa Blvd.

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

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



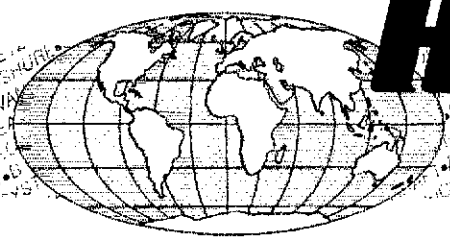
CALL TOLL FREE (800) 854-6046

Toll free including Alaska & Hawaii. Phone Hrs: 9:30 a.m. to 5:30 p.m. Pacific Time. California and Arizona customers call or visit nearest store. California and Arizona residents please add sales tax. Prices, specifications, descriptions subject to change without notice.



WORLDWIDE DISTRIBUTION

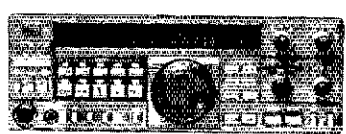
LIMITED QUANTITIES AVAILABLE AT 1985 PRICES!



HAM RADIO OUTLET

6 STORE BUYING POWER

KENWOOD TS-711A TS-811A



Ideal VHF/UHF base stations for 2M/70CM transceive operation.

GREAT PRICES. CALL

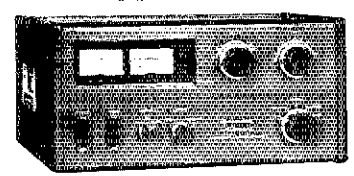
KENWOOD TS-940S



TOP-OF-THE LINE HF TRANCEIVER

CALL FOR LOW, LOW PRICE

KENWOOD TL 922A



2 KW PEP LINEAR AMPLIFIER
Pair of EMAC 3-500Z Tubes

KENWOOD

TH-21AT/41AT

Compact. Only 2.4" W, 4.74" H, 11" D. Outstanding performers in an ideal package size



TR-2600A
Deserves its well-earned reputation as the leading HT

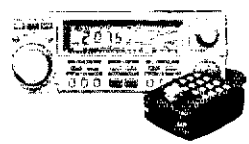


CALL FOR PRICE

KENWOOD

TW-4000A

2M/70 CM DUAL BANDER



SALE! CALL FOR PRICE

KENWOOD

TM-2570



FIRST COMPACT 70W/2M FM MOBILE TRANCEIVER

IN STOCK FOR IMMEDIATE DELIVERY

KENWOOD TM-211A TM-411A



2-M 450 MHz

CALL FOR PRICE

KENWOOD R-2000



COMMUNICATIONS RECEIVER

- 10 memories with memory scan
- 150 KHz - 30 MHz
- Optional coverage 118-174 MHz

QUALIFIED PERSONNEL

KENWOOD

TS-430S



CALL FOR LOW, LOW 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

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: Don, Mgr. N6IPE
Hwy. 17 to 23rd Ave. Exit

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900: Glenn, Mgr. K6NA
Hwy. 163 & Claremont Mesa Blvd.

PHOENIX, AZ 85015
1702 W. Camelback Rd
(602) 242-3515: Bob, K7RDX
East of Hwy 17

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



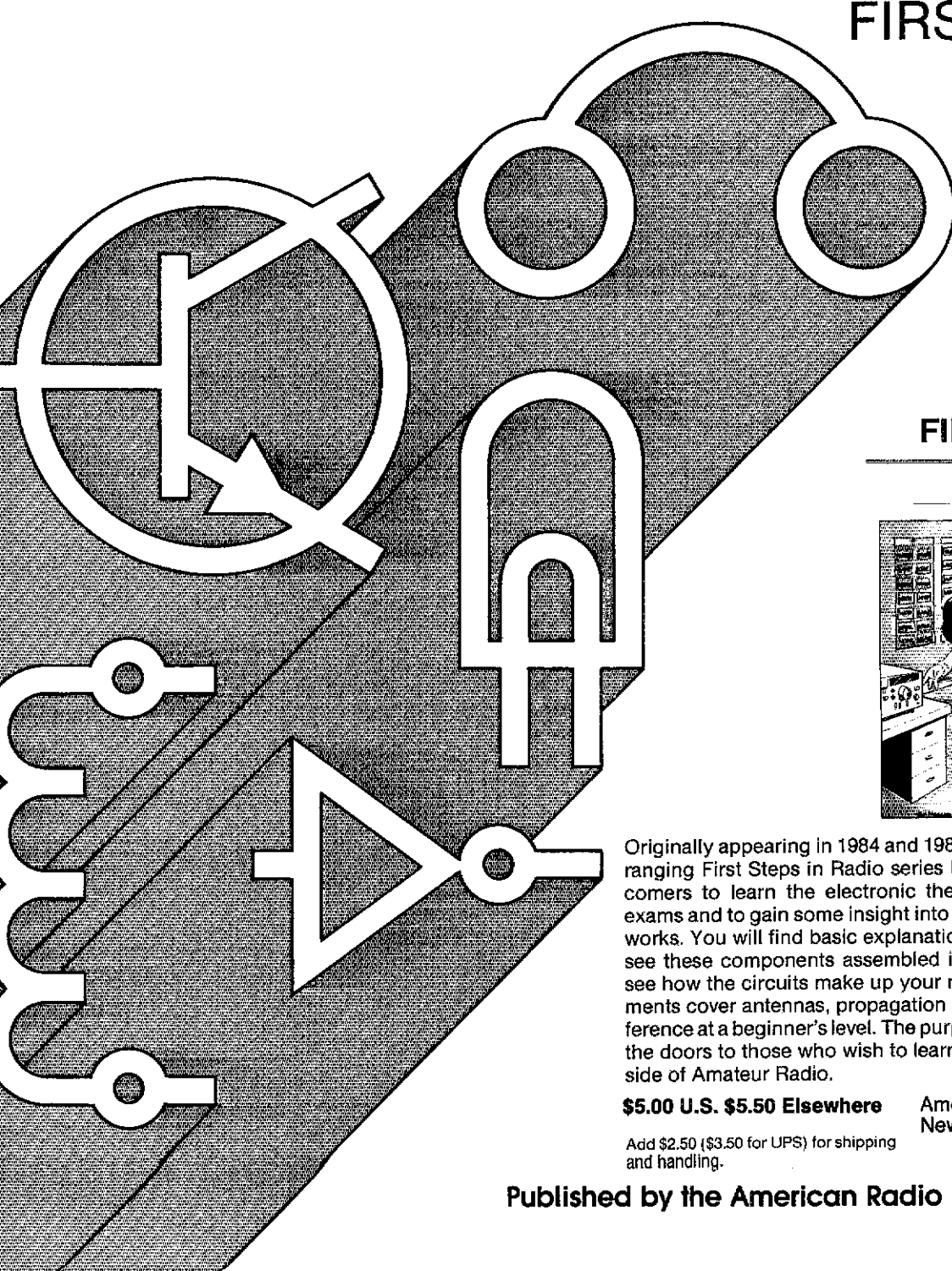
CALL TOLL FREE (800) 854-6046

Toll free including Alaska & Hawaii. Phone Hrs: 9:30 a.m. to 5:30 p.m. Pacific Time. California and Arizona customers call or visit nearest store. California and Arizona residents please add sales tax. Prices, specifications, descriptions subject to change without notice.



JUST THE BOOK FOR THE BEGINNER!

FIRST STEPS
IN
RADIO



FIRST STEPS IN RADIO



Originally appearing in 1984 and 1985 issues of *QST*, the wide-ranging First Steps in Radio series helped thousands of newcomers to learn the electronic theory needed for licensing exams and to gain some insight into how their radio equipment works. You will find basic explanations of circuit components, see these components assembled into practical circuits, and see how the circuits make up your radio gear. Additional segments cover antennas, propagation and radio-frequency interference at a beginner's level. The purpose of this book is to open the doors to those who wish to learn more about the technical side of Amateur Radio.

\$5.00 U.S. \$5.50 Elsewhere

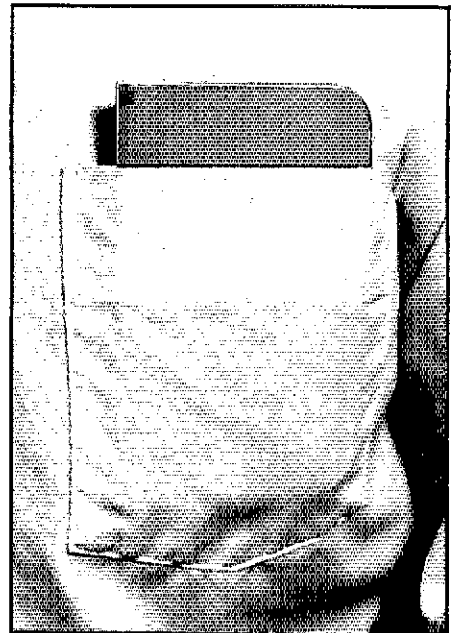
American Radio Relay League
Newington, CT 06111

Add \$2.50 (\$3.50 for UPS) for shipping
and handling.

Published by the American Radio Relay League



WHAT'S IN BOB'S POCKET?



THE ARRL 1986-1987 REPEATER DIRECTORY! 10,320 LISTINGS 29.5 MHz-10GHz

We've made the **ARRL Repeater Directory** even more practical to use. Now you can carry it around in your pocket and it will fit in most glove compartments. Even though we shrunk the size of the book to 3¼ x 5¼ inches, the listings appear in the same size as the previous editions. In this handy book, you'll find much useful information including: CTCSS (PL) Tone Frequency Chart, Addresses of members of both the ARRL VHF-UHF and Repeater Advisory Committees, separate listings of digipeaters and other special mode repeaters, band plans, repeater operating practices and a compilation of frequency coordinators and ARRL Special Service Clubs. 15th Edition, copyright 1986. Still only \$3.00. Please add \$2.50 for shipping by parcel post or \$3.50 for UPS for each order or available from ARRL dealers.

THE AMERICAN RADIO RELAY LEAGUE, INC.
225 Main Street
Newington, CT 06111

29.5 — 29.7 MHz

Location	Input	Output	Call	Notes	Sponsor	Source
ALABAMA						
Bessemer	29.60	145.15	N4AHN	oal	K4GTQ	ARC
Birmingham	29.56	29.66	K4GTQ	o		ARC
Mobile	29.54	29.64	KE4QC	o	KE4QC	ARC
Tuscaloosa	29.58	29.68	KX4I	o		ARC
CALIFORNIA						
MONTEREY BAY AREA						
#MONTEREY	29.52	145.64	N6AHW	oi	MRRBG	N6AHW
#MONTEREY	146.91	29.60	WB8CAN	o	MontBay	NARC
SANTA CLARA	29.54	29.64	K5GZK			
#SANTA CRUZ	29.52	29.62	N6AHW	oi	MRRBG	
SOLANO	29.56	29.66	N6BPK	o		
Hollywood Hls	29.56	29.66	W6ORD	o		
Johnstone Pk	29.58	29.68	W6BIGH	o		
Monrovia	29.54	29.64	W6QF	o		
Newbury Park	29.52	29.62				
Palomar Mt.	29.56	29.66				
COLORADO						
Boulder						
CONNECTICUT						
Bloomfield	29.58	29.68	W0A	o	RMVHFS	CCARC
Columbia	29.56	29.66	KB1GA		KB1GA	TSARC
Glastonbury	29.68	147.69	WA1C8Y			TSARC
Montville	29.57	29.67	K1NOJ	PL		TSARC
N Coventry	29.54	29.64	K1JCL	o(c)	K1JCL	TSARC
DELAWARE						
Claymont	29.56	29.66	KC3AM	o	KC3AM	TMARC
DISTRICT OF COLUMBIA						
Fairfax, VA	29.58	448.725	KD4DN	oi	KD4DN	TMARC
Gaithersbrg MD	29.56	29.66	N3AUY	o	KD3R	TMARC
Sterling, VA	29.58	29.68	KD4DN	oi	KD4DN	TMARC
FLORIDA						
Clearwater	29.58	29.68	KF4ZC	oPL 1Z	KF4ZC	FRC

TYPICAL LISTINGS

We should all be well versed in its use. Let's all insure that NTS in Illinois continues to get the support that it deserves. **GOOD IDEAS DEPT:** The Wheaton Community Radio Amateurs (WCRA) included an "ELMER PROGRAM" info form in the last issue of their club newsletter, "Hamletter". The intent of their program looks to be to provide newcomers with some of that good old 1 to 1 elmering. Other clubs should follow WCRA's lead in making a conscious effort to help Amateur Radio grow and stay strong. **ILLINOIS SECTION TOLL-FREE HOTLINE 800-IL-ARRL.** We now have a toll free telephone number for Illinois ARRL—800-451-2775. Use it for requests, complaints, compliments or anything that relates to ARRL in Illinois. The line has been in for about two weeks, and is being well received. The intent of this service is to provide for easier communication between league members and section leadership on matters which would not normally be handled on the air. This is a new career development program. Continuation will depend on responsible use of the service. **Traffic:** W9HLX 812, KA9FEZ 732, WB9RFB 341, NC9T 276, W9HDT 226, W9NKG 226, W9EHS 111, K9BVE 109, N9EWT 76, KD9K 52, K9JL 42, W9KR 35, KA9BJ 34, K9ZJ 27, W9DDB 27, W9DZV 25, W9DHCW 23, W9JLNO 22, K9QEW 21, K9EUI 20, W9BHI 17, W9RTD 12, W9VEY/M 11, WA9RUM 8, W9BTV 8, KD9TK 5.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WB9ZQE STW; W9JUU, SAC: K9TUS, STC: K9PS. SGL: WA9VQD, SOBC: K9STA, SPIC: K9DJI, SFC: N9WB, SOOC: K9JG, Net Managers: ITN KD9DU, QIN K9JC, IKN KW9D, IRN N9ASR, VHF W9MPT, IWN KA9ERC. February Net Reports:

Net	Freq.	Time	Daily	UCT	QNI	QTC	QTR	Ses.
ITN	3910	1330	2130/2300	3019	727	2621	84	
QIN	3916	1430/0000/0300		636	393	1069	80	
ICN	3708	2315		60	20	400	20	
IRN	3629	0030		75	1	435	20	
IWN	3910	1310		1385	0	264	28	
IWN VHF Bloomington				997	0	280	28	
IWN VHF Kokomo				1052	0	192	28	

Hossier VHF Nets for February QNI 4728, QTC 113, Bulletins 120, QTR 3902 in 128 sessions for 19 nets. CAND 997 messages in 28 sessions. D9PN 100 Stns. W9JUU. D9PN report for January 1986 276 messages in 860 minutes for 62 sessions in 92 Stns. W9JUU, K9CAG, K9CBE, W9BHI, K9B9R, 9RN Cycle 4 Report for February QNI 343, QTC 522, QTR 1029 in 56 sessions. In 100 Stns. W9FC, N9HZ, K9JL, W9JUU, W9B9S, WA9CF, W9UYU. Appointments: ORS WB9PZF Badland, OCAA, W9CJT Columbus. Silent Keys W9BNLR Flat Rock in KR9L has been appointed VHF Awards Manager, and N9BF has been appointed HF Awards Manager for the Fort Wayne Radio Club a Special Service Club. The Lake County ARES received a letter of thanks from the Lake County Red Cross for their help with an undisaster demonstration. It seems to me that our Novice training programs state wide are improving. 23 people enrolled in a class in Terre Haute this month. The RCA Radio Club, the Indianapolis Red Cross Radio Club, KA9SWI, and W9DUU put on a program at the Indiana State Middle School for the Deaf. Everyone in the state deserves a big hand for their training efforts. Indiana has a new carrier Newsletter "IDEA" Edited and Published by WB7QWG. Traffic: W9JUU 930, K9JL 368, W9DWD 262, WA9YF 148, W9JZJ 118, W9UMY 105, KA9FFO 102, W9MDS 101, K9JH 82, W9JUU 76, WA9QCF 62, KA9EIV 60, W9GWM 60, K9WVV 48, K9KTB 34, W9ZGC 33, W9JHR 31, N9HZ 25, W9QLW 20, W9DZ 16, N9DYC 16, WA9OKK 16, N9DTG 15, N9DHX 12, AB9A 11, K9B9F 11, K9WC 11, W9JHI 10, KD9CC 10, K9ZBM 10, K9DUP 9, W9BTZ 8, K9B9R 8, K9PS 7, K9SBA 6, K9DJI 5, W9PZF 5, K9STA 4, W9KMY 4, W9B9J 3, KA9SM 3, W9DZV 3, WA9CF 3, WA9JC 3, W9XD 1, W9EJ 1, W9RTT 1, K9BDE 1, W9BPD 1, W9DOK 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9DAG, STW: K9JTG, ACC: KA9ZG, BM: WB9JWS, OOC: N9GK, PIC: K9ZZ, SGL: A9GV, TC: K9GDF. The Ozaukee Radio Club presents an ARRL sanctioned Sweepstake at Cedarburg in the Circle B Recreation Center, Highway 60 and County I, May 3rd, beginning at 8:00 AM. License exams, free parking, ARRL materials tables, and plenty of door prizes with talk-in on 146.97 or 146.52. See you at Cedarburg. Just a reminder, the Green Fox ARC is a Special Service Club with informative and interesting meetings at Green Lake Town Hall, plans to provide Riponfest communications, and works with County Emergency Government; check with Club President K9BVC for details. Now is a good time for club leaders to plan for Field Day activities. The Green County ARA has become ARRL affiliated. Net Control Stations are needed for daytime 9RN, contact WA4JTE, NCS wanted for evening 9RN, check with W9JLL. Packet radio talk net Mondays, 9:30 PM on 146.87 MHz in Milwaukee, AG9V is on packet radio. Congratulations to both W9YCV and K9VGE for confirming 100 grid squares and with the help of Awards Manager N9EEJ, they have received their VUCC awards. W9CBE worked thirteen countries on the low satellites. Info about Braille net manual for blind hams from WB9ESM. W9NGP suggests that, when delivering messages by telephone to licensed Amateurs, we should give information about traffic handling and encourage them to check into the nets. Make a goal this year—help at least one person to become a licensed Radio Amateur. I am compiling a new and thorough list of all nets in Wisconsin, please let me know of any local nets; swap club, ARES, specialty, or 2-meter nets. W9BCC and W9NYI are front page news in Stevens Point Journal with full page article and pictures. News and suggestions are always welcome. Traffic: W9PYP 1037, K9BCJ 764, WA9WYS 502, KA9R11 354, K9GDF 212, KA9BHL 212, W9CBE 211, W9D9I 211, W9JCH 158, W9UCL 139, K9U2O 119, W9DND 101, AG9G 100, N9BCX 96, N9BDL 96, W9H9W 92, KA9JY 74, N9DHT 67, N9AUG 66, W9ODV 61, W9LDO 60, W9FYD 59, K9AKG 56, KA9BHK 5, (Jan.) W9B9GO 75, K9Y9 7, W9B9NR 3, (Dec.) K9AKG 5.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., KC0T—SEC: KA9ARP, STW: KD0CI, Hello Again! The Mora Vasaoppet Cross Country Ski Race was covered again this year by Amateur Radio. KA9EVR and the entire group are to be congratulated for another job well done. The Mora Open Fleeteer Assn not only covers the Vasaoppet, but they also provide communications for a local canoe race in May and a bike-athon in August. MORA gets our salute in the club salute for February. Over 1600 amateurs and computer enthusiasts attended the annual Mid-winter Madness held in Fridley on Feb. 22nd. This event sponsored by the Robbinsdale ARES seems to get bigger and better every year. WJSE, the Public TV station in Duluth, recently presented a program on amateur radio that featured Jim Beck, N9MS. Many of you may get to see this on your local PBS station at a later date. Many folks who saw it had nothing but good things to say. We are extremely proud of Jim and are indeed happy to bestow our "Amateur of the Month" award to him for February. NET NEWS: The new assistant net manager of MSN/1 is W9UCE. He is a very good CW operator and will be a great asset to the net. Our congrats to WA9LTK who has worked all US counties. He is one of about 500 amateurs who have accomplished this. Most

BUTTERNUT

HFBV	80-10 vertical	125.00
HFBZ	80-40 vertical	114.00
ZMCVS	2M vertical	69.95
BMKI	100' high kit	41.95
1B150S	160m odd on	45.00
JPS	odd post sleeve	5.30
	AND MORE!	

CUSHCRAFT

A3	4 ft. fiband	275.85
A3	3 ft. fiband	210.00
R3	10, 15, 20 ceramic tuned	
	vert	260.95
A5	5 band trap vert	98.00
32-19	19 el. 2m boom	89.95
AT5WB	15 el. wide band 2m	
	boom	78.95
424B	24 el. 70cm boom	77.00
418TB	18 el. OSCAR 45	
	MHz	58.00
A124-101	10 el. OSCAR 145.9	
	MHz	49.00
AOP-1	OSCAR pack 2m &	
	70cm	140.00
AR-2	2m vert ringo	24.60
AR-2	2m vert ringo	
	ranger	30.00
AR-2B	2m vert ringo ranger	
	II	37.00
	AND MORE!	

HUSTLER

8BTV	8 band trap vert	128.95
8BTV	8 band trap vert	109.95
8BTV	4 band trap vert	64.95
8B-124	124 el. stat. 2m	
	collinear	116.95
MULTIM2	mobile mast	27.95
RM10RMT5	10m-15m resonator	
	istal	11.95
RM10S/M15S	super resonator	16.95
RM20R/MT20S	rod & super	
	resonator	15.95/21.95
RM30	3m rod resonator	16.95
RM40/RM40S	rod & super	17.95/25.95
RM75/RM75D	75 el. rod super	18.95
RM25S/M85D	75 el. rod super	31.95
BM 1	bumper mt.	15.95
BM 2	slingshot ball mt.	12.85
BM 3	slingshot ball & spring	
	mt.	27.85
DD 1	truck disconnect	13.85
DD 2	2m 50m mag mt.	28.95
DD 3	truck mt w/swing	
	ball	16.95
	AND MORE!	

RTTY-AMTOR Packet

20G	10' sect	41.50
20AG	top sect	40.00
25G	10' sect	51.50
25AG	2.3' top sect	82.10
45G	10' sect	115.50
45AG	2.3' top sect	126.00
AS25G	acres steel	15.00
AS45G	acres steel	48.75
1B-3	thrust bear	59.95
M200	10" mast	22.25
SB25G	short base	26.25
SB45G	short base	49.50
EP245G	gin pole	187.80

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, WRAS or Ted, AA4GM at 703-930-3350. If you are in the DC area, stop in and marvel at our dedicated RTTY room.

PAKRAIT PK-64—World's Best Price/Performance Ratio
The Pakrait 64 is the world's first live mode in-line Amateur Radio smart data controller. \$219.95

NEW! PK-60 Packet Controller
Licenses TAPRI board factory wired for all RS-232 compatible computers. Now at \$219.95

CP-1 AEA Computer Patch™ Interface
Convert your personal computer and transceiver into a full featured RTTY station w/ the CP-1 Computer Patch interface and software by AEA.
Now available for the Commodore 64
complete with cables for the AEA CP-1
Keyboard overlays and manual & GAT
RS-232 option available

KANTRONICS UTU
Now Available at EEB.
Can be used on CW, ASCII, AMTOR and RTTY.
Easy for beginners.

BIRD
EEB is Bird's No. 1 East Coast Dealer.
Large Inventory, Package Deal, & CALL & BIRD 43—elements—loads

Antennas

HY-GAIN

H7DXS	7 el. fiband	490.95
H5MKZ	5 el. fiband	457.95
EX-14	4 el. fiband	362.95
H3LHS	3 el. 750W cap	218.95
18AV17WBS	8 band trap vert	121.95
18AV10WBS	4 band trap vert	74.95
V25	2m. omnidirect	50.95
V45	70cm omnidirect	99.95
H914MAD	2m mag mt	21.95

KLM

KT34R	fiband 4 el.	137.95
KT34XA	fiband 5 el.	485.95
2M-14C	2m satellite	87.95
2M-22C	2m satellite	117.55
435-18C	70cm satellite	113.95
435-40CX	70cm satellite	195.95

MOSLEY

TAS3	3 el. fiband	280.00
TAS3R	3 el. fiband	179.00
CF-36	6 el. fiband	450.00
CF-36	3 el. fiband	265.00
PD037	3 el. fiband	485.00

VAN GORDEN

P0B010	80-10 dipole kit	34.95
P0B040	80-40 dipole kit	32.50
P04010	40-10 dipole kit	30.95
S0B0	80 shortened dipole	28.95
S040	40 shortened dipole	28.95
ALL BANDER	160' 10m	28.95
	AND MORE!	

LARSEN

1M150MM		41.90
NLA150MM		45.30
NMB150MM		45.30
RD4 142 HQ		16.95
	AND MORE!	

CABLE & CONNECTORS

Belden 9913	per ft.	48c
Columbia RG 213	32c	
RG30U	29c	
RG31U	35c	
R 259 Silver	14c	
All Male for 80'	107.40	
BUD(M)-UHF1'	4.80	
	AND MORE!	

ROHN

20G	10' sect	41.50
20AG	top sect	40.00
25G	10' sect	51.50
25AG	2.3' top sect	82.10
45G	10' sect	115.50
45AG	2.3' top sect	126.00
AS25G	acres steel	15.00
AS45G	acres steel	48.75
1B-3	thrust bear	59.95
M200	10" mast	22.25
SB25G	short base	26.25
SB45G	short base	49.50
EP245G	gin pole	187.80

Towers

KENPRO ROTOR

KR-500	elevation 12.5 ft.	161.95
--------	--------------------	--------

ALLIANCE ROTOR

OT10	3.50 ft.	48.00
------	----------	-------

DAIWA 75DE ROTOR

Compare These Specs & Pricing		
MR75DE	1 Motor	4 Motor
Wind Load		
Sq. Ft.	16.1	21.5
Tulco		
Flur		
Lbs.	610	1200
Break		2400
Pwr.		
Lbs.	5600	9600
Price	\$218.00	\$295.00
	Additional Motors \$77.00	Bracket Add \$30.00
	Free U.S. Great Circle Transfer Map w/Color	

ALINCO "Dual Pod" the perfect match for today's antenna installations. 1 or OSCAR systems. Jghf HF beams. VHF/UHF beams. 4 legs—strong—rotor plate—accepts optional thrust bearing. Lightweight, durable aluminum construction—easy installation.
ETS-120 45' \$ 87.00
ETS-150 56' \$ 79.00
ETS-180 67' \$ 95.00
ETS-210 79' \$ 107.00
AAZ-7A Thrust Bear \$ 38.00
AAZ-2 Rotor & Control \$121.00
See Aliner Ads for Details

TET

H843SP	40, 15, 10, 3 el.	244.95
MV3AH	7.2, 28 vert	48.95
MV3AH 7/81/28 vert	80.45 with radio	
MV3BHR	14/21/28 vert.	80.45 with radio
MLA-4	loop 3.5/7/12/28	139.95
SO-10	28 MHz Swiss Quad	118.95
SOY-08	2m Swiss Quad	66.95
SOY-08	2m Swiss Quad	66.95

MISC.

Albion Della Team Sloper		49.95
Larsen KD4-150 HQ		16.95
Larsen Dual Banders		38.45
Unidella 1-1		17.95
Ant. Spec AP151 3G		34.50
AC-Parola two		14.95
Lightning Arrestor UHF MF		3.80
Butler HF-38		165.00
Hustler UGM		19.95
Unidella Dual Band		81.00

ALINCO ALR-20BT

SPECIAL CALL
• 5 & 25 watts—10 Ch. memory
• Seat Control on Tone
• Seat in Sub Audio. Inc.
• The ALR-20BT is the safest mobile rig on the market. No need to take your eyes off the road—COMPLETELY PROGRAMMABLE FROM MIC.

ALINCO ALM-20BT

SALE CALL
Don't buy any HT until you study this fantastic unit. Programmability identical to ACR-20BT. You only need to learn one radio when you have both full featured "scan" memory, 5 watts, 2 auto audio tones, Receives 140-160 MHz.

ICOM RT1A HP—High Performance

EEB has imported the world class RT1A and enhanced its performance beyond the manufacturer's dream.
• 24 hour bench test and 6 month warranty
• SSB filter upgrade to improve AM Narrow SSB selectivity and dynamic range
• Front end upgrade improves dynamic range plus premium enables operation below 1800 kHz
• 4 kHz filter replaces 8 kHz wide filter—improves SSB selectivity
• Audio output upgrade drives more audio at less distortion—more easy listening
• AGC line control for optimum AGC control
• Sensitive diodes for clear sound increased performance
• Spike protection installed at the pwr. supply for max spike and surge protection
• Final check out alignment
• We also install ICOM options at no charge
RT1A HP MF Mechanical Filter add \$200.00 to RT1A
RT1A HP X1 6 pole X1a Filter add \$200.00 to RT1A
RT1A HP XFS 2.4 kHz X1a Filter add \$300.00 to RT1A
RT1A 24 hour tested—no mods \$699.99

ICOM R7000 VHF/UHF

EEB will offer a R7000 HP—Dual Band Release date July 86
MEC 71.
Now you can control & enhance the performance of ICOM R71A, 281A, 221A, 471A, 127A with the amazing MEC 71v computer interface for the C-84
• Display, 1 print & receive memories
• Store in log 705 memories w/computer
• Unlimited memory W/SSC storage
• Keyboard entry or key, mode, memory scan
Get all the details—Call or write today.
MEC 71a. Introductory Price at \$199.95
Established Dealer Inquiries Invited

ELECTRONIC EQUIPMENT BANK

516 Mill Street NE
Vienna, VA 22180 USA

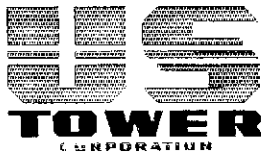
Prices & specs subject to change
Shipping charges not included
Returns subject to 20% restock charge
Free catalog in USA, all other \$10.00
ORDER TOLL FREE 800-366-3270
Tech Info—VA orders 703-938-3350



ELECTRONIC EQUIPMENT BANK

516 Mill Street NE
Vienna, VA 22180 USA

Prices & specs subject to change
Shipping charges not included
Returns subject to 20% restock charge
Free catalog in USA, all other \$10.00
ORDER TOLL FREE 800-366-3270
Tech Info—VA orders 703-938-3350



Fastest Shipments in the Industry.

8975 W. GOSHEN AVE., VISALIA, CA 93291

MA SERIES CRANK-UP MASTS.

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	300	3"sq.	4 1/4"	\$ 735.00	
MA-550	55'	22'1"	3	525	3"sq.	6"	\$1245.00	
MA-770	71'	22'10"	4	925	3"sq.	8"	\$2385.00	
MA-850	85'	23'8"	5	1295	3"sq.	10"	\$3895.00	
MA-850MDP	85' section "QUADRA MAST" with heavy duty motor drive, positive pull down feature (MA-850MDP only).							\$6695.00

shown w. optional MARR 550C motor base



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	440	12 1/2"	15"	\$ 925.00
TX-455	55'	22'"	3	700	12 1/2"	18"	\$1395.00
TX-472	72'	22'8"	4	1175	12 1/2"	21"	\$2295.00
TX-489	89'	23'4"	5	1850	12 1/2"	25"	\$3995.00
TX-489MD*	89'	23'4"	5	1980	12 1/2"	25"	\$5995.00

*Complete with new heavy duty motor drive unit with dual level and positive pull down feature. Limit switches are included.

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-638	38'	21'6"	2	600	15"	18"	\$1195.00
HDX-555	55'	22'"	3	980	15"	21"	\$2095.00
HDX-672	72'	22'8"	4	1620	15"	25"	\$3595.00
HDX-672MD*	72'	22'8"	4	1820	15"	25"	\$5495.00
HDX-589MD*	89'	23'8"	5	2500	15"	30"	\$7195.00

*Complete with new heavy duty motor drive unit with dual level and positive pull down feature. Limit switches are included.

FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.

Will handle 12 sq. ft. of antennas at 50 MPH winds. (TMM-433HD handles 16 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	300	10"	17 1/4"	\$ 985.00
TMM-433HD*	33' w/o mast	11'4"	4	430	12 1/2"	20 3/4"	\$1195.00
TMM-541SS*	41' w/o mast	11'4"	5	480	10"	20 3/4"	\$1295.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.

STANDARD BASES INCLUDED WITH ALL TOWERS
 ALSO AVAILABLE: • Motor drives for most towers
 • 5' to 24' antenna masts • Coax arms • Service platforms • Mast raising fixtures • Special bases

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.

of you who are regulars on MSPN know him as one of our bulletin stations. There are now about 140 amateurs in Minnesota with Packet Radio capability, and the number is growing rapidly. A reminder of upcoming Hamfests in Bemidji May 3rd and Duluth May 10th. Refer to QST's "Hamfest Calendar" for details, and we'll see you there! New Novices include KA0VNV KA0VVO and KA0VVP. Recent upgrades include KA0SYL to General with KA0IBX and KA0NBS to Extra. Congrats to you and all others who have upgraded. We regret to pass along word that Donald A. Murray, a former Chief Engineer at the St. Paul office of the FCC died recently. Many area amateurs remember him when he personally administered exams. KB0DY, John Skinner, Thomas of New Ulm and NB0JU, Bert Rothman of Orr Minnesota are Silent Keys. Our condolences to their families and friends. Thx to the Brainerd Area ARC, Lake Region ARC and the Moose Lake Area HA Assn for their newsletters. Keep 'em coming folks! The St. Paul Radio Club has details and application blanks for a "Worked All Minnesota Counties" award. Write to PO Box 9375, North St. Paul Minn 55109-0375 for info. Howard Marks, W0OZC, and new Dakota Division Director announced recently that Rick Whiting, W0TN, is the new Vice Director for the division. In closing, our congrats to KA0BFP who attempted to successfully win the MGR for MSBNRTTY in spite of the admitted shortfalls at typing! Gee, does that mean I have a chance? 73 de K0DCI.

NET	FREQ	TIME	QNI/QTC/SESS	MGR
MSN/RTTY	3620	7:00P	80/4/11	WA0LPT
MSN/1	3685	6:30P	217/89/28	KA0EYU
MSN/2	3685	10:00P	229/31/28	NC0E
MSN	3710	8:00P	203/19/28	KA0ODQ
MSPN/3	3929	12:00P	429/138/28	WB0WNJ
MSPN/5	3929	5:30P	1077/130/28	WD0BGS
MAN/WXNT	3929	8:15P	45/128/27	KJ2Z
PHONE	3925	9:00A	375/011/49	WD0BAC

Emergency Frequency: 3929 MN MSO: 3620 Bulletin: 3685 and 3929 Traffic: WB0WNJ 521, WA0TFC 331, K0DCL 238, KA0EYU 222, N0CLS 96, WB0HDD 93, KA0ODQ 91, K0DCI 90, KT9I 86, WA0ONE 78, KA0RZA 76, N0JP 73, W9DM 71, W0GRW 67, KA0ARP 66, NE0D 56, K0COI 42, K0COT 35, WD0GUF 31, WD0BGS 28, N0BEI 20, WB0FMI 16, WA0MJC 15, KA0BFP 14, W0HZU 13, W0YK 13, K0CVD 10, KA0CDC 8, KA0AUF 7, N0EWA 5, WA0ONJ 3.

NORTH DAKOTA: SM, Michael Mankey, WB0TEE—Upgrades: KA0VLM, Kevin, tech; KA0VVF, Greg, tech; KA0SNJ, Marvin, General; ND0GHA, Jason, Advanced; N0GUZ, Karin, tech; N0GUF, Erling, tech; N0GUY, Mark, tech; N0GUX, Charlie, General. Congratulations to all. Do you want to earn a new award? Now you can earn the "Worked All Counties" award. If you work KA0L, W0KGBI, NK8E either on two mtrs or HF you can receive this line award. KA0LIL, Terry, asks for your cooperation in the pile-ups. KA0LIL has just upgraded to Advanced. The Mayville Hamfest will be held June 7, 8, and as anyone that has ever attended will tell you, it is a good one. WB0VHW is the frequency coordinator for North Dakota. He can usually be found on the DATA net or on the Carrington 67 machine. Net Summary for February:
 Net Freq Mgr Sess QNI QTC
 GOOSE RIVER 1990 W0CDO 4 98 160
 ND WX NET 3883 WA0RWN 23 172 115
 DATA 3883 KA0FSM 27 462 40
NORTH FORTY: 04/84 ND0GHA 4 34 0
 Traffic: KA0FSM 43.

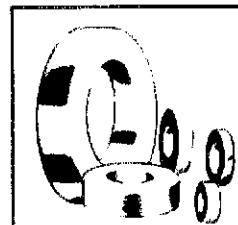
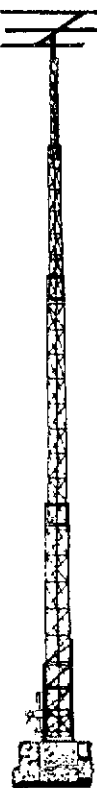
SOUTH DAKOTA: SM, R. L. Cory, W0YMB—STM: Ole Johnson, N0ARF, Assn SM; Bob Olson, KA0PFR, SEC; Warner Muns, KA0PY. Newly elected officers of L.A.R.K. Radio Club at Watertown are Pres KD0YL, Vic Pres KA0SID, Sec/Treas WB0MVJ, and KA0UEH Appointed Mgr for the S.D. Novice Net. Black Hills Radio Club will conduct VE upgrade exams on May 10, 1986 at 9 AM in the basement of the Pennington County Court House. S.D. CW net is building up, but still needs more checkins. Week nights 3550 kHz at 7 PM Central time and 6 PM Mountain time. Send news for this column direct to W0YMB, South Dakota SM. Traffic: K0ZBJ 60, WA0VRE 52, WA0LEN 45, K0BAF 40, W0MZZ 30, WB0BOM 28, K0PKPY 22, K0RWE 13, N0ABE 11, W0YMB 11, KA0SLD 5, K0BYL 3, W0HOJ 2.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF—ASM: K5UR. SEC: N5BPU. STM: W5OK. TC: W5FD. ACC: N5SD. BM: W5HYW. SGL: W5LCL. Repeater Coordinator: WB5FDP. I trust each of you enjoyed the Arkansas Hamfest and ARRL State Convention. I enjoyed seeing each of you again. Assistant Technical Coordinators are needed for several areas of the state. If you are interested, contact W5FD or myself at the address on page 8. Those of you interested in participating in ham radio activities in celebration of the Arkansas Sesquicentennial should contact ACC at the address above. N5SD 6712 Alia Vista Dr., North Little Rock, 72118. Severe weather time is still here. When bad weather is in the state, monitor 3995 kHz and 148.34/94 Little Rock. Contact W5RUX or N5BPU in Little Rock for additional info.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—SEC: KA5PFB. ACC: K5DPG. SGL: KD5SL. QOC: KE5OK. TC: NSJM. Baton Rouge ARC election: Pres: Rick, NV5A. VP: Bob, KA5HLP. Sec: Barbara, K5MOL. Tres: Tom, NSADP. The club reports near completion of a major project in procuring an emergency operations trailer. With deep regret, we lost a good friend and outstanding "ham" in the death of Vince Rosso, W5KC. He had been licensed for over 65 years and was widely known in the DX circles for his accomplishments and an ARRL DXCC plaque bearing a large number 1. A big attorney to Larry, N5LH, from the river front area, is now active in the LTN and District Nets. He covers for the New Orleans and surrounding areas almost every evening and would like some help and also participation in the Lafayette and Alexandria areas. The Jefferson ARC (Metairie) election: Pres: Doug, W5FO. VP: John, KA5RNT. Tres: Bob, KB5GQ. Sec: Francis, NS5UF. Their club has quite an array of instructors for their forthcoming ham classes commencing 19 May for 14 weeks MWF 7-9 PM at their clubhouse in the Metairie Playground. For further details contact Doug, KA5MSD at 832-8803. Traffic: W5GHP, WA5LHL, K5WOD, WA5WZD, WA5V, WB5NCM, N5LJE, KA5POL. CAND report WA5SV 100% in 28 sessions. DFN 5 reports, La. 95% in 56 sessions.

MISSISSIPPI: SM, Paul Kemp, KW5—ASM: K5ONE. SEC: K4HRD. SGL: AL7RC. ACC: K05VD. STM: KB5V. PIC: KA5NBE. QOC: W5VHC. VHF Coord: NSDMU. BM: AJX. TC: WB5SKK. Congratulations to the Jackson ARC on another outstanding Hamfest/ARRL State Convention; special kudos to Hamfest Chairman W5SBSJ and his crew, who did a SUPER job... it was enjoyed by all! Start planning now for the always excellent MCARA Hamfest at Biloxi in October. Congrats for recent upgrades to Extra Class: KA5ROA and KF5GK. Regret to report recent Silent Keys W5GRP and N5EUE (XYL of KD5P). Gulf States Emergency Net has been reactivated on the gulf coast, meets MWF at 7:15 PM local on 146.25/88 (KB5V), net manager: AF1LLIATED CLUBS: reminder the Club Challenge of the 80's continues in 1986, with numerous benefits to participating clubs. don't miss this great opportunity for YOUR club! MSBN(W5HKW), Sea-



Toroid Cores.
 Iron Powder
 & Ferrite.
 Ferrite Beads.
 Ferrite Rods.

Free catalog and winding chart on request.

PALOMAR ENGINEERS

Box 455, Escondido, CA 92025
 Phone: (619) 747-3343

Radio World

YOUR NORTHEAST'S FAVORITE HAM STORE
 FEATURING: Kenwood, ICOM, Yaesu and all other major lines of Amateur equipment and accessories. Write or call for quotes.

WARRANTY/NON-WARRANTY REPAIRS
 WE'RE JUST A FEW MINUTES
 OFF N.Y.S. THRUWAY I-90, EXIT 32
 ONEIDA COUNTY AIRPORT TERMINAL BUILDING
 ORISKANY, NEW YORK 13424
 Call (315) 736-0184

Stop By Your Local
 ARRL Book Dealer.
 He'd Like To See You!

Work VHF or HF Packet On Any Computer With Kantronics Complete Packet Communicator

KPC-2

From IBM to C-64, or any computer with an asynchronous serial port, you can now work packet on VHF or HF with one TNC, the KPC-2! Extra cost options are unnecessary. KPC-2 is packed full of features and backed by our full-time customer support departments. KPC-2 has totally new hardware and software, Kantronics designed. For more information contact Kantronics or a Kantronics dealer.

Suggested Retail \$ 219.00



Features

- AX.25 Version 2.0 software
- Supports multiple connects, up to 26
- RS232 or TTL compatible (C-64 too!)
- HF modem included! (both U.S. and European tones)
- Carrier Detect, and software squelch operation
- FCC Part 15 Certified
- Kantronics industry standard extruded aluminum case
- Power supply and cabling included
- All EPROM software is Kantronics sourced and copyrighted

- 128K EPROM, 16K RAM — expandable to 32K, 4K EEPROM.
- Advanced software HDLC routines, eliminating costly out-of-date chips

Customer Support

- Extensive dealer network
- In-house programmers/engineers
- In-house service representatives
- Periodic software updates (like 2.0!)

Want more information on Packet?
Contact us about our new **PACKET VIDEO**.
\$ 25.00 (shipping included), VHS or BETA format.

Kantronics
RF Data Communications Specialists

1202 E. 23 Street Lawrence, Kansas 66046 (913) 842-7745

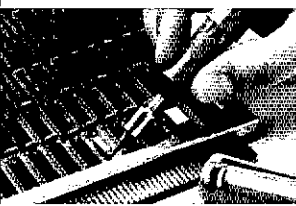
Pocket-Size Soldering

- Safe, no open flame.
- Only 7 inches long.
- Adjustable, with 10-60 W power.
- 3 tip sizes available
- No cords or batteries.
- Runs 60 minutes on one refill.
- Heats and cools in seconds.



Portasol™ is the first butane-powered, portable soldering iron that's safe, convenient and economical. Not much larger than a felt marker and as easy to use as a cigarette lighter, Portasol is the ideal tool for soldering in tight spots or where no electrical outlets are available. And because it's static free, Portasol is ideal for use with CMOS and other static-sensitive components.

WARRANTY:
ONE YEAR ON CASE,
30 HOURS ON TIP
 ONLY \$29.95 each, plus \$2 S&H. Make check/MO payable to AM-TECH, P.O. Box 92054, Rochester, NY 14692. New York residents add 7% sales tax. Please allow 4-6 weeks delivery.



Save Time-Money with HAZER

- Never climb your tower again with this elevator system.
 - Antenna and rotator mount on HAZER, complete system trams tower in vehicle upright position.
 - Safety lock system on HAZER operates while raising-lowering & normal position. Never can fall.
 - Weight transferred directly to tower. Winch cable used only for raising & lowering. Easy to install and use.
 - Will support most antenna arrays.
 - Safety - speed - convenience - inexpensive
 - Complete kit includes winch, 100 ft. of cable, hardware and instructions. For Rohn 25 G Tower.
- Hazer 2-Heavy duty alum., 12 sq.ft. ld. \$297.00 ppd.
 Hazer 3-Standard alum., 8 sq.ft. load 213.00 ppd.
 Hazer 4-Heavy galv. steel, 16 sq.ft. load 278.00 ppd.
 Ball thrust bearing TB-25 for any of above 42.50 ppd.
 Satisfaction guaranteed. Call today and charge to Visa or MasterCard.

As an alternative, purchase a Martin M-13 or M-18 aluminum tower engineered specifically for the HAZER system, or a truly self-supporting steel tower. Send for free details.

GLEN MARTIN ENGINEERING INC.
 P.O. Box Q 253 Boonville, Mo. 65233
 816-682-2734

sions 28, QM 2316, QTC 81; MTN(K5OAF), Sessions 28, QM 121, QTC 48; MMN(KF5GK), Sessions 28, QM 514, QTC 5; GCSBN(W5JHS), Sessions 28, QM 816, QTC 16; MLEN(W5SO), Sessions 4, QM 102, QTC 0; HAEN(KA5ROA), Sessions 4, QM 52, QTC 1. Traffic: NSAMK 340, K5OAF 221, KT5Z 118, W5WZ 50.

TENNESSEE: SM, John C. Brown, N04Q-ASM/ACC; WA4GLS, OO/AA; W9FZW, PIO; N7EJL, SEC; WA4GZZ, SGL; WA4GZZ, STM; NG4J & TC; WA4HK. It is not usual for the names of Silent Keys to be included in this column as well as other places in the QST, but this is one of the exceptions. It is with sadness that the list must include W4ZZ and K4EP. A couple of oldtimers that will be missed by the total amateur community, not just Tennessee. Our condolences to the families of each and also to the others that passed this period. There must be a lot of midlife and oldtime community in the cold months as I am getting lots of GOOD reports of upgrades and first timers into the hobby. Our hats off and congratulations to all of them. Keep up the fine work. The turn-around time for ticket action at Gettysburg seem to be around three to four weeks or thereabouts. Make sure you do not wait too long to do the renewals on the ticket. Not only is the new hamfest season upon us, so is the SEVERE weather time. Stand ready to assist in the reporting, spotting and all aspects to not only the weather service but your fellow man if or should the occasion arise. The Section Manager is getting several of the Club bulletins, and you can be assured that every one in read as well as in the mail with notes about special activity to be included in this report. It is with pleasure to note that several of the metropolitan clubs are beginning to form "Club Councils" to broaden their "CLOUT" in the local area. This is a real goal and aim for larger populated areas. Keeping in mind that each one of the individual clubs can continue in it's speciality, but supporting and participating in the area council. These councils should be to make yourself a part of the "Tennessee Council of Amateur Radio Clubs." Nothing but much GOOD can come from that route. The Section activity for the period is as follows: LF--Sessions 92, QM 2007, QTC 297; HF--Sessions 57, QM 2007, QTC 681; CW--Sessions 54, QM 202, QTC 670. Does someone want to start a "packet net?" Traffic: W9FZW 190, K4VWQ 178, WA4FMR 110, W4DDX 79, WA4HK 92, W4TVY 28, W4PFP 24, KA5KDB 20, KB4UO 16, NN4S 15, WA4GZZ 9, KA4BSG 9, KA4UVR 8, WB4TDB 6, KE4LS 6, (Jan.) KA4RSH 194. Is your report included?

GREAT LAKES DIVISION

KENTUCKY: SM, Dale Bennett, WA4JTE--Congratulations to the Amateur Radio Transmitter Society of Louisville for 50 years of affiliation with ARRL. Many thanks for your support and keep up the good work. ARTS meet the second Friday of each month at 7:30 PM at the T. J. Taylor building, room 147, 18 repeater. Everyone welcome. Pres: Mike Doorhoelter, WB4AJE, Vice Pres: Ron Baker, WB3HFH; Sec/Treas: Lee Hagen, K4OZQ. Information provided by AA4HJ. Double congratulations to KA4BCM. Mike has started an ACC bulletin. First issue out, and it looks good. Mike has been appointed to Blue Ribbon Committee on emergency message traffic. Jessamine Amateur Wireless Society was very active during gas-line explosion on February 21. Several hams took part in emergency activities. Fine job done by all.

MICHIGAN: SM, James R. Seelye, WB8MTD--Being one who lately has had to rediscover the pleasures of low-power operating, it seems fitting here to give you a look at the MI QRP Club, one of the oldest and largest organizations of its kind. It was started in January of 1978 by a small group of dedicated mid-MI QRP enthusiasts and now includes members from all over the world. Included on the club's constitution is a statement of purpose: "To foster and develop friendship and cooperation among radio operators who have a common interest in the unique pleasure and challenge of operating... at power levels of 5 watts output or less." The MI QRP Club is affiliated with ARRL. These folks provide daily that effective communication at HF can be carried out with low power and simple equipment. It is refreshing in these times to know that there are so many operators who are dedicated to the principles of simplicity and economy and clean usage of our most valuable resource, the RF spectrum. The club sponsors a net which meets each Wednesday at 9:00 PM local time on 3935 kHz. Non-members are invited to stop by and get acquainted. The club also sponsors an extensive and prestigious awards program, including their own WAS and DXCC. For complete info, write to MI QRP Club, 5846 W. Frances Rd., Clio, MI 48430, or stop by the club display at any major MI hamfests. Silent Keys, with deep regret: WB8TCH, WA8UUG, WA8VHC. I congratulate Mark Schreiner, N8QO, on his nomination by SVRA for the 1986 Hiram P. Maxim award and wish him the best possible success. Our VHF Mgr., N8EKS, reports an increase in reporting of VHF activities than in directly to his club efforts in (beating the bushes). For February, he received 16 reports covering 63 sessions, 1045 checkins, and a traffic count of 13. We still are not coming close to realizing the potential of our local nets for NTS traffic, and, even though the FCC 3rd-party logging rules no longer are a hindrance, I continue to hear about groups which prohibit routine formal message traffic on their repeaters. Public service should be everyone's business. Routine message handling is public service in itself, along with providing invaluable training for emergency operating. Let's get up to date, folks! Net summary (QNT), tic sessions: QM: 894/306/81; MTN: 608/255/28; MACS 466/205/28; UPN 1087/82/32; MNN 215/40/54; Traffic: KABCPS 837, AF8V 358, W8DKQC 238, W8QHB 218, KABVOZ 203, W8RNP 74, N8JR 73, K8XG 70, W8BWW 218, W8RHF 57, W8PWF 48, W8SCW 44, K6HAP WB8MTD 34, W8OJOU 32, W8BAZ 31, K8UPE 29, W8DMJ 25, K8OCP 23, W8BSIW 21, W8YUO 20, W8BSYA 17, W8HXH 15, W8EQI K8IG 12, W8CUP 10, W8AMVH 9, W8DEIB 8, W8AURM 6, W8APIM 5.

OHIO: SM, Jeffrey A. Maass, K8ND--ASM: N8AUH, SEC: W8BMPV, STM: KF8J, BM: W8ZNL, AAC: KJ3O, TC: K8BMU. QOC: AD8I, PIO & SGL: N8CVK.
 NET QNT QTC Sess. Time(Local) Freq. MGR
 BNEI 219 162 28 18:00 3.577 W8JMD
 BNLI 158 28 20 21:00 3.577 W8O
 BNR 250 132 28 18:00 3.805 W8EK
 BSSN 556 316 56 0945, 1830 3.873 K8OZ
 CNN 153 36 28 18:30 3.708 W8KWBW
 OSN 285 148 28 18:10 3.577 N8AEH
 OSSBN 1921 734 83 1030, 1615, & 9.9725 W8BMZZ
 1845
 OSSN 150 72 28 0646 3.577 K8AGJ
 Q6MN 92 7 11 21:00 50.16 W8D8CTX
 Ohio Section ARES Net 1500 Sun. 3.875 W8BMPV
 May hamfests: Medina County May 11; Portage Cty Hamfest May 18; Sandusky Valley ARC/Fremont May 16; Athens County May 18 (unconfirmed); Columbus June 1. We are officially out to the hamfest season in Ohio. The tests are being done in Canton, Columbus, Hillsboro, and Mansfield; send an SASE or radiogram to K8ND for details. Ohio suffered an earthquake on January 31, with many ARES organizations going on "standby" while everyone attempted to determine

whether there were major problems. There weren't, but there certainly could have been! Register your station with your county's Emergency Coordinator! I'm saddened to note the passing of the following Silent Keys: W8WAV, WB8TEH, K8LRK, and W8QO. Please advise me of Silent Keys by mail. During February, I attended three events, the NDARS Winterfest, the Mansfield Mid-Winter Hamfest, and the ARRL Great Lakes Division Convention in the Cincy area. It was good to have a chance to throw off cabin fever with so many good friends! The Lucas County ARES Board of Directors for 1986 are WB8H7H, N8PFR, K8AGVZ, and W8D9YV. Toledo-area amateurs provided communications for the annual Winterfest, a huge outdoor celebration including sports, ballooning, art, education, and every other activity that can be done outside in February! The Trumbull County ARES has installed HF and multiple VHF antennas atop their county Red Cross headquarters building, in preparation for a repeat of disaster! Queen City Emergency Net officers for 1986: Pres WB8SCL; VP W4EEB; Sec N8BZZ; Treas W8B8WAV; Communications Manager W8D8DF. The first issue of the Ohio Section Journal, our new newsletter, was mailed in late February, and the second issue should be in your hands now. The OSJ is co-edited by Ron Griffin, N8ACH, and John Naab, KA8TNA, and is scheduled for the annual ARRL organizational appointments (Official Relay Station, Official Emergency, Station, Official Observer, etc.) and to all active ARRL affiliated Clubs. If you would like information on applying for an appointment, contact me! New appointees in February: W8TY EC Allen City; K8WQF EC Clark City; K8DKU ORS and OBS; W8ZOL OBS; N8ZM ATC; and N8CSH ATC. Congratulations all! The Fayette ARA (FARA), a new ARRL Special Service Club, installed their new repeater equipment in February on their 147.27 MHz frequency. The coverage has been enhanced, and they welcome your use of the machine. The 1986 Tour of the Scioto River Valley (OSRV) bicycle event is scheduled for May 10-11, with over 130 amateurs providing administrative and first aid communications as well as a message traffic service for the 4000+ cyclist on Mother's Day. If you would be interested in participating, contact District Emergency Coordinator W8BKQ ASAP! Traffic: W8BO 815, K8VB 468, K8JD 264, W8DKFN 258, W8BDMF 228, K8OZ 222, W8OZK 215, W8B8JW 195, W8B8AC 188, K8TVJ 173, K8DKU 171, W8JMD 163, W8SKP 156, N8JP 152, K8ND 148, K8EBE 135, N8EFB 128, N8FB 113, W8BMEK 102, KF8J 95, W8EK 92, K8CUB 88, W8ZOL 84, K8BCGF 79, N8M74 74, K8RHS 73, N8PNT 72, W8AHEH 72, W8BJE 71, W8SSV 70, W8DKBW 64, N8AKS 61, K8GJM 60, K8BYU 60, N8EY 60, W8VYS 43, N8EY 43, K8AGJ 42, K8D8C 41, W8BKW 40, K8DZ 40, N8BAE 40, W8WEG 42, W8BHQ 40, K8BXL 40, K8DFW 39, K8EF 37, K8BNT 35, W8IO 34, W8FPA 33, W8MIO 33, W8B8WY 31, K8CKY 31, N8CQ 31, N8BF 29, K8OCP 28, K8TJX 26, W8BRIB 25, N8FWA 24, K8CWH 24, K8CJ 23, K8ATHO 23, W8BKW 22, K8ALOM 22, W8ANU 21, N8HBI 19, K8RC 19, K8YV 19, W8BAWM 18, K8VOY 18, K8AR6 17, W8RG 17, N8KB 15, W8BHL 15, W8FUP 14, N8AJU 12, N8KC 12, N8CJS 12, K8BIC 12, K8BWH 12, K8CJ 11, N8BY 10, N8GOB 10, N8SK 9, W8BTR 8, W8BVC 8, W8DCT 7, K8DFR 7, W8D8C 7, W8D8K 6, N8CV 6, K8HGU 6, W8B8O 6, W8D8C 6, W8D8C 6, W8D8C 6, K8RFX 5, W8BATN 4, W8BGM 4, W8LZ 4, W8BKI 4, K8JUP 3, W8ZM 3, N8GST 2, K8LT 2, W8BNH 2, W8BYD 2, K8LT 1, K8MFF 1, K8MFF 1, W8D8N 1, K8BWI 1, W8XT 1, (Jan.) W8BATN 5, W8XT 3.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK--ASM: K2ZM, STM: W82MCO, SEC: AK2E, ACC & SC: N2BFG, BM: W82EAG, SGL: K8ZHQ, TC: K2CZO, ATC: WA2VGM.

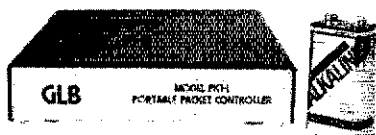
NET	TIME/DAY	FREQ.	NET MANAGER
ESS	2200Z	3.590	W2VSS
CDN	2230Z	3146.34/94	W8ZMCM
HVN	2230Z	144.535/135	KA2MYJ
NYPON	2100Z	3.913	
NYS/M	1400Z	3.677	WB2EAG
NYS/E/L	2300/0200Z	3.677	WB2MCO
SCRN	0000Z	147.735/135	KV2U
SDN	0130Z	147.68/06	K2ZVI

NET LISTINGS (QNT/QTC): AESN 4/5 ATEN 8/12 ESS 365/4 NYPON 661/561 NYS/M 334/173 NYS/3 408/323 NYS/M 281/143 SDN 281/143 W8ZMCM 29/3 CLUE NEWS Albany ARA has new officers Pres: W8B8WY VP: W8BEJ SEC--KN2Q TREAS--K2XA. Tricentennial Commission Director spoke at March meeting. They will have dinner celebrating 50 yrs ARRL affiliation April 11. Report WA2JVB Silent Key. Mt. Beacon working on plans for busy public-service season. Saratoga RACES heard W2YJC speak on packet. Schenectady ARA heard W8SH talk about founding of club-new members K2UJ WA2WQZ WB2FMB--Silent Key KA2JJP. WARA heard W2JZH discuss new equipment and K8ZQN talk about awards. W8CA finished last minute plans for W8OCEST. With deep regret report passing of WA2KJO, N8Y of NYPON. He will be greatly missed. JANI PSHR: W2PKY K2ZVI, FEB PSHR: KA2MYJ, W8ZVUK WA2JBO K2ZVI W2PKY WB2MCO KC2TF N2EQM. Jan. Traffic: (Jan.) W82EAG 141, W2PKY 115, K2ZVI 53, (Feb.) W8ZVUK 225, KC2TF 204, W2PKY 137, WB2MCO 129, KA2MYJ 118, WA2JBO 107, K2ZVI 94, N2AWI 35, KA2TQW 34, K2HNW 32, N2EQM 27, N2FTF 19, W8ZVVS 4.

NEW YORK CITY-LONG ISLAND: SM, John H. Smale, K2IZ--ASM/ACC: W82AP, ASM/VE: W2NL, SEC: KA2RGI, OOC: N82T, TCC/RF: W2UJP, STM: WA2ARC, PIO: W2IYX. The following are traffic nets in and around the section:
 *NLI 3630kHz 1900/2200 WB2EUF mgr
 NCVHF 6.745 rpt 1930 m-f K2MT mgr
 Bavih 6.87 rpt 2000 m-f K2YQK mgr
 SCVHF 5.87 rpt 2000 m-f K2YQK mgr
 ESS 3590kHz 1800 W2VSS mgr
 NYS/M 3677kHz 1900 WB2EAG mgr
 NYS 3677kHz 1000/2200 WB2EAG mgr
 *Denotes section net, all times are local, please try and help out by checking in whenever possible. LIMARF will continue to sponsor examination sessions on the second Saturday of the month at N.Y. Inst. of Technology, Rt. 25A, Old Westbury, in Salton Hall, Rm 2, applicants are reminded to bring 2 forms of I.D., original and a copy of your F.C.C. license, check for \$4.50, made payable to ARRL/VE, 2 pens/pencils and a calculator for the math questions, for further info contact Woody Gerstner, WB2AP, Rt. 42 Mohawk Ave., East Atlantic Beach NY 11561. LIMARF celebrates their 20th anniversary this year, congratulations. Also, Officers for LIMARF are: WA2KE Pres., WB2ALW VP, WB2KWC Treas., WA2UJ Sec. Directors: W82WAK, K2YEW, W82BDN, K2ES, N8K2T, WA2BGE, KA2RGI. SEC for the section reports that the Suffolk County ARES/RACES net will be meeting on 144.730/145.330 Mondays at 2100 local. Any problems with antenna zoning in your town?, contact Vice Director Steve Mendelsohn, WA2DHF, for lots of info. W2UJP TCC/RF for the NLI section was guest speaker at Kings County RC. K2UAT, Skip Courtney, who died in June, 1985, was honored at the South Side High School Class of 1955 reunion. More than 100 class members endorsed and supported

GLB PACKET RADIO GOES PORTABLE

THE FIRST CONTROLLER
DESIGNED FOR PORTABLE
AND SOLAR-POWERED
STATIONS



- LOW 25 mA Current drain.
 - Miniature size—Lightweight
 - All metal, shielded enclosure.
 - On-board Lithium Battery RAM backup.
 - On-board watchdog for reliability.
 - Standard DB-25 Connectors.
 - Output signal indicates "Connected" Status.
 - Does not require squelched audio.
 - 8K RAM-32K ROM.
 - Remote Command Mode for Unattended operation.
 - Hardware command lockout for security.
 - Commands compatible with our Model PK1.
 - Retains all other features of the Model PK1.
 - Extra I/O lines for special applications.
 - AX-25 & VADIC Protocols.
- Power requirement: 9 to 15 Volts DC @ 25 mA typical
Dimensions: 4.6 X 5.9 X 1.0 inches
Total Weight: 12 ozs.

PK11—Wired / Tested
List price—\$239.95
Amateur net—\$209.95

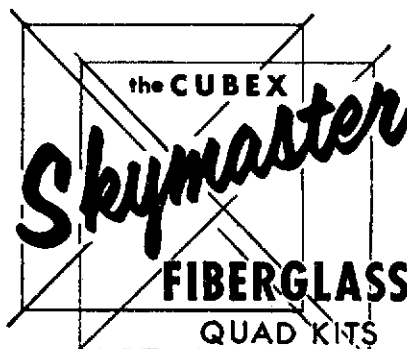
Please specify Call Sign, SSID Number, and Node Number when ordering.

Contact GLB for additional info and available options.
We offer a complete line of transmitters and receivers,
strips, preselector preamps, CWIDlers & synthesizers for
amateur & commercial use.
Request our FREE catalog. MC & Visa welcome.

GLB ELECTRONICS, INC.

151 Commerce Pkwy., Buffalo, NY 14224
716-675-6740 9 to 4

"CHOICE OF THE DX KINGS"



2 ELEMENT—
3 BAND
KIT SPECIAL

ONLY
\$229⁹⁵

FOB Calif.

CONTENTS

- 8 Fiberglass Arms, 1 pc. White 13 ft.
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler, 2" to 2"
- 16 Wraplock Spreader Arm Clamps
- 1 CUBEX QUAD Instruction Manual (Boom and wire not included)

MK III 2 EL COMPLETE "PRE-TUNED"
QUAD ONLY \$279.95

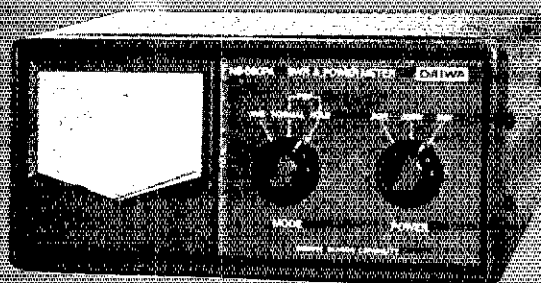
2-3-4 or more element Quads available. Send 50¢ (cash or stamps) for complete set of catalog sheets, specs & prices

CUBEX COMPANY

P.O. Box 732, Altadena, California 91001
Phone: (818) 798-8106 or 449-5925

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

New Cross Needle SWR/Power Meters For All Bands



15° angle face
for easy reading and operation

NS-660A SWR/Power Meter*

Frequency Range: 1.8-150 MHz
Power: 3 Ranges (Forward: 1/30/300 W/3 kW)
(Reflected: 5/60/600 W)
Tolerance: ±10% at full scale
Illuminated meter face
SO-239 Connectors

NS-663A/AN Power Meter*

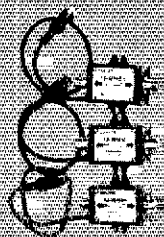
Frequency Range: 140-525 MHz
Power: 3 Ranges (Forward: 3/30/300 W)
(Reflected: 6/6/60 W)
Tolerance: ±10% at full scale
Illuminated meter face
A: SO-239; AN: N Type Connectors

NS-660PA Peak Power Meter*

Frequency Range: 1.8-150 MHz
Power: 3 Ranges (Forward: 1/30/300 W/3 kW)
Indicates forward power only on PEP modes
Tolerance: ±10% Av. Pwr.; ±15% PEP at full scale
Power Source: 6.3-20 VDC
Illuminated meter face
SO-239 Connectors

NS-668 SWR/Power Meter* For UHF Band

Frequency Range: 900 MHz-1.3 GHz
Power: 3 Ranges (Forward: 1.5/15/60 W)
(Reflected: 3/3/12 W)
Tolerance: ±10% at full scale
Illuminated meter face
N Type Connectors
*Optional sensors adapt each meter
for use on other bands.



External Sensors (For Indoor/outdoor use)

Permit operation over range of 1.8 MHz through 1.3 GHz.
Optional for use with series NS-660 series meters.
U-66H, 1.8-150 MHz, Max 3 kW, SO-239 Connectors
U-66V, 140-525 MHz, Max 300W, SO-239 Connectors
U-66VN, 140-525 MHz, Max 300W, N Type Connectors
U-66St, 900 MHz-1.3 GHz, Max 60W, N Type Connectors
9C-20 60 ft. Cable with connectors for use with remote sensors



CN-490M SWR/Power Meter

Frequency Range: 880-930 MHz
Power: 2 Ranges (Forward: 6/30 W)
(Reflected: 2/10 W)
SWR Detection Sensitivity: 1:2 W Min.
Tolerance: 15% at full scale
Backlit
N Type Connectors

NS-448 SWR/Power Meter for UHF Band (Separate Sensor Type)

Frequency Range: 900 MHz-1.3 GHz
Power: 2 Ranges (Forward: 5/20 W)
(Reflected: 1.5/5.6 W)
Tolerance: 15% at full scale
Includes D-16 VDC scale on meter for checking line voltage
Compact 2 3/4" x 2 3/4" x 1 1/2" deep
Backlit
N Type Connectors

High Quality Dummy Loads

	DM-10	DM-20	DL-2
Frequency	DC to 1.7 GHz	DC to 1.7 GHz	DC to 2.5 GHz
Impedance	50 ohms	50 ohms	50 ohms
Power	10 W CW	20 W CW	2 W
VSWR	Less than 1.2:1	Less than 1.2:1	Less than 1.2:1
Connector	N Type	N Type	N Type

Mobile Antennas

(Folding Whip)

DA-200b
144 MHz (1)
Double capacitive loading
Length 73"
Connector PL-258

DA-500b
144/440 MHz (2 bands)
Length 37"
Connector PL-259

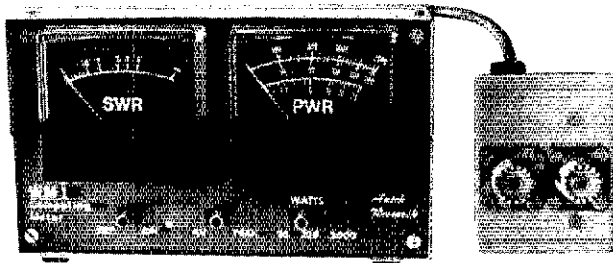


DAIWA U.S.A. INC.,

1908A Del Amo Blvd.
Torrance, CA 90501
(213) 212-6057

MADE BY DAIWA INDUSTRY CO., LTD., TOKYO, JAPAN

COMPUTING SWR & WATTMETER



NEW!
Model WM1
\$89.00
(Includes AC Supply)

- **AUTOMATICALLY COMPUTES SWR.** No adjustments needed!
 - **READS SWR DIRECTLY.** Even when you're talking on SSB!
 - **GREATLY SIMPLIFIES TUNER ADJUSTMENT.** SWR reading not affected by forward power. No confusing readings.
 - **REMOTE RF HEAD.** A must! Up to four feet from meter. Coax can't pull meter off table.
 - **AVERAGE & PEP READING.** Allows compliance with latest FCC rules.
 - **THREE RANGE SCALES.** 2000, 200, 20 watts. Usable to less than 1 watt.
 - **TWO TOP-QUALITY METERS.** Large 2 3/4" meters.
- 1.5-30 MHz 5% F.S. Accuracy. Uses 8-18 VDC or 115 VAC. 5 1/4" x 3 1/2" x 2 3/4". Attractive light/dark grey styling.
- WHY PUT UP WITH AN INFERIOR METER OURS DOES IT ALL — AUTOMATICALLY!**

THE AUTEK "QRM ELIMINATOR"

Also reduces errors in computer CW/RTTY copy!



Model QF-1A
For SSB & CW
\$73.00
(Includes AC supply)

- 115 VAC supply built-in. Filter by-passed when off.
- Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.
- Four main filter modes for any QRM situation.
- Continuously variable main selectivity (to an incredible 20 Hz!)
- Continuously variable main frequency. (250 to 2500 Hz)

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will do to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

Built-in 115 VAC supply. 6 1/2" x 5 1/2" x 2 1/2" two-tone grey styling. Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig—Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr. or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works! If it can't pull him out, nothing can.

an award in his name. A fund to support an annual award to a South Side High School student has been established, gifts for the Memorial Fund for John G. (Skip) Courtney may be mailed to Peter Brindley, 362 Route 25A, Mount Sinai NY 11766. Please note that Woody, WB2IAP, keeps a very up-to-date list of VE exams, places and names of people running them, please let him or W2NL know of any changes. Traffic: K2YQK 342, K2GCE 213, W2GKZ 60, K2JFE 7.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASM (VE liaison): N2XJ. SEC: K2BZM, 8TM; K2HNO, OQ/ACC: N2WMI, ACC: K2BJG, PIO: W2BNQV. SGL: W2KB. TC: K2BLA. BM: N2CXX, February 1986 appointments are: N2BOT EC (Riverdale); W2QPY NM of TCEN; OCS: K2ZS, K2AZZ, N2KAT and N2KAT; OCS: OFS W2QPY; OCS: K2ABZS and W2IBB. NINJA ARE S does not have sufficient members in most of our NNJ districts. For information on how to apply contact SEC Ed Tritari, K2BZM, 41 Plymouth Rd. Paterson NJ 07502, 790-1503. Ed will put you in touch with the DEC in your county. ECs for each municipality are needed, and we can use as many OCS's as possible. Our PIO has established a NNJ section "Speakers Bureau" for the purpose of registering amateurs to present talks on amateur radio to non-amateur groups. PIO contact is Charles Kosman, W2BNQV, RD 2 Box 249 Annandale NJ 08801, 795-7396. ARRL Hq is now forwarding requests for technical information or assistance to section technical coordinators. Our NNJ TC is ready to handle these requests. New requests should be made directly. TC contact is Albert Helrick, K2BLA, RD 4 Box 87 Boonton, NJ 07005. NNJ ATCs are now in place to provide technical assistance to amateurs in all areas of the NNJ section. You don't have to be an ARRL member to request this service, but we think you will want to support our effort by joining. OBS W2FMN is now operational as a 100 wpm Baudot MSO on 144.99 MHz. SSC Bergen Amateur Radio Asso has appointed K2UFM and SSC Ramapo Mountain ARC has appointed W2RS as HF Awards Manager. The Ramapo mountain ARC conducted a seminar on amateur radio featuring the ARRL "Newest Frontiers" and provided communications for the "Forward to the Future" space shuttle flight simulation aerospace education project at the Oakland middle school. Jeannine Duane, W2ZMBW, the New Jersey finalist for the NASA teacher in space was part of the program. Congratulations to the following who were newly licensed or upgraded during February sessions of the NNJ VE Board (Cranford), the Bergen Amateur Radio Asso (Fairlawn), and the Old Bridge Radio Asso. Novice: F Gasparini. Technician: K2WVGJ, K2ZWGK, K2ZUQ, K2ZVZO, K2ZWEK, K2ZWKZ, and J Wallace. General: R Galbraith, K2ZLV, W2ZHAJ, K2ZBS, and Sullivan. Advanced: N2CID, K2ZJHS, W2ZOXI, K2ZIGZ, and N2PFC. Extra: K2ZFCG, K2ZFCG, K2ZPT, K2ZRH, W2ZQU, and W2ZKI. February Data:

Net	Mgr.	Freq.	Time	Sess	QNS	QNI	QSP
NJM	W2RXX	3695	1000	Dy	2R	215	116
NJPN	W2CC	3950	1800	Dy	31	327	148
NJNE	AG2R	3695	1900	Dy	28	194	157
NJNL	AG2R	3695	2200	Dy	28	077	022
ORITN	W2QMP	147.12	2000	Dy	28	282	192
TCETN	W2QPY	146.685	1930	Dy	28	045	025
NJVN	W2ZANK	146.49	2230	Dy	28	217	118
NJPTN	W2ZSNA-1	145.01					

UPLINK Amateur Radio News call 201-735-8550

MIDWEST DIVISION

IOWA: SM, Rollin J. Sievers, W8AVW—SEC: K8BBG, BM: K8IIR, ACC: W8QAM, PIO: N8EBA, OCC: K8BRT, TC: K8DAS, SGL: K8QK, STM: K8BXL. The Davenport Hamfest was a great success. Also a meeting there involving appointees and other interested hams which was conducted by the SM and the SEC was very informative. NOBJ, Bill, of Salem is the new NM for the Iowa Cde Net. The net is scheduled to meet Mon. Wed. Fri. at 8 PM local time on 3705 MHz. This net is going to need all the support it can get, please give it a try. Cedar Valley Amateur Radio Club Officers for 1986 are: Pres. N2CZ, VP: K8QPR, Treas: K8SYO, Sec: N8CQR. K8DRT is still looking for more good OOs; you must be a Tech or higher and licensed for at least four years. Congrats to K8GRW and K8QEK for upgrading.

Net	QNI	QTC	Freq.	Time	Day	Mgr.	
75 mtr	noon	1229	65	3970	1830	Dy	W8JFF
75 mtr	eva	877	71	3970	2330	Dy	N8AEF
TLCN	(CW)	280	142	3560	003-0400	Dy	W8YLS
ITEN		177	4	2330	Sun	K8BBG	

Area RTTY operators-A net meets on 145.41 MHz repeater in Ottumwa, Saturdays at 7 PM. Net is announced on voice then moves to 100 WPM Baudot on 3705 MHz. Net is on 404 mcs, 56 sessions. Iowa represented 100% by A9D, K8ADF, N8CWW, W8FC, K8GP, W8QMV, N8SM, W8SS, W8YLS. Traffic: W8BAU 224, W8SS 166, K8XGP 122, W8DFWB 115, W8YLS 84, K8BXL 70, K8ADF 64, W4JL 52, W8AVW 34, W8JFF 32, K8GSA 30, K8BRE 18, W8FC 14, W8WB 8.

KANSAS: SM, Robert M. Summers, K8BXF—SEC: N8BLD, STM: W8OYH. It is with deep regret that I inform you of another Kansas SILENT KEY: W8WXY, Clem. Word from the hospital in Salina has Wilbur, W8WXY, on the road to recovery list. State traffic net reports for January are as follows with QNI/QTC: K8BN 1444/87, KPN 409/17, KWN 865/639, KMWN 658/622, CSTN 2418/50, QKS 202/44, QKS-SS 337/8 and the KS RTTY net 83/10. Many thanks again to those fellows who are representing us on the Ten-Tec level. N8CQC especially. Len has also recently added RTTY capability to his shack. Congratulations to K8TBR upgrading to Advanced. W8H1 sporting a Ten-Tec Corsair driving Alpha 76A top loaded vert ant, another of Kansas finest traffic handlers. Next month we will continue to give a few more of the club bulletin editors a word or two of praise. This month we need to say to all those who have been supporting the state Weather nets—HANG IN THERE!! Hopefully there will be another ruling, maybe even by the time you read this. If not, we in Kansas won't fret cause we were in existence long before we started reporting to the WX SERVICE. A slight change in direction is no hit for a climber. REMEMBER something else too!! DON'T LET THE FCC WRITE ARRL FIRST!!! TR help us—FCC didn't. Traffic: Jan, N8GQC 527, W8QBK 318, W8FIR 230, W8KJL 122, W8FRC 118, K8SU 98, W8OYH 96, W8H1 75, K8BXF 73, W8FDJ 72, W8BZEN 44, W8BHZ 42, W8QMT 33, W8PB 16, W8MYM 12, N8BZ 3, W8RBO 2.

MISSOURI: SM, Ben Smith, K8PCK—SEC: W8TOK, STM: K8SI, Bulletin Manager: W8TEG, OQ Coordinator: W8RHK, TC: K4CHS, ACC/PIO: KTSY. All of these Section Leadership Officials are eager to assist the amateurs of Missouri in obtaining Field Appointments, EC and DEC Appointments, helping with club programs and RFI problems. Feel free to contact any of us anytime. Effective March 1, K8PGN is no longer Net Manager of MTTN. We are sorry to see Brenda resign from that position, but we want to thank her for two years of service to Missouri. Ken says, W8PFC, W8BCK and W8FGL. Anyone that ever attended the old Ham Butchers Net picnic will remember the musical entertainment W8FOL and his XYL provided for the picnic. February seems to have been a slow month for amateur radio activity. As spring arrives and clubs take part in more community events please send me reports. Nets reporting:

NO LONG DELAYS. WE SHIP 95% OF ORDERS FROM STOCK

We sell only factory direct. No dealer markup in our price. Order with check, M.O., VISA, MC. We pay shipping in 48 states. Add 5% tax in Fla. Add \$3 to Canada, HI., Ak. Add \$18 each elsewhere. (Shipped air.)

Autetek Research

BOX 302 DEPT J

ODESSA, FLORIDA 33554 • (813) 920-4349

Get ★★★CONNECTED to Packet Radio

by Jim Grubbs, K9EI

The Packet Radio Handbook

Over 150 pages of information exclusively on packet radio

17 Chapters including:

- ★ Choosing a TNC
- ★ Packet protocol for the beginner
- ★ Packet Accessories
- ★ How to make your first packet contact
- ★ Packet Bulletin Board Operations

\$12.95 plus \$2.50 for first class shipping and handling in U.S. and Canada.

Also available *The Commodore Ham's Companion* \$15.95 (see January '86 QST page 47 or February '86 CQ page 68) and *Command Post* \$9.95.



P.O. Box 3042
Springfield, IL
62708

MULTI BAND TRAP ANTENNAS

TRAP DIPOLES:

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55'	\$59.95
D-42	10/15/20/40/80	2	105'	64.95
D-58	10/15/20/40/80	4	92'	108.95
D-66	10/15/20/40/80/160	6	163'	129.95

TRAP VERTICALS--"SLOPERS"--*

Model	Bands	Traps	Length	Price
VS-41	10/15/20/40	1	28'	44.95
VS-52	10/15/20/40/80	1	49'	59.95
VS-93	10/15/20/40/80	1	42'	69.95
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 feedline works all bands - Instructions included - 10 day money back guarantee!

SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
D-15	15	27'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	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'	\$6.00	\$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 SO-239 Receptacle
- Handles Full Power
- Completely Sealed, Weatherproof
- Easy to make 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/pr.
For 5-band Dipole Ant. 80/40/20/15/10 \$38.00/pr.

ORDER DIRECT FROM FACTORY. All orders shipped US Postpaid. VISA/MC - give card #, Exp. date, Signature

SPI-RO MANUFACTURING, INC.
Dept. 106, P.O. Box 1538
Hendersonville, NC 28793

Dealer Inquiries Invited

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!

Ham Accessories For Superior Operation

SWR & POWER CROSS NEEDLE METERS

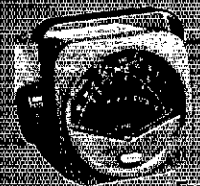


CN-620B and CN-720B
Frequency Range: 1.8-150 MHz
Power: 2 Ranges (Forward, 20/200/2000 W)
(Reflected, 4/40/400 W)



CN-630 and CN-630N
(N Type Connector)
Frequency Range: 140-450 MHz
Power: 2 Ranges (Forward, 20/200 W)
(Reflected, 4/40 W)

NS-448
900 MHz - 1.3GHz
(Forward 5/20 W)
(Reflected 1.6/6.6 W)
Separate Sensor Type



CN-520
Frequency Range: 1.8-80 MHz
Power Range: 200/2000 W

CN-540
50-150 MHz
20/200 W

CN-550
144-250 MHz
20/200 W

CN-410M
Frequency Range: 1.5-150MHz
Power Range: Forward 15 W/150 W
Reflected 5 W/50 W

CN-460M
140-450 MHz
15 W/150 W
5 W/50 W

CN-465M
140-450 MHz
15 W/75 W
5 W/25 W

BackLit, with mobile bracket.

ANTENNA TUNERS



CNW-318
Range: 1.5-30 MHz (8 bands)
Power: 1 KW CW (25% duty)
Rating: 100W CW (1.8-3.4 MHz)
Output: 10-250/25-100 ohm
Impedance: (On 3.5 MHz)

CNW-418
Range: 1.8-30 MHz (17 bands)
Power: 200 W CW (3.5-90 MHz)
Rating: 100W CW (1.8-3.4 MHz)
Output: 10-250 ohm

CL-680 (no metering)
Range: 1.8-30 MHz (17 bands)
Power: 200W CW (3.5-30 MHz)
Rating: 100W CW (1.8-3.4 MHz)
Output: 10-250ohm

CNW-919
140-150 MHz
200W CW
10-250ohm

MOBILE

ANTENNAS (Folding Whip)

- DA-2006**
144 MHz 3rd
Double Capacitive Loading
Length 72"
Connector PL-259
- DA-6006**
144-148 MHz
6 Bands
Length 57"
Connector PL-259

AUDIO FILTERS

AF-606K & AF-406K

Four stages of filtering... variable bandwidth over broad range... razor sharp CW reception... built-in speaker. The AF-606K adds PLL Tone Decoder circuitry, PLL locks onto the desired CW signal and reproduces it with utmost clarity.

ELECTRONIC KEYS

Sharpen your "list" with Daiwa precision!

DK-210

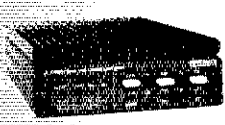


COAXIAL SWITCHES

PAT. No. 59-0008003

Model	Position	Frequency	Connectors	SWR	Insertion Loss
CS-201	2position	800 MHz	SO-239	Back 1:12	Less than 0.2 dB
CS-201G	2position	1.3 GHz	N type		
CS-401	4position	600 MHz	SO-239		
CS-401G	4position	1.3GHz	N type		
CS-4	4position	1.3 GHz	BNC type		

POWER AMPLIFIERS



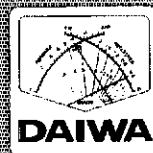
Model	Band	Input Power	Max. Output Power
LA-2035	144-148 MHz	0.5-3 W	30 W plus
LA-2035R	144-148 MHz	0.5-3 W	30 W plus
LA-2065R	144-148 MHz	1-14 W	60 W plus
LA-4040R	430-450 MHz	10 W	35 W

POWER SUPPLIES

PS-30XM	Max 31A Continuous 24A 13VDC-15 VDC Variable
PS-310M	Max 31A Continuous 24A 9VDC-14.8 VDC Variable
PS-310MD	Max 31A/24A Continuous 13.8 VDC Fixed Plus sub-DC outlets Max 5 BA/5A Continuous 3 VDC-14.8 VDC

Heavy Duty Power Supply

PS-560MD
Max 56A/44A Continuous Plus sub-DC outlet 10.6/10A 1 VDC-15 VDC



DAIWA U.S.A. INC.,

1908A Del Amo Blvd.

Torrance, CA 90501

(213) 212-6057

MADE BY DAIWA INDUSTRY CO., LTD., TOKYO, JAPAN

ASK ANY HAM... THEN ASK FOR HUSTLER.

AMATEUR ANTENNA PRODUCTS



STILL THE
STANDARD OF PERFORMANCE



One New-Tronics Place
Mineral Wells, TX 76067
(817) 325-1386

NET	Sea	QNI	QTC	Day	Time	PM	Freq	MHz	Mgr
MON	5/6	342	260	Div	7:00P	45	3.585		K6SI
K0SSB	28	812	89	Div	8:00		3.983		K7Y
MEOW	28	534	84	Div	8:30		3.983		K0DSQ
HBN	20	290	20	Mon-Fri	12:05		3.890		K0DSQ
NEMOE	12	90	8	TSat	7:30		144.535	13	K4FTS
PHD	4	171	7	Mon	9:00		146.43		W4MKH
MCFON	4	31	6	Wed	8:15		222.424	02	AI0
RRABN	27	345	4	Div	8:00		148.397	79	K4LLN
LARES	4	26	4	Wed	8:00		146.107	70	W0BRHC
POARES	4	28	4				145.194	69	K0BUU
ZAEN	4	64	2	Tue	8:00		147.842	24	NOBE
LOZBC	24	348	0	Mon-Sat	6:00	AM	146.137	73	W0RTL
LOZFM	4	90	0	Sun	9:00		146.137	73	W0RTL
SARFI	4	59	0	Thu	9:00		146.437	03	W0EAW
CMEN	4	35	0	Wed	9:00		146.187	76	KBCKK
ARES	4	45	0	Sat	9:00		147.955r		N0FCW

Traffic: W0BMA 932, K0SI 241, AI0 153, N0DN 122, K0PRB 118, N0BKE 97, K0DUJ 87, K7S Y 86, W40YJX 59, K0GAS 57, K0PCK 43, K0DSQ 43, N0SS 39, W0UD 39, N0RP 22, W0YPL 12, K0CUU 1.

NEBRASKA: SM, Vern Wirka, W0B0GQM—STM: Jerry Kohn, W0DEGK. Please note the new address of your Section Manager: Vern Wirka, W0B0GQM, 3106 Vinton Street, Omaha, Nebraska 68108. The phone number is 402-541-4572. Another new meter repeater is operational in Nebraska. The NCCO repeater is 144.59 MHz input, 145.19 MHz output machine located ten miles west of Lincoln on the southwest corner of Pawnee Lake. The Midway Amateur Radio Club reports the WBYIG repeater on 147.99 MHz input, 147.39 MHz output now has an operational phone patch. Phone patch operation is the * sign to bring the phone patch up and the # sign to bring the patch down. Everybody is reminded that proper identification is required when accessing and clearing the repeater phone patch. Members of the Ralston, Nebraska, Radio Club were featured in an Omaha World Herald newspaper article. The Ralston Club includes students from the Ralston Middle School and Ralston High School. Club sponsor, Ralston Middle School life science instructor, Martin Lesch, says club members are involved in short wave listening and amateur radio. Some Ralston Students have obtained their novice licenses since joining the club. Traffic: K0DKM 164, W0KK 112, N0DA 23, K4BECB 11, W4B0K 8.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Robert J. Koczur, K1WGO—STM: K1EIC. SEC: K41ECL. BM: K3ZJJ. ACC: K6G1M. OO/RFI: NA1I. TC: W1HAD. PIO: KX1E. SGL: K1AF.

NET	FREQ	LOCAL TIME	QTC	QNI	NM
CN	3649	1000/2000	19	207	K1EIR
CPN	3858	1800 M-S	112	277	K41BHT
NVTN	22/88	2130	41	194	N1BOW
WCN	78/18	2030	408	266	W0IGXZ
RIN	13/73	2100	53	210	K41JAN

Field day is coming fast. Now is the time to start making plans and dusting off that field equipment. If we all pull together, we can make this the best Field Day ever for the Connecticut section. Congrats to Betsy and Paul Doane, K1EIC and K1HAD, and to Barbara Lombardi, K1EIR. Due to their selfless activity on the air in behalf of the Mexico City earthquake victims, they were recognized on Dr. Norman Vincent Peale's program on WOR radio and an affiliated network of over 600 stations. Fantastic publicity for ham radio. Keep up the good work. Things like this are part of the reason that ARRL membership keeps climbing. Membership as of January 31, 1986 for New England was 9,802 as compared to 8,606 the previous year. The FARA club is planning a move to new headquarters within the next few months. The new address will be published here when it becomes available. From John Ronan, K3ZJJ, Vermont joined NESMC at the February 15 Board meeting. Now all New England states are members. Vermont, as Connecticut, in "secondary" status. For Connecticut, this means that TSARC remains the primary coordinator. Connecticut may change status by a majority vote of Connecticut repeaters. For repeater coordinating questions relative to either TSARC or NESMC, please call K3ZJJ at 225-3388. From AJ Jaras, NA1I: Any violation of the FCC regulations, the Communications Act or an international regulation is of interest and concern to all of us in the radio amateur community. The OO/AA program is responsive to all types of rules violations. Have you got what it takes to help others? Become an OO. Contact AJ Jaras—NA1I—122 Columbus Ave., Meriden, CT. 06450-9992. That's all for this month. Keep hammering it up. K3s. Traffic: K1EIR 392, K41MD 37, W01S2 369, W1EWF 193, K41KTH 141, K41MKJ 123, K41GWE 119, W1YOL 118, N1BOW 98, N1DMV 75, N1DNA 65, K41BHT 55, KY1F 54, W1BDN 39, K1AOE 26, W1NLD 26, N41O 18, W0IESJ 10, W1CUH 9, W1QV 6.

EASTERN MASSACHUSETTS: SM, Luck Hurdur, KY1T—ASM: K3HL. OO/AUX: K41KF. SEC: K01PA. STM: KW1U. ACC: K1AZE. TC: K41IU. PIO: K1HLZ.

NET	MGR	FREQ	TIME(LOC)	DY	QTC	QNI
EMRI	N1AJW	3658	1900/2200	DY	187	182
EMRIPN	N1BOW	3880	1730	DY	279	200
EM2MN	K41AMR	145 23	2000	DY	183	307
NEEPP	K1BZD	3945	0830	SN	5	51
HRTN	W01CMQ	04/64	2230	DY	178	356
EMRIS	N1CJF	3715	1800/2030	DY	213	195
CITN	K01AF	745/045	1930	DY	160	255

Congratulations to new net manager, K01AF, who took the reins of the Cape and Islands Net on April 1. Thanks to N1BYS for first establishing and then capably nurturing the CITN. OES AE1X reports spending considerable time preparing and presenting proposal for use of Amateur Radio to new Director of Attleboro CO. OO/AUX Coordinator K41KF sez that the Amateur Aux. to the FCC's FOB is hard at it, assisting the FCC wherever possible. Two recent examples include collecting data regarding an Amateur who is allegedly enjoying the benefits of packet radio (without the benefit of a tech license), and a gentleman whose HF signal gains and losses 26 dB when turning on and off his amplifier. Think about it! Several club newsletters are already talking up Field Day—which serves to warm up those of us shivering in our shacks. Wellesley ARS has Novice class going full guns, with a General class in the planning. Lower Cape Cod Amateur Radio Service Group has been formed to address problems of attracting young people to Amateur Radio, assisting the elderly and/or handicapped and promoting the Amateur Radio Service via the media. Contact K1KED or W2LP for further info. Congrats to N1BGW for top traffic totals this month and to K41K & W01CMQ who had top scores on Public Service Honor Roll. Traffic: W0BGW 254, W1W1Z 249, W1ATY 245, K41AF 203, K41K 153, N1BHM 141, W1ZCH 232, KY1I 196, N1CWE 181, W01CMQ 175, N1DDC 170, K41AMR 146, K41ON 123, N1AJJ 113, W1CE 94, N1DVI 69, K1ISEC 62, K41EID 60, K41LH 57, K01PA 63, W41KLG 46, W1DMH 30, K41KU 30, W41FM 27, K1ABO 27, W41SNH 21, K1BZD 21, K1LCO 11. HAVE YOU

EXPRESSED YOUR OPINIONS TO YOUR DIV. DIRECTOR AND YOUR SECTION MANAGER LATELY? 73.

MAINE: SM, Cliff Lavery, W1RWG—ASM: W1KX. SEC (vacant). STM: AK1W. ACC: KY1C. BM: W1JH. OO: W1KX. PIO: KY1E. SGL: K1NIT. TC: K1PV. Bill Mann, W1KX, has been appointed Assistant Section Manager; welcome aboard Bill. Also writing new emergency emergency coordinator, Lee Branum, K17JG, has resigned to put more time on his academic program; he is still net manager of the Maine Public Service Net. PSHR: W01GBP W1RWG W41YNZ. NETS: Sessions/QNS/QTC: SeaGull 23 610 199 K1GUP PineTree 28 259 109 K1M2B CentralMaine 8 180 17 W1WCI LatePineTree 15 47 13 W41YNZ RACES 4 59 7 W1RWG Aroostook 4 60 0 W41YNZ

Volunteer exams are scheduled for May and June; check dates. PLIC VE test examined 30 candidates taking 48 elements and passing 35. 24 either upgraded or received code credit. PAWA is conducting a Tech/General class. Packet radio has made a strong start in Maine according to K01L at a recent demonstration at a meeting of Augusta club. Traffic: AK1W 159, K1M2B 102, W1ISO 92, W01CBP 86, W1KX 66, N1D1A 56, W1RWG 46, K41JQJ 45, W1JTH 42, N1D1A 56, W1BMX 42, W41YNZ 24, W1VEH 19, W1GCB 18, N1BIR 15, N1BME 8, W1OTQ 6, K41F1L 6.

NEW HAMPSHIRE: SM, Bill Burden, W01BRE—STM: W1TN. ACC: K1IM. The quarterly state organization (NHARA) meeting was held in Concord, NH, with excellent attendance by club reps and Section staff. K1IM was commended by League HQ for the new state newsletter format. W1FYF reported that many area hams assisted in providing emergency comm support during a telephone outage affecting the Keene hospital. The state organization has become affiliated and the CVFMA voted to become an ARRL affiliate—congratulations! Amateur Radio was part of the Seabrook evacuation plan exercise with K1ACL, W41PEL, W01GXM, K01KJ, W1YFZ and many others participating. Congratulations to Bill Dodge, W41PEL, on becoming the first HF Awards manager in New England! Two new ATCs appointed by TC W1JY—Dale AF1T and Mike K1VLB—contact them with your technical questions. Correction on new NARC club officers—K41LDF President; AK1K V-President; K4GHI Secretary; W41TGN Treasurer; K1C1L Membership; W01BRE Programs. The new Concord Brass-copiers is Bill Burden, W1RWG. W01GZX sent me a message reporting that the NH section (and all NE sections) had 100% attendance on 1PN in February! A tremendous accomplishment with a lot of time and energy contributed by dedicated traffic handlers—congratulations to the 1PN team. Try joining this winning team—get on a traffic net and send a message or handle traffic just once a week or even once a month! You'd be surprised how a few of you getting on regularly could help the system provide better service and reduce the load on some of the regulars. W1TN reported that W1QYV was selected for the ARRL Blue Ribbon Panel to study and recommend methods of handling message traffic over emergency frequencies. Traffic: W1N 100, G5FM 109, G5SN 100, N1CPX 106, W1PEX 284, N1AKS 168, N1NH 133, W1TN 111, K1IM 109, W01GXM 87, W1ALE 85, K1K1E 83, K41LWB 70, K41UO 70, K1TYG 65, K1POV 58, K41S/4 35, K41L BH 22, N1ALM 18, W1FYR 17, K41HPO 15, W1HSB 10, N1DQA 8, W1HJF 6.

RHODE ISLAND: SM, John [Bob] Vota, W01FDY—New officers of E.B.A.W.A. Pres. K1SJ, V.Pres./res. W01DEZ, Sect N1BYV. E.B.A.W.A. has new Rpt on the air 144.73/145.33. Hope to c.u on the air. New Club in RI No. Prov. Amateur Radio Club. Officers are Pres. W01FDY, V.Pres. K41KSK, Treas. K41JFT, Sect. N1DRL. The NPARC is an open club to all licensed Amateur Radio Operators. RI QSO Party top scores: RI1—K41GQV, 2—K41KSK, 3—W01DEU. (Out of State) 1—W01ZB, 3—W01GTA. The NET-WORKS, a newsletter for active Traffic Handlers, and glad to see that all the New England Nets are doing so well. We still need traffic handlers here in RI. Pse help. INX. Traffic: W1E0F 128, K41XJH 40. The SM or one of his staff will visit all Field Day Sites this year. Good luck all.

VERMONT: SM, Ralph Stetson, KD1R—Welcome to MAY, the month of planning. Or should I say the last full month to prepare for the Challenge of FD 86. I would appreciate a note indicating where your club will be set up. Belated 88th birthday wishes to "the Ole Farmer" W1LTV. Congrats to new NM N1CRE of the VT SSB which meets daily at 8 PM except for Sundays at 8 AM on 3.909. A special thanks to N1C0B & N1ARI, outgoing NM of VT SSB net. Understand that W1JLU and K41DLK are getting active with N1M. Welcome aboard and have fun! Well, I have had a Hamfest with 10-year-old Milton Hamfest. He is from Concord, N1UNU. Two days after Milton Hamfest, I learned of another young Ham, 11, in Brattleboro area. Each of these young men are to be recognized by their schools and local clubs as well. Watch the Packet Bulletin Board for further info. A reminder to all club newsletter publishers: I need to have your input for previous month in my hand by the 5th of month to ensure coverage in this column. This might be why column is a bit thin this month. As of this writing, I have received no newsletters. So please remember the deadline for submission to myself, AE1T and W1C1M is the 5th of the month. Your help in remembering this date is much appreciated. There was a good turn out for the Annual Milton Midwinter Hamfest considering we had a typhoon winter storm on the day before and right at the height of flu season. Even so, a lot of bargains were to be had. Hope to see you there next Feb. and looking forward to Deerfield later this month. As always, I wish to remind folks that if they are having a problem that is Ham Radio related, please call me at my number on page 8. I wish to extend to all traffic handlers my appreciation for a job well done, especially K1C1O who hit 1000 points this month. Traffic: K1TQ 1120, N1DHT 70, W1LTV 68, W1S 56, W1W 35, W1OAK 27. Net Reports: VTR 28/184/104; GAR 24/567/36; GMM 24/366/30; V1PHN 4/398.

WESTERN MASSACHUSETTS: SM, Don Haney, K41H—OO: N1M. PIO: K01BE. SEC: K01SAL. STM: W1K1H. TC: K41JIM. ST: W1L1D. The end of a successful netting for W1ZPB after a year of studying solar and other energy sources. W41OPN wrote a very good article published in February World Radio. KY1H and W01EYL started Novice classes for NOBARG and had 30 prospective hams the first night. Plans are afoot to use packet radio for health and welfare traffic for the next Yankee/Rowe fest expected in early summer. HCRA received a very enjoyable letter from W1HDO who lives in Florida now after many years in this area. Field Day is coming soon. Are your plans getting finalized? K0ES has been working on CMAAA plans since February. N41Q conducted a Novice training sessions in Worcester. K41WAB/K1LUNY just had a successful annual Oxpedition, this time to Bequa in the St. Vincent group. Enjoyed meeting several of you at Mt. Tom meeting and a super program on ARES, RACES, and NTS. Congrats to N1DMU for BPL in February. Nice work Dan. WMTN on .91 at 1:00 averaged 13 check-ins per day and looks like 6:00 PM is better

CAN'T AFFORD A "ZZZ"?



But you want a new excitement machine?

Are you ever in luck! For a whole lot less than the price of a new "Z", you can buy a new Bencher paddle - an investment for a lifetime of responsive, smooth keying that "Z" owners can only dream of. See your Bencher dealer. Ask for a test drive. Check out the model and color selection. And get set for a thrill!

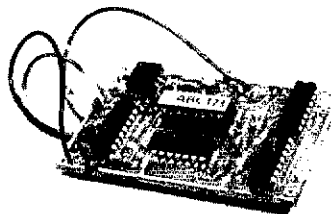
from Bencher - we make CW fun again.

BENCHER, INC.

313 W. LAKE ST. CHICAGO, IL 60608-1312/263-1800

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.

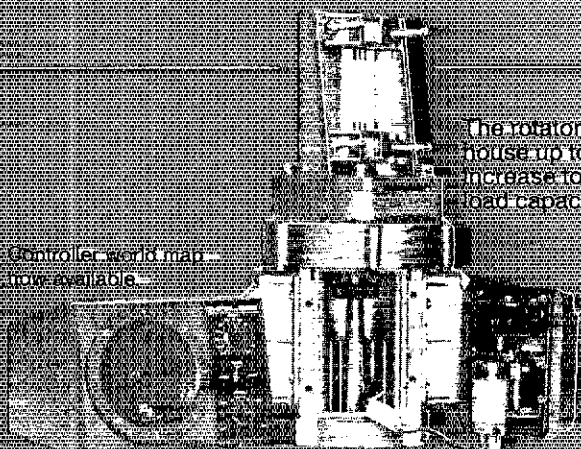
Inquire about commercial models.

AUTOCODE

P.O. Box 7773 Dept. Q
Westlake Village, CA 91359
(805) 497-4620

Advanced Multi Torque Antenna Rotator

Controller world map now available



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

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

The main frame and reduction gear train have been designed to withstand maximum wind loading.

Maximum brake power is 18,300 lbs/in when 4 motors are installed.

Low voltage (24 VAC) motors. Low cost 6-wire control cable. Can be installed on the same base as a TELEX unit.

Specifications

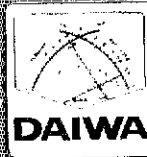
Rotator Unit

	MR-750E/PE		MR-300E
Rotation time	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)
Output torque Brake power	1 motor	610 lbs/inch 5,200 lbs/inch	220 lbs/inch 1,700 lbs/inch
	2 motor	1,200 lbs/inch 9,600 lbs/inch	440 lbs/inch 3,500 lbs/inch
	3 motor	1,800 lbs/inch 13,900 lbs/inch	650 lbs/inch 5,200 lbs/inch
	4 motor	2,400 lbs/inch 18,300 lbs/inch	870 lbs/inch 7,000 lbs/inch
Rotation angle	375 degrees		
Permissible mast size	1 1/2 ~ 2 1/2 inch (38 ~ 63 mm) < diameter >		
Control cable	6-wire cable 0.5sq - 1.25sq (AWG16/18/20 etc.)		
Continuous running	5 minutes Max. permissible		
Dimensions	15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)		
Unit weight	16.5 lbs (7.5 kg) < with 1 motor unit fitted >		

Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set

Unit	MR-750E/PE	MR-300E
Price	\$149.95	\$119.95
Price with 4 motors	\$249.95	\$199.95
Price with 6-wire cable	\$259.95	\$209.95
Price with 6-wire cable and 4 motors	\$299.95	\$249.95
Price with 6-wire cable, 4 motors and 1 year warranty	\$349.95	\$299.95
Price with 6-wire cable, 4 motors, 1 year warranty and 1 year labor	\$399.95	\$349.95



DAIWA U.S.A. INC.

1008A Del Amo Blvd.
Torrance, CA 90501
2191 212-6057

DAIWA INDUSTRY CO., LTD. TOKYO, JAPAN

QUANTITY PARTS DISCOUNT PRICES
FAST SHIPPING
ALL ELECTRONICS CORP.
 905 S. VERMONT • P.O. BOX 2040E • LOS ANGELES, CA 90008

SEND FOR FREE NEW 1986 CATALOG... 48 PAGES!

10 AMP SOLID STATE RELAY
 CONTROL: 3 - 32 vdc
 LOAD: 140 vac 10 amp
 SIZE: 2 1/2" x 1 1/2" x 3/8"
\$9.50 EACH 10 FOR \$90.00

48 KEY ASSEMBLY
 NEW T.L. KEYBOARDS. Originally used on computers, these keyboards contain 48 S.P.S.T. mechanical switches. Terminates to 15 pin connector. Frame 4" x 9" CAT # KP-48 \$6.50 each 2 for \$11.00

XENON FLASH TUBE
 3/4" long X 1/8" dia. Flash tube designed for use in compact camera flash units. Ideal for experimenters. CAT# FL-T-7 2 for \$1.00

13.8 VDC REGULATED POWER SUPPLY
 These are solid state, fully regulated 13.8 vdc power supplies. Both feature 100% solid state construction, fuse protection, and L.E.D. power indicator. U.L. listed.
 2 amp constant, 4 amp surge \$18.00 each
 3 amp constant, 5 amp surge \$25.00 each

RECHARGEABLE NI-CAD BATTERIES
 AAA SIZE 1.25V 500MAH \$1.85
 AA SIZE 1.25V 500MAH \$1.85
 AA with solder tab \$2.00
 C SIZE 1.2V 1200MAH \$3.50
 D SIZE 1.2V 1200MAH \$3.50

EDGE CONNECTORS
ALL ARE 1.56" SPACING.
 22/44 EDGE CONNECTOR
 P.C. style \$2.00 each
 22/44 EDGE CONNECTOR
 solder lug style \$2.50 each
 28/56 EDGE CONNECTOR
 P.C. style \$2.50 each

D.P.S.T. LIGHTED ROCKER SWITCH
 115 vac lighted rocker. Snap mounts in 7/8" x 1 1/2" hole. Orange lens. 16 amp contact. \$1.50

ULTRA-MINIATURE 5 VDC RELAY
 Fujitsu # FBR211NE005M20
 High sensitivity CALL: 120 chms \$1.25 each
 CONTACTS: 1 amp 10 for \$10.00
 Mounts in 14 pin DIP socket

MINI-PUSH BUTTON
 S.P.S.T. momentary normally open 1/4" pushing. Red button. 35¢ each 10 for \$3.00

MINIATURE TOGGLE SWITCHES
 S.P.D.T. (on-on) Solder lug terminals. \$1.00 each 10 for \$9.00
 S.P.D.T. (on-off-on) Solder lug terminals. \$1.00 each 100 for \$80.00

TO PLACE ORDERS
 (IN CA) 1-800-258-6666
 (IN CA) 1-800-258-6666

time for WMFN on 3937 with great improvement in check-ins. Also, be sure to join in on WMN on 3582 at 7:00 PM. All the nets will always welcome new people. PSHR: WB1HIH, N1DMU. Traffic: N1DMU 660, W15JV 264, W1UD 237, KA1T 185, KA1EKQ 153, KA1KPH 110, WB1THJ 78, W1KK 61, W1ZPB 37, W1JP 36, WA1OPN 19, WA1MJE 1.

NORTHWESTERN DIVISION
IDAHO: SM, Lam Allen, W7JMH—CLUB NEWS: Pocatello Club: N7XS gave program on Packet Radio, well received; is working on a Digipeater for Kimpot Mountain. PARC plans to help with Communications at March of Dimes and Statue of Liberty Bicycle race this year, will sponsor VE Exams in June. Kootenai Club is again sponsoring a Hamfest at Coeur d'Alene in July. Don't miss it. Boise Club will sponsor VE Exams for the Radio Hams of the group coming to Boise for the National Airstream Trailer Convention the last of June and first of July. ARRL MATTERS: KA7THF is new EC for Bannock County. RACES and ARES being reorganized in North Idaho. PEOPLE AND THINGS: Congrats to Upgrading YL's N7GTU and N7GTT to General! N7DYU visiting sister in Eugene, OR, while brother-in-law in hospital. WA7GSM has checked into CO WX net 3600 times as of Feb. 28! W7ASA has received his OCWA Golden Anniversary Award. Buzz got his first license in 1931, but was not listed in the Call Book until 1933. NET REPORTS:

Net	Freq.-Time	Ses.	QNI	QTC
FARM	2937 15b 7P Da	28	1919	21
ID CE	3930 15b 810A M-F	20	1288	14
IMN	3635 CW 8P Da	24	1266	45
NW TFC	146 3B/98 FM 730P Da	28	864	23
PESN	2-M FM	4	118	

GENERAL: Time to look over and overhaul antenna systems after the winter storms. Be sure to check guy wires—a broken one will let you down. Traffic: W7GHT 152, N7BHL 145, KA7KAI 44, W7JMH 29, NK7K 5.

MONTANA: SM, Les Belyea, N7AIK—ASM/TC: K6PP, SEC: W7LR, ACC: WB7TWG, SGL: W7JMX, STM: KF7R, BM: K7KER, PIO: N7HAZ, N7QK & K6PP gave an impressive packet radio demo at Fairmont Hot Springs for the state's DES convention. WA7DEO (Missoula) received a QSL (via ARRL) from Challenger astronaut Tony England, W0LRE. W7GHT has been appointed to the Blue Ribbon committee, charged with investigating emergency message traffic. He would like anybody who may have some ideas or input on this matter to contact him. Call changes—KA7NMA now KE7NN, KA7OVN now KE7NO, FYI—Montana is in ITU zone 6 and WAZ zone 4. Did you skip reading the list of eight ARRL appointees? These trained specialists are here to help you. PSHR—WB7WVD, KF7R.

NET	SESS	QNI	QTC	MGR
MSN	4	78	0	K6PP
MTN	28	2085	144	KF7H

Traffic: WB7WVD 71, KF7R 53, N7AIK 16.

OREGON: SM, William B. Shrader, W7OMU—STM: W7VSE, SEC: N7CPA, PIO: KC7YN, SGL: KA7KSK, STC: N7ENI, ACC: KB7CO, OO: N7SC, RFI: AK7T. Upgrades: WB7CSO, N7HOM, W7DVE (Extra), N7HIO, KA7NPL, WB7ALX, WA7FFB (Adv), KA7CZ, KA7CIV, KA7VO, K86JH, KA7HAG (Gen), KA7WEZ, KA7WPS, KA7WZS, KA7MI, KA7WFL, KA7WQP, KA7WOK, KA7WPT, KA7VOG, KA7WKG, KA7WVG, KA7WVW, KA7WKM, KA7WER (Tech), KA7WTC, KB4OXE (Novice). OTVARC members receiving awards for Public Service were KC7PS, KA7RFD, N7DUJ, KA7OLH, KA7SIK, KE7HS, KA7KN, KA7SSB, N7EPE, N7GFK, WB7JJC, K7WWG, WA7KLA, KA7RNO, N7JL, W7FBP, and W7JWG. Congratulations to one and all, Salem ARCC officers KB7CW, Pres.; N7OEX, V.P.; KA7WPT, Sec.; KA7CVZ, Treas.; hoodview ARCC officers KA7HIO, Pres.; N7LW, V.P.; WA7OEM, Sec.; and N7YX, Treas. WB7RZM and WB7UJA had first SO. Ore. to Bay Area packet QSO in Jan. McMinnville ARCC officers KA7MDM, Pres.; WB7RFL, V.P.; and KA7FIN, Treas. Salem ARCC sponsors a CW net on 28.180 MHz at 7 PM on Wed. Good Place for Novices to check in and gain cw and net experience. How about your club doing something like that? Eugene Hamfest will be on 26 and 27 July. The Morse Traffic Club held an exhibition of Morse operation at the Model Railroaders show in Valley River Center in Eugene. Traffic: W7VSE 412, K7OVK 218, N7ELF 122, W7ZB 63, KA7AD 57, N7BGW 39, W7FBP 26, AL7W 16, W7LNE 10.

WASHINGTON: SM, Gene Sprague, KD7G—STM: KD7ME, TC: W7BUN, SEC N7DRT, ASM: KR7L, ACC: KC7PH, OOC: N7LW, KC7CZ, the State Government Liaison and Public Information Officer, because he has been offered an opportunity to pursue a position that he has wanted for some time. He informs me that he will not have the necessary time required to continue as SGL/PIO. John will be missed very much. He has contributed so much to Amateur Radio that it would take far more space than this column could ever provide to list all that he has done for all of us. We are happy for you, we wish you the very best, and thank you for the many years you have given all of us...pleasant journeys John. The Central Washington State (Yakima) Hamfest will be held on May 17 & 18 at Yakima, WA. Thanks to the clubs that are sending me their newsletters, which are full of interesting information. With this info we try to keep you in the news as far as possible on what is happening in your area. Find out our section as well others. VE7FB, Section Manager, British Columbia, Canada has informed me that VE7EXPO will be active twelve hours per day for six months. He also suggests that 147.34/94 repeater is the best means to get directions, for Amateurs coming to Vancouver, B.C. and is workable from Seattle WA, North. TNX to Ernie, VE7FB, for sharing this info with us. Congrats to KC7PH, the Affiliated Club Coordinator (ACC), on his appointment to Northwestern Assistant Director. Congrats to Apple City Radio Club of Wenatchee on its ARRL Affiliation and for the good PR on local HBS in the newspaper about their Amateur Radio hobbies. I would like to list all clubs activities each month, but that is not possible, so we will try and be fair when listing your contributions to Amateur Radio. Again, TNX to all who provide the emergency and public-service communications that Amateur Radio is called upon to provide so often. Wish I could list each and everyone of you. Our citizens are indeed fortunate to have such dedicated people. Have a question of a technical nature, interference situation, etc., contact W7BUN, the Technical Coordinator (TC) or his Assistant Technical Coordinators (ATC) W7GB, W7AT, W7AT, K7LJ, K7WA, and WA7BJP. Congrats and Best Wishes to K7CLL, the new EC for Clark Co. If you like to communicate, your local EC can explain the volunteer ARES program to you. Traffic: WB7WOW 200, KR7F 169, K7GXZ 118, WA7CBN 78, W7GB 76, N6EQZ 57, W7IEU 33, K7AJT 22, KA7TCE 20, KC7PH 18, N7GGJ 15, KD7TJ 14, N7GDW 12, K7VW 11, K7OXL 6, N7FXM 4, KD7G, KR7L and KD7ME (no totals).

PACIFIC DIVISION
EAST BAY: Bob Vallo, W6RGG—ASM: W6ZF, N6DHN, SEC: W6LKE, OOC: N6YZ. I am sorry that the Dec column did not appear. I mailed on Jan 9, but it apparently did not reach HQ. The Jan report did not reach HQ due to no one's fault but my

SAANTEC The World's First 2-Meter Time-Weather-Autodialer H/T

\$299

- Has a 24-hour clock
- Has two 7-digit autodialer memories
- A simple mod enables you to receive the 162 mhz weather channels

In addition - The ST-20T Has these other outstanding features:

- Memory channels
- Automatic standard or "Oodball" 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

All handhelds are born with identical specifications. What they are capable of doing, and how easy it is to get them to do it is where Santec beats them all. Names mean nothing - what your H/T will do - means something. The Santec ST-20T is something!

ATTENTION SAANTEC OWNERS BATTERY PAKS \$29.00
 Add \$1.50 UPS shipping

FINAL 440 MHZ EQUIPMENT CLOSEOUTS!

KDK FM-7033 10 memos, scan, 19-watts LCD readout 1 min. more	Lit 5379 Closeout Priced \$269.00	SAANTEC ST-442 10 Mem. scan, program, 5w watts LCD readout, more.	Lit 3309 Closeout Priced 249.00
--	--	--	--

Please add \$2.00 UPS Brown shipping. Add \$1.90 for C.O.D. Calls LIMITED SUPPLIES. Sale ends when stock depleted

WILLIAMS RADIO SALES
 The Nation's Premier KDK & Santec Dealer!
 600 LAKEDALE ROAD, DEPT. 5
 COLFAX, N.C. 27235
 (919) 993-5881
 Noon to 10 P.M. EST

CODE STAR--PRICED FROM \$129.00

- ★ Ideal for Novices, SWL's and seasoned amateurs
- ★ Built-in code practice oscillator & speaker
- ★ 12 VDC Operation or 120 VAC with adapter provided
- ★ Optional serial/parallel ASCII output port

More Features Per Dollar Than Anything Else! Copies code from your receiver! Improves your code speed too! Large LEDs Easy to connect and operate. Compact. 2lbs. Connect computer (like VIC-20)/printer with optional ASCII output port.

CODE STAR™ Kit... CS-K \$129.00
 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

COLORADO COMM CENTER

KENWOOD



TR-2600

• 300MW 1.5Watt
• Heavy 2 Meter
hand held
Transceiver
• LCD Readout
• 10 Memories W/
Lithium Back up
• Band and
Memory Scan



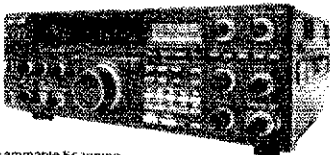
TH-21AT

• Compact Pocket
Size
• 1 Watt
• Opt. 500 M.A.
Battery

TM-2570



• First 70 Watt FM Mobile
Autodialer • 23 Channel Memory
• Front Panel Programmable CTCSS



TS-940S "DX-celence"

• Programmable Scanning
• High Stability Dual-Digital VFO's
• 40 Channel Memory
• General Coverage Receiver

800-227-7373

- AEA
- ALINCO
- ASTRON
- AVANTI
- B&W
- BENCHER
- BUTTERNUT
- CUSHCRAFT
- DAIWA
- HAM-KEY
- HUSTLER
- HYGAIN
- ICOM
- KANTRONICS
- KDK
- KENPRO
- KENWOOD
- KLM
- LARSEN
- MFJ
- MIRAGE
- NYE VIKING
- QUATRON
- SANTEC
- WELZ
- YAESU

COD'S WELCOME

YAESU



FT-209RH

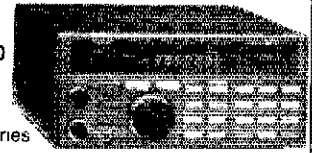
• 5 Watts
• 10 Memories
• LCD
• Compact

FT-2700R

• Duo-Band Full Duplex
• 25 Watt



FRG-9600



• 100 Memories
• 60 MHZ - 905 MHZ Continuous



4262 Lowell Blvd. • Denver, Co. 80211 • 433-3355



AMATEUR TELEVISION



Maryann
WBGYSS

P.C. ELECTRONICS

2522 PAXSON
ARCADIA, CA 91006

Tom
W6ORG



NEW 70 CM ATV TRANSCEIVER



\$299 delivered
TC70-1

SEE US AT DAYTON
BOOTH 359

* **FULL COLOR, SOUND & LIVE ACTION** just like broadcast TV. Get on this exciting amateur video mode at our affordable ready to go price.

* **FEATURES:** small 7x7x2.5". Push to look (PTL) T/R switching. GaAsfet downconverter tunes whole 420-450 MHz band. Two switch selected video & audio inputs . . . 10 pin color camera jack & RCA phone jacks. Xmit video monitor output. Over 1 watt pep RF output on one or two (add \$15) selected crystal controlled freq. 439.25, 434.0, or 426.25 MHz.

ATV APPLICATIONS: you can show the shack, projects, home video tapes, computer graphics & listings, repeat SSTV, or even Space Shuttle video & audio if you have a home satellite receiver. Do public service events such as marathons, races, parades, search & rescue, major fires, repeat weather radar, etc. DX depends on terrain and antennas, typ. 1 to 40 miles. For greater DX we have 20 watt amp for \$109 and 50 watts for \$185.

WHAT IS REQUIRED FOR A COMPLETE OPERATING SYSTEM? The TC70-1s downconverter outputs to any TV on ch 3 for receiving. Connect a good 70 cm antenna and low loss coax. Plug in camera, VCR, computer, etc. or any composite video source. Plug in mic for standard 4.5 MHz TV sound. Connect to 13.8 vdc for base mobile or portable. SEE Chapt. 20 1985 ARRL Handbook. That's it!

CALL (818) 447-4565 OR WRITE FOR OUR CATALOG, more info, or who is on in your area. Downconverters start at \$49 to receive. We stock antennas, modules and everything you need for ATV. Prices include UPS surface in cont. US. Transmitting equipment sold only to licensed Tech class or higher amateurs verifiable in 85 callbook or copy of new license.

GROTH-Type

**COUNTS & DISPLAYS
YOUR TURNS**

- 99.99 Turns
- One Hole
- Panel Mount
- Handy Logging Area
- Spinner Handle Available

Case: 2x4"; shaft 1/8"x3"

TC2 \$12.50
TC3 \$13.50
Spinner Handle
Add.....\$1.50

Model TC2: Skirt 2-1/8";
Knob 1-5/8"
Model TC3: Skirt 3";
Knob 2-3/8"

Prices include UPS
or Parcel Post in US

R. H. BAUMAN SALES

P.O. Box 122, Itasca, Ill. 60143

Our Very-Hard-To-Find Components List

CAMBIAN RF CHOKES

.15µh, .22µh, .33µh, 4.7µh, 10µh.....1.20 ea.

UNDERWOOD/SEMCO METAL-CLAD MICA CAPACITORS

Type J101: 5pf, 10pf, 15pf, 25pf, 30pf, 40pf, 60pf, 80pf, 100pf, 200pf, 250pf, 390pf, 470pf.....1.60 ea.
Type 3HS0006: 25pf, 30pf, 35pf, 40pf, 56pf, 68pf, 91pf.....1.60 ea.
Type J102: 1000pf.....2.00 ea.

P.C. BOARDS FOR MOTOROLA BULLETINS

AN-762, EB-27A, EB-63, AN-756, EB-67.....14.00 ea.
AN-791.....10.00 ea.

FERROXCUBE DEVICES

VK200 20/4B RF Choke.....1.20 ea. 56-590-65-3B Ferrite Bead.....0.20 ea.

MISCELLANEOUS

Arco 403 Trimmer Cap 3-35pf.....1.80
Sprague GYA10000 Poly Trim 2-10pf.....1.10
NF2-12V Aromat Relay.....6.25
SBL-1 Double Balanced Mixer.....6.50
T25-10 Toroid Core.....0.40
T37-3 Toroid Core.....0.40

We also carry a line of VHF, UHF amplifiers and ATV equipment.
Call or write for our free catalog.



**CCI Communication
Concepts Inc.**

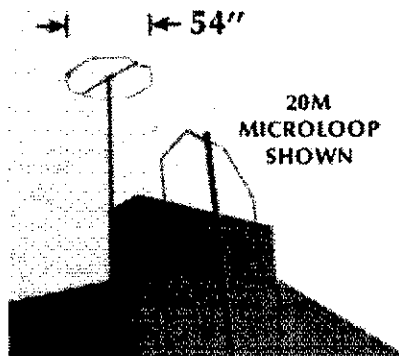
2648 North Aragon Ave. • Dayton, Ohio 45420 • (513) 296-1411



- REALLY cramped for space?
- Want a 10, 15 or 20M concealable or portable antenna?
- Want a "bird dog" for your beam?
- Want 40M in a small space?
- Try the new WARC bands?

MICROLOOP

These compact monoband loops provide omnidirectional (no rotator) horizontally-polarized (low-noise) coverage when parallel to ground, or performance approaching a full-size dipole when vertical. Tunable (SWR < 1.5:1) to your favorite band segment via built-in adjustable coaxial capacitor capable of continuous 200 watts CW or PEP. Cover other band segments via antenna tuner. Rugged low-loss copper with stainless steel hardware. 2" PVC mast required (not provided), or suspend from tree or ceiling with nylon rope. Prices include US shipping (except HI, AK). Florida add 5% sales tax. Send check with your order or call us with your VISA or MasterCard.



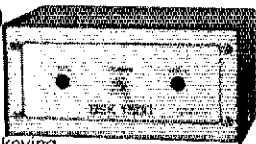
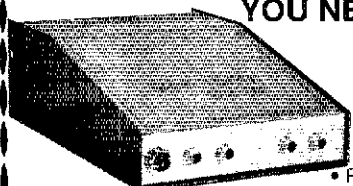
10, 12, 15, 16 or 20M MICROLOOP (20M is 54" across, others smaller) ... \$83.50
 30M or 40M MICROLOOP (108" across for 40M, 30M smaller) \$93.50

ADN Advanced Design Networks, Inc.
 8601 66th Street North • Pinellas Park, FL 33565

CALL TODAY
 (813) 544-2596

NOW FULL BREAK-IN WITH ANY AMPLIFIER

IF YOU OWN ONE OF THE NEW FULL BREAK-IN
 QSK TRANSCEIVERS
 YOU NEED A QSK 1500



FEATURES:

- Capable of 100 WPM keying.
- Ultra high speed PIN diode switching.
- Rated 1500 watts output CW @ 40 WPM into 50 OHM load.
- No modifications needed to either your transceiver or amplifier.
- Totally silent... No clicking relays.
- Compatible with linear amplifier... Even Homebrew.
- Installs in minutes with only 2 additional coax cables (RGB) and 2 additional shielded leads with phono plugs. (Not supplied).
- Fully automatic bandswitching from 1.8 to 30 MHz.
- Designed and manufactured in U.S.A.
- Permits high power AMTOR with your amplifier.
- Includes a custom built continuous duty power supply.
- 1 Year warranty.

AVAILABLE FROM EITHER DEO OR UAR



CONTACT: DR. J.R. SELLER
 GROVEPORT, OHIO
 (614) 836-3929



\$299

PLUS \$7.00 SHIPPING
 IN U.S.

UNIVERSAL AMATEUR RADIO, INC.

CONTACT: RALPH RICKETT
 1280 Aida Drive
 Reynoldsburg, Ohio 43068
 PHONE: (614) 866-4267

Large
 Stock

BUY — SELL — TRADE ALL BRANDS NEW & USED



DRAKE KENWOOD COLLINS ICOM YAESU HEATHKIT
 SEND \$2.00 FOR CATALOG & WHOLESALE LIST



ASSOCIATED RADIO
 8012 Conser - Box 4327
 Overland Park, KS 66204 • (913) 381-5900



SAVE

SAVE

own. OOs K6TI, K6ARE and WA6TGF fortunately finding only minor discrepancies. STM NIGA has stepped down from that position and now serves as our new director as AJJ. Thanks for your help, Don. The new QSL mailing deadline makes it important for all reports to reach me as soon as the first of the month as possible. Traffic: W6VOM 243, W6DOB 91, K6APW 159, W6BUZ 24, (Jan.) W6VOM 167, K6AGD 135, K6APW 128, W6DOB 76, NIGA 58, W6BUZ 27, (Dec.) K6APW 302, K6AGD 248, NIGA 160, W6DOB 154, W6BUZ 37.

NEVADA: SM, Joe Lambert, WB1XD—Freno-Carson City Floods: K7HRW, our SEC was deputized Asst. Dir. of Civil Defense for NV during the emergency. He, with ARES & RACES, did a fine job handling communications. Nevada Section ARRL is sponsoring an open meeting of all hams. This will be a lunch at Kings Table in Meadowood Mall in Freno at 11:45 AM, May 17. Featured speaker is Pacific Div. Director Rod Stafford, KB6ZV. Everyone is encouraged to attend. For further info contact WB1XD or K7HRW. Error in Mar. QST re VE Exams. It was not TARA but SNARS VE schedule: 4/19, 6/21 WX Net: 258 check-ins. Still looking for help on the Nevada Sagebrush Traffic Net. Contact K7HRW. LV area 223.94 repeater is temporarily at the High Potasi site. Two more 220-MHz repeaters are expected to be on the air soon. One of these will be linked to Calif. via the Condor Net.

PACIFIC: SM, Army Curtis, AH6P—Hurricane force winds hit Hilo early morning hours of Feb. 16. W6BBDH activated the Big Island Emergency Net at 0545 with KH8IAA, KH6GM, KH8LE, WH6BGW, AH6J, WH6BHB, and AH6GD. WA3BNM and KH6IHA worked to get the first local broadcast station back on the air, and Civil Defense was kept informed through the net. A fine piece of work! KH6BQG, KH8HME, WH6BVA, KH6GP, KH6AFS, KH6BV and KH6JEG all lost antennas/towers to the wind. KH6B has applied for FCC for license CW privileges on 7050-7125 kHz for those areas now allowed voice on 7075-7100. Your support is needed. Maui reports upgrades for KH6JUS, KA5JMG, KH6UU, AH6GR, and WH6BEG. Congrats! Traffic: KH6S 45, KH6H 27.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Reports are not all in yet on the BIG FLOODS, but many hams did outstanding jobs. The traffic monitored on the Yuba-Sutter and two Sacramento repeaters for several days showed a high level of operator competence. It was especially gratifying to hear of the support being provided to active areas by members of outlying groups. For example, Chico, Red Bluff, Nevada City and Sacramento people were all heard on the scene at Marysville. Good Work, All. Two new EC appointees are Bill Addison, N6GLL, for Trinity County and Ron Weststrom, KJ6RF, for Sacramento County. The latter was appointed only for a few days later that he was literally losing sleep doing his duty as EC. Congratulations, Ron, I have heard many good reports of your work. Welcome to the licensed ham ranks to Aloha, XYL of W66N, who is now KB6LUX and the "swing" is gone from the call of Bob, N6LHBravo—he is now W66M. Ralph, KA6REE, has upgraded to General Class. Additional clubs applying for ARRL affiliation are Tehama ARS (N6IUG), Trinity County ARC (W6COW), Pres) and the Nevada County ARC is going for SPECIAL SERVICE CLUB. Traffic: W66CLD 310, N6LJY 189, KA6RF 157, WA6WJZ 147, W66BZQ 65, W6HFF 36, KB6CFX 14, W66E2 12, W66ERZ 10, WA6ZUD 4.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WA6YAB. ST: N6AWH, TC: WA6EXV. ACC: N6ECH. Asst. SMs: W6TTP and K6VY. Officers of the Turlock ARC are Pres. W6BMDN, VP W66BLH, Sec. K6SNA, Treas W6SQR. The club meets the 2nd and 4th Tuesdays in Turlock. Officers of the Southern Sierra ARS are Pres W6PVG, 1st VP K6RL, 2nd VP KA6ALX, Sec Caroline, Treas W6KQI. Officers of the Kings ARC are Pres N6DTJ, VP N6EMW, Sec N6DTX, Treas W6BZXB. Officers of the Stockton-Delta ARC are Pres WA6KXR, VP KA7CJJ, ST WA6WHP. The Central Valley RC and the Kern County ARC have merged into the Kern County Central Valley RC. The club meets in Bakersfield. N6LSB is Extra. KB6JQF is General. KB6JQE is Tech. N6DXB is a SILENT KEY. W66CZP is N6NEZ. KB6KSC has a SALT. W66MR and N66MR have Yaesu FT-73GX. N6AM is on OSCAR 10 with a Yaesu FT 726H. K6YK has worked all countries in the United States. Congratulations, John, on this accomplishment. Field Day will soon be here. It is time to get your plans together. The ARRL Pacific Division will be October 3-5, 1986 in San Jose. Traffic: N6AWH 103, W6DPD 13, K6PMG 9, WA6YAB 6, N6MXG 6, (Jan.) WN6A 1.

SANTA CLARA VALLEY: SM, Glenn Thomas, W66W—BM: W6BCY. PIO: (vacant). TC: WA6PWW. SEC: K6ITL. ACC: W6MKM. ASM: N66N. STM: W6PHT. February was certainly an interesting month hereabouts, especially if you happen to be a duck! The heaviest rains in some years combined with high winds made life interesting in Santa Clara and Santa Cruz Counties. Thanks again to all of you ARES members who participated in the flood-relief efforts. The ARES club has been actively working with the city of Los Altos Hills council on a revised antenna ordinance. Good work, Ed! The Williams Hill Amateur Radio Relay Society has their repeater back on the air. Look for them on 146.73. N6ITW is also working on the City of Menlo Park Council with regard to antenna ordinances. In both cases, PRB-1 may prove to be a very big help. Field Day is coming up very soon, we'll see ya on the air. Speaking of on the air, there are rumors of a major VHF/UHF happening in our area later this year. Yours truly was the speaker at the Memorex Amateur Radio Club. The IBM ARS is becoming even more active (it that's possible!) INX to them for the loan of their port-a-repeater during the south county floods. Speaking of repeaters, the section ARES Repeater Survey committee has been doing a bang-up job of identifying the repeaters that are available to ARES in an emergency. Also, the Pacific Division Convention is in the planning stages. Rumors about some strange late-night goings on are already circulating. The Foothills ARS had a demonstration of fast-scan ATV...in fact the entire club meeting was televised by K6BDNI. Last but not least, this month's Foothill Flea Market (May that is) will be for the EMARC group (a Fleamark?). QO reports from W6DU, K6AYB. Traffic: W6YBV 158, W6PFI 66, W6PHT 40, W6ZRJ 18.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Evarhart, K4SWN—IMPORTANT NEWS THIS MONTH is the Amateur Radio License Plate Bill—HB-952 which will be brought up for a vote in the short session of the General Assembly next month (JUNE). The League, representing ALL amateurs in Section has printed information supporting the bill presently in the Senate Transportation Committee. This info was distributed at Charlotte Hamfest/ARRL State Convention, Raleigh and to radio clubs. Shows a list of all Senators and their districts on the state map. What we amateurs in NC must do NOW is to contact your Senator(s) that represent you and explain the bill and to let them know what Public Service Amateur radio provides to the citizens of NC. Then, ask THEM to SUPPORT the bill in committee and then on the Senate floor for final vote. Only 26 of 50 votes are needed for passage. Lets make it a

SPRING SPECIALS POWERFUL PACKET.

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

3621 FANNIN ST
HOUSTON, TX 77004-3913

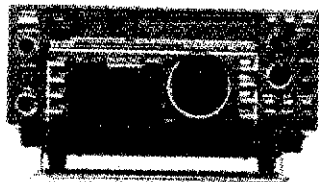
CALL FOR ORDERS
1-713-520-7300 OR
1-713-520-0550



ALL ITEM MS ARE GUARANTEED OR SALES PRICE
REFUNDED

EQUIPMENT

Kenwood Call for prices on all Kenwood
Kenwood TS940S, contesters' delight Call
Kenwood TS 440 Call for trade
Icom H/UDR 25 2000 MHz 795.00
Icom IC3200 489.95
Santec ST20T Handi Talkie 289.00
Icom IC735 799.00
Ten-Tec 2510 (Easy OSCAR) 489.00



ACCESSORIES

B&W VIEWSTAR ANTENNA TUNER 89.95
Heil HC3/HC4/HC5 Stock
Heil BM10 Boom Mike headset 53.95
CSI Private Patch III 469.95
FLUKE 77 auto-ranging digital multimeter 125.00
Bird 43 Wattmeter Call
Bird Elements, H/59.00, A-E/48.00 In Stock
Dawa CN620B, 20-200, 2000W 109.95
Dawa CN630 140-450, 20 200W 129.00
Stabylex 20SR, 25 amp 12VDC, 16 amp cont.
over-voltage protected 99.00
Alinco ELH 230D- Excellent buy 79.00
Nye MB5-A (for the big boys!) 529.00
Shure 444D 54.95
Wahl 7470 Soldering Station 49.00
Kenwood IF 10A, B, C Stock
Kenwood IF 232C Level translation 49.00
Miller CS14T Low pass filter 43.50



SAVE

QUANTITY DISCOUNTS

206.00

Want a good discount? Get three of your friends and order Madison's special four lot prices. For example:
ICOM IC27A 1270.00
Call for your lot prices on other rigs.

KEYS

Benchner & Vibroplex Less 10%
Benchner is now improved. Screws & springs, all stainless steel and extra hand polishing.
Vibroplex Carrying Case 20.00 w/purchase
MFJ Super keyboard #496 169.00
Nye ESK-001 Keyer 58.00

TUBES

Collins & Drake Replacement tubes stock
GE 6146B 11.95
Eimac 3-500Z 109.95
GE Industrial Tubes Call
GE 12BY7A 6.00
GE 6JS6C 11.95
Cetron 572B 69.00
GE 8950 14.00

BOOKS

We stock SAMS, TAB, ARRL, RSGB, Ameco Radio
Pubs Call
Some of the best buys are the RSGB books

CALL RAD 65-287 SWR, Relative Power Meter 32.95
3 150MHz, KW +

PACKET POWER

AEA PK-64, does RTTY, ASCII, AMTOR also 199.00
AEA PK-80 1 APR II 199.00
NEW Kaitronics Packet II 199.00
Icom 271A Great packet radio Call

SERVICES

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

ANTENNAS

Isopole 44.95
A4 269.00
402CD 279.95
424B 84.00
215WB New, 15 El, 2M beam 79.95
AOP-1 Complete Oscar Antenna 149.95
Butternut HF6V, 80-10 vertical 125.00
HF2V, 80 & 40 vertical 119.00
HF4B 189.00
Hustler G7-144 119.95
Hustler GBTV 139.00
Ham4 Rotator, 12X, CD45-2 Call
KLM HF World Class Series Antennas Call Don
Alpha Delta Twin Sloper 49.00
Coax Seal 2.00/roll
B&W Dipoles Less 10%
Hy-Gain TH7DXS 489.00
Explorer 14 349.00
Discover 1 element 40M 169.00
2 element 40M 369.00
3 element only 249.00
V2S (2meter) 59.00
HG52SS 52 ft crankup tower 1199.00
Prepaid freight when you order other Hy-Gain items with tower
KLM KT-34A 339.00
40M-2 299.00

OTHER ANTENNAS

Larsen Kulduck 17.00
Larsen 440 HW 1/2 wave Kulduck 25.00
Avanti AP151 3G on Glass Antenna 36.00
Anteco 2M, 5/8, Mag Mount, Comp 25.00
Avanti APH450-5G on glass 38.00
Orion 2M 1/2 wave Hanoy Antenna 19.00
Van Gordon SI A 1 160-80-40 Sloper 34.00
Valor AB-5 Mobile 79.95
Stoner DA100 P Active Rx Antenna 190.00

SURPLUS

24 Pin Soldertail dip sockets 25/each
150MFD/400V DC 1.95
1.5 Amp/400V full wave bridge rectifier 1.95
2 5A/1000PIV Epoxy diode 29 each or 19.00/100
0015/10KV or 001/20KV 1.95 each
3N201 95
4 inch ferrite rod 1.95
365pF cap 1.95
Sanyo AAA, AA Nicads w/tabs 2.00
2, 4, 5, 6, 8 pin mic plugs 3.00
1/8, 1/4, watt carbon resistors 05 each

Meters 0-3000 VDC

2 1/2" Square 0-1 Amp DC 9.95 each
Drake - Collins mike plug 2.00
Close out on rigs & accessories. All the time Call
We may have what you're looking for

BELDEN

9913 low loss, solid center, foil/braid shield 45c/ft
8214 RG8 Foam 43c/ft
8237 RG8 37c/ft
8267 RG213 52c/ft
8000 14 Ga stranded copper ant. wire 13c/ft
8448 8 conductor rotor cable 31c/ft
9405 Heavy duty 2-16 Ga 6-18 Ga 52c/ft
9258 RG8x 19c/ft
9269 RG-82A/U 16c/ft
8403 Mic Cable, 3 condctr & shield 80c/ft
100 feet 8214 w/bands installed 45.00
8669 7/16" tinned copper braid 1.10/ft
International Wire RG214, non-mil, good cable 70c/ft
International Wire 9086 exact replacement for Belden 9913 36c/ft

AMPHENOL

831SP-PL259 Silverplate 1.25
UG176 reducer RG8X 30
831J Double Female UHF 2.00
82-61 N Male 3.00
82-97 N Female Bulkhead 3.00
82-63 Inline Female N 4.00
82-98 N elbow 4.00
31-212 BNC-RG59 1.50
31-2 BNC-RG58 1.50

TOWER ACCESSORIES

1/4" E.H.S. Guy cable, Rohn US, 1000 ft 250.00
3/16" E.H.S. cable, Rohn US, 1000 ft 210.00
1/4" Guy Cable, 6100 #7 x 7 strand, import 15c/ft
3/16" Guy Cable, 3700 #7 x 7 strand, import 12c/ft
3/8 x 6 E&J Turnbuckle 7.95
3/16" Wire Rope Clips 40
1/4" wire clips 50
1/4 Thimbles 45
Porcelain 500D Guy Insulator (3/16) 1.99
Porcelain 502 Guy insulators (1/4) 3.39

COMPUTER STUFF

Kaitronics UTU-XT 319.00
Fits any computer (even yours!)
Morse University (Great CW program for C-64) 399.00

USED EQUIPMENT

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

POLICIES

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

BIRD

STOCK ITEMS CALL

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

MADISON

Electronics Supply

3621 FANNIN
HOUSTON, TEXAS 77004

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

C-COMM

THE HAM RADIO SPECIALISTS




IC-02AT
IC-04AT

IC-2AT
IC-3AT
IC-4AT


**VHF/UHF
HANDHELDS**




IC-735

New compact general coverage receiver/ham band transceiver.

**Call to Place
Your Order**



**ALL MODE VHF/UHF
BASE STATION**



IC-271A/H 2 Meter
IC-471A/H 430-450MHz


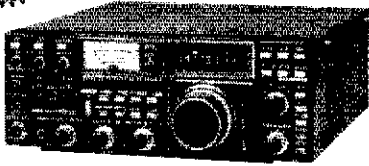


IC-1271 1260-1300MHz




HANDHELD ACCESSORIES

IC-14 Vinyl Case for IC-02AT
BC-35 Drop In Charger
BP-2 425mA 7.2V NICAD Battery
BP-3 250mA 8.4V NICAD Battery
BP-4 Alkaline Battery Case
BP-5 425mA 10.8V Battery
BP-7 425mA 13.2V NICAD Battery
BP-8 800mA 8.4V NICAD Battery
HM-9 Speaker Mic
CP-1 Cigarette Lighter Cord
DC-1 DC OP Pack
Leather Case for IC-2AT
HS10 Headset for HTs
HS10SA VOX Unit for IC-02AT
HS10SB PTT Switch Box

IC-751A

- All Ham Band Transceiver/General Coverage Receiver
- New Design
- 100% Duty Cycle Transmitter
- 105dB Dynamic Range
- All Modes Built-In
- 12 Volt Operation
- QSK up to 40W/PM
- Built-in FL-32A 9MHz/500Hz CW Filter
- Electronic Keyer Unit Included
- 100 Watts Output
- 32 Memories
- New LED Annunciator






IC-3200A

Dual Band
2M and 70CM




IC-R71A

.1 - 30MHz deluxe general coverage receiver



IC-R7000

25 - 1300MHz receiver direct entry and scanning



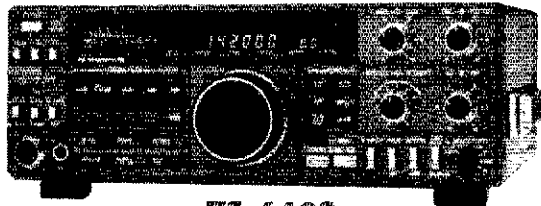

VHF/UHF MOBILES

IC-27A 25W, 2M, FM
IC-27H 45W, 2M, FM
IC-37A 25W, 220MHz, FM
IC-47A 25W, 70cm, FM

Call for YOUR Low Price!

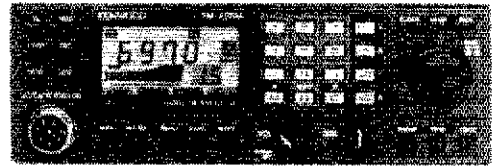


KENWOOD



TS-440S

KENWOOD



TM-2530

TM-2550

TM2570

Call For Your Price

KENWOOD

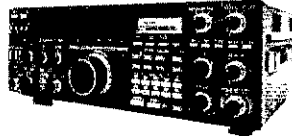


TS-430S

Popular transceiver with general coverage receiver for fixed, mobile or portable use.

Call for Low Price

KENWOOD



TS-940S

A new standard for competition grade transceivers and an outstanding value.

The Popular TS-930S Still Available

TELEX hy-gain

ANTENNA PRODUCTS SALE

TOWERS

- HG52SS
- HG37SS
- HG54HD
- HG70HD

ANTENNAS

- TH7DXS
- TH5MK11S
- EX-14

ROTATORS

- T2 X
- HAM IV
- CD45 II

* Special pricing includes free shipping in the 48 contiguous states.

* Alaska and Hawaii orders shipped freight collect-charges from Seattle only.

* To prepaid orders for towers or tower/rotator/antenna packages.

* Free shipping applies to prepaid orders for towers or tower/rotator/antenna packages.

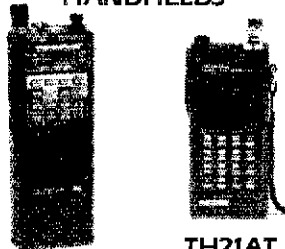
KENWOOD

HANDHELD ACCESSORIES

- HMC-1 Headset w/VOX \$39.95
- SMC-30 Speaker Mic 34.95
- ST-2 Base Charger for TR2600 ... 89.95
- MS-1 Mobile Charger for TR2600 42.95
- PB-26 NI-CD Battery for TR2600 .. 34.95
- LH-3 Leather Case for TR2600 37.95
- SC-9 Soft Case for TR2600 19.95
- BT-3 Battery Case for TR2600 11.95
- PB-21 NI-CD Pack for TH-21/41 17.95
- PB-21H 500 MAH NiCd Pack
for TH-21/41 29.95
- BT-2 Battery Case for TH-21/41 ... 7.95
- SC-BT Soft Case for TH-21AT/41AT . 9.95
- BC-6 Two-Pack Quick Charger .. 84.95
- BC-2 Wall Charger for PB-21H 10.95
- AJ-3 BNC Adapter for TH-21/41 .. 6.49

KENWOOD

HANDHELDS



TR2600A
TR3600A

TH21AT
TH31AT
TH41AT

Full line of accessories available.

FREE UPS GROUND SERVICE ON MOST ITEMS.

K7HBN George W7GAB Dale K7DS Frank N67N Craig



George, Dale, Frank, Craig and other knowledgeable professionals are willing to help you.

800-426-6528

TOLL FREE — Including Alaska and Hawaii.

ATTENTION WATS CALLERS: We have expanded our telephone hours Monday thru Friday 7:30a.m. - 5:30p.m. PST (10:30a.m. - 8:30p.m. EST) for the convenience of our East Coast and early morning buyers.

Washington Residents: Call (206) 784-7337

All prices, specifications and availability subject to change without notice. Washington residents add applicable sales tax. Free UPS Ground Service applies to most transceivers with related accessories excluding antennas.

C.COMM

6115 15th Ave. N.W.
Seattle, WA 98107
(206) 784-7337

STORE HOURS:
Mon.-Fri. 9:00a.m. - 5:30p.m.
Saturday 10:00a.m. - 4:30p.m.



ORDER TOLL FREE

1-800-233-2482

MINNESOTA & ALASKA or DX CALL 612-255-0855

or 218-765-3254

We Ship Worldwide
Helpful, Personal Service

ANTENNAS

HY-GAIN

TH7DX.....	\$489.00
TH5Mk2.....	429.00
Explorer-14.....	329.00
30/40 add-on.....	85.00
204BAS.....	269.00
205BAS.....	369.00
155BAS.....	229.95
105BAS.....	149.00
Disc. 7-1.....	160.00
Disc. 7-2.....	345.00
Dir. Kit 7-3.....	215.00
18HTS.....	445.00
18AVT/WBS.....	119.00
14AVQ/WBS.....	75.00
2BDQ.....	65.00
5BDQ.....	135.00
V2S.....	48.00
V4S.....	57.00
214BS.....	49.00
BN-86.....	22.00

ALL TELEX/HY-GAIN PRODUCTS IN STOCK!

BUTTERNUT

HF6V.....	112.00
HF2V.....	109.00
TBR-160 Coils.....	46.95
RMK II.....	41.95
STR II.....	29.95
TLK.....	14.95
HF4B.....	189.00
2MCV.....	42.95
2MCV-5.....	49.95

MOSLEY

TA33Jr.....	179.95
TA-33.....	235.00
TA-40KR.....	89.95
CL-33.....	269.00
PRO-37.....	465.00

LARSEN VHF/UHF ANTENNAS

HUSTLER MOBILE ANTENNA SYSTEMS

ANTENNA SUPPLIES

ALPHA-DELTA

LT 200W.....	18.95
HT 2KW.....	24.95
RT 200W Dix.....	28.95
HV 2KW Dix.....	31.95
DX-A Sloper.....	46.95

New! Coax Switches

COAX-SEAL \$2.00/roll
7" end insulator..... 4.95 per pair
1/8" nylon rope..... 0.05/ft

KLM

KT34A.....	335.00
KT34XA.....	479.00
40M-1.....	169.00
40M-2.....	300.00
40M-3.....	449.00
40M-4.....	639.00
2M-11X.....	56.95
2M-13LBA.....	76.95
2M-16LBX.....	95.00
220-14X.....	79.95
220-LBX.....	95.00
432-20LBX.....	67.95
432-30LBX.....	95.00
2M-22C.....	112.00
435-40CX.....	147.00

KLM WORLD CLASS ANTENNAS IN STOCK!

CUSHCRAFT

A3.....	205.00
A4.....	264.95
R3.....	250.00
DW3.....	110.00
AV3.....	49.95
AV4.....	87.95
AV5.....	95.00
40-2CD.....	274.95
A50-5.....	74.95
617-6B.....	189.95
ARX-2B.....	34.95
147-11.....	49.95
A147-22.....	119.95
A147-20T.....	63.95
215WB.....	74.95
32-19.....	80.00
42-18.....	88.00
220B.....	88.00
424B.....	74.95
416TB.....	54.95
A144-20T.....	64.95
AOP-1.....	139.95

AMERITRON

RCS-8 and RCS-4 coax switches..... 119.95

HI-Q

1:1 Balun..... 11.00
Ctr. insulator..... 6.00

TOWERS

UNR-ROHN

FREE-STANDING:

HBX-40.....	198.00
HBX-48.....	265.00
HBX-56.....	335.00
HDBX-40.....	249.00
HDBX-48.....	325.00

Today's best buy in a tower.
All steel, galvanized and
Rated at 10 and 18 sq. ft.

FOLD-OVERS:

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

Fold-over towers shipped
freight prepaid. Prices 10%
higher in western states.

HY-GAIN CRANK-UP TOWERS

HG-37SS	CALL/WRITE FOR PRICING.
HG-52SS	
HG-54HD	
HG-70HD	

Hy-gain towers shipped
freight prepaid in
continental U.S.

ROHN GUYED TOWERS:

25G sections.....	48.00
45G sections.....	109.00
TB-3 bearing.....	49.95

Full line of genuine ROHN
accessories for complete
tower installations.

PHILLYSTRAN (Non-conducting,
electrically transparent guy
systems) in stock.

WE STOCK: Roof Towers and Tripods, Masts, Guy Cable, Anchors, Guy Insulators, Brackets and Bases.

ROTORS

TELEX

AR40.....	119.00
CD 45 II.....	169.00
HAM IV.....	249.00
T2X.....	289.00
HDR-300.....	565.00

KENPRO

KR-400.....	145.00
KR-600.....	229.00
KR-2000RC.....	439.00
KR-500.....	175.00
KR-5400.....	295.00
KR-5600.....	369.00

WIRE & CABLE

ANTENNA WIRE

Copperweld.....	0.12/ft
12 ga.	
Copperweld.....	0.10/ft
14 ga.	
Ladder line.....	0.10/ft
450 ohm	

ROTOR CABLE

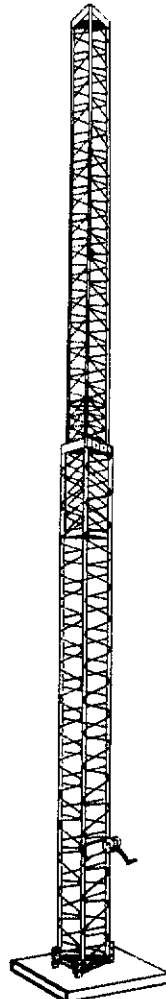
Std: (6-22, 2-18).....	0.19/ft
Hvy: (6-18, 2-16).....	0.35/ft

BELDEN COAX

9913 low loss.....	0.42/ft
RG-213/U (8267).....	0.40/ft
RG-8/U (8237).....	0.32/ft
RG-8/U (8214).....	0.35/ft
RG-8X (9258).....	0.19/ft
RG-11A/U(8261).....	0.37/ft
RG-59/U (8241).....	0.14/ft
RG-58/U (8240).....	0.13/ft

QUANTITY DISCOUNTS ON WIRE AND CABLE

COAX AVAILABLE IN PRECUT LENGTHS WITH CONNECTORS ATTACHED
COAXIAL HARNESSES MADE TO YOUR SPECS



LET US BID A FREIGHT PREPAID HY-GAIN TOWER ANTENNA FOR YOU.



antennas & towers

rf enterprises

Route No. 7

St. Cloud, Minnesota 56301



VISA/MASTERCARD - shipping additional, except as noted

Prices subject to change without notice.
Minnesota residents add 8% tax.

There are two ways you can operate an amateur dual band UHF/VHF radio: you can go through the extra expense and bother of using two antennas... or, you can install the new Larsen 2/70—the single antenna that brings you both bands.

The Larsen 2/70 blends a half-wave element for 2-meter (144-148MHz) amateur band and collinear elements for 70cm (440-450MHz) amateur band. One antenna serves both bands, and is available with three different mounts for any mobile needs.

The self-resonant design of the Larsen 2/70 allows mast

applications for vessels and base stations outfitted with standard Larsen BSA-K hardware. With or without a ground plane, the Larsen 2/70 gives you the highest performance attainable, whether you are using a dual band radio or two separate radios.

If your radio does not have a built-in band splitter, we can even provide that.

Performance... savings... convenience... and a no-nonsense warranty—four great reasons for banding together with the Larsen 2/70. See your favorite amateur dealer or write for a free catalog today.

In recognizing my 50 years of ARRL membership and the presentation of a personalized plaque at the January meeting of the Platinum Coast Amateur Radio Society at Melbourne, Florida. As I look back over those 50+ years as an amateur radio operator and a corresponding membership, there is clear evidence of the important part the ARRL has played in the preservation of the amateur frequencies on a worldwide and national basis. Add to that the ever increasing role of ham radio activities and the continued efforts to keep us abreast with the state-of-the-art just sum up a small part of ARRL's significant part of ARRL's significant contribution to amateur radio. Many thanks for a splendid job. Sincerely yours, D. N. Lapp, W2EKL." WB4WDK reports another Amateur Radio demonstration. The Highlands County Chapter of the Red Cross transformed the St. Agnes Church into a mock disaster shelter and invited the public to attend. KE4VK had set up a portable two-meter FM station and demonstrated the capabilities of amateur radio during emergencies. He utilized a repeater/autopatch at the EOC in Sebring and had communications with K4ZNB 15 miles south in Lake Placid. WB4WDK also gave a report of the Highlands County ARC booth activity at the Highlands County Fair in Sebring. The display included a low-band rig operating on 20 meters with a computer hookup to read RTTY, a 2-meter-all mode transceiver and a VCR to show videotapes. It was a big success and 14 people were interested enough to sign up for future radio classes. KE4VK and WD4HN were the Chairpersons for the booth and were responsible for the success of the Club's first exhibit at the County Fair. K4SCL reports that there are now traffic handlers regularly checking their packet mailboxes for NTS traffic at Clearwater, Tampa Bay, Ocala, Melbourne, Stuart, West Palm Beach and Miami. Traffic sent to NTS at these boxes will be issued and handled promptly without need to send to a specific packet station. K1AT reports that WB2OUK has been appointed an Assistant Technical Coordinator for Palm Beach County. W4SS announces that the following have recently been appointed as Emergency Coordinators—N4HAP, Sarasota County and WA3TOX, Manatee County. N4JOA reports that he upgraded to Advanced at the Miami Tropical Hambores. The City of Palms Hamfest was held March 1—The Traffic Handlers Luncheon was a roaring success—Thanks to WA4HDH, KA4FZI and WA4EIC for their part in organizing it! The sentiment expressed was that it is hoped that it was the first ANNUAL Traffic Handlers Luncheon. A lively discussion on PSHR requirements was the main issue on the program. KA4KTP has been appointed as HF Awards Manager for the Hollywood ARC, an ARRL Special Service Club. Congrats to WB4WYG who was named "Ham of the Month" for February by the Indian River ARC. 73 de WA4PFK. Traffic: W4DUG 6450, W3CUL 5229, W3VR 2348, W4NFK 697, WD4KBW 665, K4SCL 519, K4EUK 483, WA4PFK 454, K4ZK 300, WA4EIC 279, WB4WYG 272, KP4JA 271, N4KFLJ 201, KA4FZI 193, KA4GUS 191, KA4NXP 155, AA4BN 150, WA4RUE 134, KA4YHS 123, WA4PK 110, W4YCL 95, N4KB 94, W4TAH 87, WD4LHO 80, WD4L 77, K4IA 70, N4SIE 54, KY8T 54, KP4FL 51, KY8Y 47, WB2JCE 47, WAESH 45, KB4MON 41, K4FQU 37, K5IHH 36, N4ET 35, WB4GCK 31, WA9VND 30, K4BLM 25, KB4LPL 25, WA4HDH 23, WT4F 22, N4MML 22, WD4NXX 21, W3TLV 20, W3LJR 20, KA4SIH 20, K4ZV 19, K9EHP 18, N4NXX 16, KB4LKT 15, KB4KAW 14, K4OVC 11, N4IXQ 11, W4MFD 10, W4WYR 10, W4UIO 10, W4V4 9, WD4MCC 9, KD4GR 9, W4MPV 8, W8OM 8, N4ILN 8, K4IRT 8, K9AKY 8, WD4KPG 8, KB4EWO 5, WK4F 5, KB4BLN 4, KA4GDU 4, N2FEL 3, WA8BQM 3, K7LCA 2.

SOUTHWESTERN DIVISION
ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP, NMs KBLL, KA7HEV, WB7CAG. Congrats to KB7MT who upgraded to NS7C, and to KB7MUL, recently appointed ORS. Both of these amateurs are blind. Cochise ARA will hold annual hamfest at Sierra Vista May 2-4. They are continuing to work on their new facility. John, KQ7T, recruited twelve new ARES members in Cottonwood-Jerome area, and says, "more to come." Great word of Navajo Co. ARC for club at affiliation. New officers are KA7VTM, KE7GP and KA7YUW. Northland Pioneer College and Navajo ARC joined forces in installing 146.08/146.68 repeater in Holbrook. KA7ARZ, KE7GP and KA7VTM were featured in local newspaper article. The new facility will be used in emergency preparedness plans. N7RU in Flagstaff appointed HF Awards Manager for Coconino Co. ARC, an ARRL Special Service Club. Good luck, Scott. ARA received "Newsletter of the Month" Award from 73 magazine. Betty, WA6HRX, and staff of "Scuelch Tail" do a great job. Congratulations, Arizona Packet Radio Ass'n reports thirty members around the state. Portable "suitcase" stations are beginning to appear in batteries. Great for future emergency service. Tucson Amateur Packet Radio held annual meeting with approx. eighty attendees from all over U.S. plus Japan and Canada. SW Div. Dir. Heyn, WA6WZO, visited Tucson and spoke at joint meeting of TRA, OPRC and Catalina ARC. Good turnout for Fried. Your SM is continually impressed with all of the Public Service activities reported by the clubs. These "good works" really help our cause when state and local governments try to restrict or regulate ham activities. Keep it up, guys, and also enjoy the additional benefit of knowing that you are doing something very worthwhile with your hobby. Keep those cards and letters coming in. 73. Jim. Traffic: KA7MUL 559, W7TAMM 252, KB7EE 237, K6LL 118, W7EP 110, WB7CAG 66, KA7HEV 56, W7GAC 43, W7KXJ 24, K7POF 21, K7JKM 19, WA7KQE 13, K7NMQ 8, WB3LQQ 8.

LOS ANGELES: SM: Bob Poole, AJ6F—ASM: K6IYK. SEC: AK6Y. STM: W6INH. ACC: KX7O. OOC: K6STM. The following corrections and omissions apply to the march issue: WA8HXM was the source for the RFV public TV blurb, and DEC NR60 was left out of the new ARES lineup. Sorry folks! The Downey club keeps active with public service; the "Ride-or-Sight" bike event, for example, was covered by DARC and the Rio Hondo Club. Congrats to the new President of the

BAND TOGETHER



Larsen Antennas
 The Amateur's Professional™

See your favorite amateur dealer or write for a free amateur catalog.

IN USA: Larsen Electronics, Inc. / 11611 N.E. 50th Ave. / P.O. Box 1799 / Vancouver, WA 98668 / 206-573-2722
 IN CANADA: Canadian Larsen Electronics, Ltd. / 149 West 6th Ave. / Vancouver, B.C. V5Y 1K3 / 604-872-8517

LARSEN® KGLROD® AND KGLDUCKIE® ARE REGISTERED TRADEMARKS OF LARSEN ELECTRONICS, INC.

TONO THE STANDARDS OF EXCELLENCE TONO
SUPERIOR WEAK SIGNAL PERFORMANCE
COMMERCIAL MODEM

COMPARE with ANY unit at ANY Price

Now Available With
PACKET RADIO

**THE WORLD OF VHF/HF PACKET*,
 CW, RTTY, ASCII AND NEW DUAL
 AMTOR** IS AS CLOSE AS YOUR
 FINGERTIPS WITH THE BRILLIANTLY
 INNOVATIVE STATE-OF-THE-ART
 MICRO-COMPUTER CONTROLLED
 EXL-5000E.**

SPECIAL SALE

\$649

With Packet Radio — \$749/\$795



SHOWN WITH OPTIONAL PACKET TNC

Everything built in — nothing else to buy!

* AUTOMATIC SEND/RECEIVE — ANY SPEED ANY SHIFT • BUILT IN COMPUTER GRADE 5" MONITOR • EXTERNAL MONITOR JACK • TIME CLOCK ON SCREEN • TIMED TRANSMISSION AND RECEIVING • SELCAL • CRYSTAL CONTROLLED AFSK MODULATOR • PHOTOCOUPLED CW, FSK KEYS • ASCII KEY ARRANGEMENT • 15 CHANNEL BATTERY BACK-UP MEMORY • 1,280 CHARACTER DISPLAY MEMORY • SPLIT SCREEN TYPE-AHEAD BUFFER • FUNCTION SCREEN DISPLAY • PARALLEL PRINTER INTERFACE • SPEEDS: CW 5-100 WPM (AUTOTRACK), 12-300 BAUD (ASCII AND BAUDOT); 12-600 BAUD TTL; 100 BAUD ARO/FEC AMTOR • ATC • RUB-OUT FUNCTION • AUTOMATIC CR/LF • WORD MODE • LINE MODE • WORD WRAP AROUND • ECHO • TEXT CURSOR CONTROL • USOS • DIDDLE • TEST MESSAGES (RY AND OBF) • MARK AND BREAK (SPACE AND BREAK) SYSTEM • VARIABLE CW WEIGHTS • AUDIO MONITOR CIRCUIT BUILT IN • CW PRACTICE FUNCTION • CW RANDOM GENERATOR • BARGRAPH LED METER FOR TUNING • OSCILLOSCOPE OUTPUTS • BUILT IN 100-120 / 220-240 VAC 50/60HZ AND 13.8VDC POWER SUPPLIES • AND MUCH, MUCH MORE • SIZE: 14W x 14D x 5H • 1 YEAR LIMITED WARRANTY •



**Θ-777 THE MOST ADVANCED COMPUTER INTERFACE
 EVER DESIGNED FOR COMMERCIAL AND AMATEUR USE.**

RTTY, BIT INVERSION (RTTY), ASCII, AMTOR (MODE A (ARQ), MODE B (FEC AND SEL-FEC), MODE L), CW, ANY SPEED ANY SHIFT (ASCII AND BAUDOT)*

SPECIAL SALE \$289

- **AUTO DECODING:** Automatically decodes signal and displays mode, speed and polarity on the CRT — **COMPARE!**
- **28 BAR-LED'S** and LED'S plus a Bar-Graph Tuning Indicator indicate function, mode, and status — **COMPARE!**
- The awesome power of the Θ-777 is limited only by the imagination of the user and the terminal program of the computer.
- Use with Any computer that has RS232 or TTL I/O, IBM, Apple, Commodore, TRS80, etc.

Everything Built In - Including Software — Nothing Else To Buy!

* SPEEDS: CW 5-100 WPM (AUTOTRACK), 12-200 BAUD (ASCII AND BAUDOT); 12-600 BAUD TTL, AND RS232 OR TTL LEVEL DATA CONNECTION - 100-2400 BAUD (ASCII) OR 45.5-200 BAUD (BAUDOT) • SELCAL • MEMORY: 15 CHANNELS • 768 CHARACTER INPUT BUFFER • AUTO PTT • CW ID • DIDDLE • USOS • ECHO • AUTO CR/LF • ATC • RUB-OUT • CW PRACTICE GENERATOR • VARIABLE CW WEIGHTS • TEST MESSAGE (RY AND OBF) • FULL CRT FUNCTION DISPLAY • MARK AND BREAK (SPACE AND BREAK) SYSTEM • XTAL AFSK • AUDIO MONITOR • OSCILLOSCOPE OUTPUTS • AND MUCH, MUCH MORE • POWER SUPPLY REQUIREMENTS: 13.8 V DC, 700MA • SIZE: 9W x 10D x 2½H • 1 YEAR LIMITED WARRANTY •

EXCLUSIVE DISTRIBUTOR: DEALER INQUIRIES INVITED FOR YOUR NEAREST DEALER OR TO ORDER.
AMATEUR-WHOLESALE ELECTRONICS TOLL FREE...800-327-3102
 8817 S.W. 129th Terrace, Miami, Florida 33176 Telephone (305) 233-3631 Telex: 80-3356



MANUFACTURER:

TONO CORPORATION

98 Motospja Machi, Maebashi-Shi, 371, Japan



*PLEASE CALL FOR DETAILS

**Dual Amtor: Commercial quality, the EXL 5000E incorporates two completely separate modems to fully support the amateur Amtor codes and all of the CCIR recommendations 476-2 for commercial requirements.

Specifications Subject to Change.

Volunteer to Examine

EGE VIRGINIA
13646 Jefferson Davis Highway
Woodbridge, Virginia 22191
Information: (703) 643-1063
Service Department: (703) 494-8750

Store Hours: M-Th: 10 a.m. - 6 p.m.
Tu: Closed
WF: 10 a.m. - 8 p.m.
Sat: 10 a.m. - 4 p.m.
Order Hours: M-F 9 a.m. - 7 p.m.
Sat 10 a.m. - 4 p.m.

EGE NEW ENGLAND
8 Stiles Road
Salem, New Hampshire 03079
New Hampshire Orders: *
Information & Service: (603) 898-3750

Store Hours: Monday: Closed
Tu/WSat: 10 a.m. - 4 p.m.
Th/F: 12 noon - 8 p.m.
Sun: 12 noon - 5 p.m. **
*Order and we'll credit you \$1 for the call.
**Closed some Hamfest Sundays.

Buyer's Guide-Catalog Available - Send \$1.

LACOMBE DISTRIBUTORS

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



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

Dealer Inquiries Invited

**Hard to get
through on our
800 number?**

Call before 10 a.m. or after 5 p.m.
or call one of our regular numbers.
If you pay for the call and order,
we'll credit your order with \$1.

ICOM



NEW IC 751A
HF Transceiver with
General Coverage Receiver

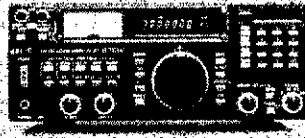
**CALL
FOR
QUOTES**



IC 9200
2m / 440 MHz Mobile



IC 745
HF Transceiver with
General Coverage Receiver



R 7000
General Coverage Receiver

IC 02AT/04AT
Handheld for 2m/440 MHz

KENWOOD



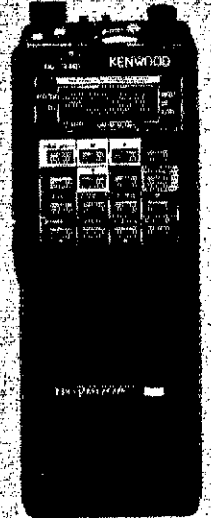
R 2000
General Coverage Receiver



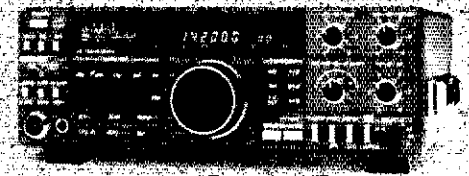
TS 940S
HF Transceiver with
General Coverage Receiver



TS 430S
HF Transceiver with
General Coverage Receiver
NEW LOW PRICE - CALL



TR-2600A
2m FM Handheld



New TS 440
HF Transceiver
with Antenna Tuner

**EXTENDED
WARRANTIES
AVAILABLE**

BEARCAT
100XL 16-channel handheld 199.95
800XL 40-ch, 800 MHz 319.00
145XL 16-ch, 10-band 99.95
175XL 16-ch with aircraft 154.95
30XL 10-ch, handheld 120.00
210XW 199.95

UNIDEN
Radar Detectors Call
CB Radios Call

SONY
2002 SWL Receiver 199.95
NEW 2010 SWL Receiver 279.95
4910 SWL Receiver 89.95

PANASONIC SWL CALL

COBRA CBs/RADAR DETECTORS

MIDLAND CBs CALL

WHISTLER RADAR DETECTORS

EAU

ST 6000 RTTY Demodulator 895.50
CT 2200 Communications Term 799.95
CRI 200 RTTY/CW Interface 899.95

PACKET

AEA PKT-1 Packet Controller 450.95
AEA PT-64 Controller 209.95
AEA PT-80 Controller 209.95
MFJ 1270 Packet 125.00
New Kantronics Packet PKTZ 199.95

HARDWARE

MFJ 1224 with MFJ C-64/V-20 Soft 79.95
MFJ New 1229 159.95
Kantronics Challenger Interface 89.95
Kantronics Interface II 210.95
Kantronics UIU Interface 169.95
Kantronics UIU-XF 299.95
AEA CP-1 Interface 179.95
AEA CP-100 Interface 284.95
AEA MP1 Micropatch 119.95

SOFTWARE

Kantronics Hamtext
Vic-20, C-64, Apple, Atari Call

Kantronics Hamsoft
Vic-20, Apple, Atari, TRS-80C, TI-99 Call

Kantronics Hamsoft/Amator
Vic-20, C-64, TRS-80 color, Atari 69.95

Kantronics Amatorsoft

Vic-20, C-64 79.95

Apple 119.95

Microlog Air Disk

Vic-20 and C-64 Disk 39.95

Cartridge 56.95

AEA

MBA-for 64 89.95

SWLText C-64 83.95

Dr. DX By AEA 95.95

Dr. QSO By AEA 71.95



PACKAGES

Microlog AIR-1 for C-64 179.95
AEA CP1 with Amator for C-64 229.95
AEA CP100 with Amator for C-64 Call



Amateur Software

for the VIC-20 and

Commodore 64

Specify tape or disk

VIC-20 C-64

Contest Log 24.95

Antenna Design 24.95

Computer Morse 9.95

Propagation Chart 9.95

Super Log 16.95

Nef Controller 16.95

DX Tool Kit 24.95

Master Log (Disk) 28.95

SUPER SPECIAL

MFJ 1228 with MFJ Software 56.95

TE SYSTEMS
RF AMPLIFIERS

With receive
GaAs FET Preamplifier
for superior weak signal
reception with improved
strong signal
intermod rejection.



1410G 2m Amp 10W In-160 out 309.00
1412G 2m Amp 30W In-160 out 269.00
4410G 440 Amp 10W In-100 out 309.00
4412G 440 Amp 30W In-100 out 309.00

These Savings

ANTENNAS & TOWERS

YAESU



FT 757GX
HF Transceiver with
General Coverage Receiver



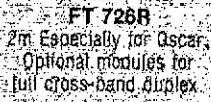
FT 209RH/709R
Handhelds for 2m/440 MHz



FT 980 CAT
Computer Controlled
HF Transceiver



FRG 8800
General Coverage Receiver
All mode 150kHz-30MHz



FT 726R
2m Especially for Oscar.
Optional modules for
full cross-band duplex



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

**ASK FOR
QUOTES ON
RADIO/
ACCESSORY
PACKAGES**

SANTEC



ST-20T 2m HT
ST-400ET 440 MHz HT
ST-200ET 220 MHz HT

KDK
FM240 2m, 25-watt

TEN-TEC



CORSAIR II Model 561



SCANNERS
HX1200 20-ch Handheld 229.95
MX4000 mobile 30-900 MHz 289.95
MX5500 20-ch 25-512 MHz cont. 359.95
MX7000 25 MHz-1 2 GHz 399.95
R1060 10-ch, 6-band 99.95
**POLARIS® MARINE AND
REGENCY LAND MOBILE**

CUSHCRAFT

A3 3-element 10-15-20m	205.00
A4 4-element 10-15-20m	264.95
R3 10-15-20m Vertical	256.95
215WB 55B/FM 2m Boomer	75.95
ARX-2B 2m Ringo Hanger	34.95
4218XL 2m Boomer	88.00
10-4CD 4-element 10m	104.95
15-4CD 4-element 15m	118.95
40-2CD 2-element 40m	279.95
Other Cushcraft models available	CALL

KLM

KT34A 4-element 10-15-20m	334.95
KT34XA 6-element 10-15-20m	479.95
2m-11X 11-element 2m	59.95
2m-16L BX 16-element 2m	91.95

MOSLEY

CL-33 3-element Triband Beam	265.95
TA-33 3-element 10-15-20m	239.95
Pro 37 7-element 10-15-20m	465.95

HUSTLER

6-BTV 10-80m Vertical with 30m	128.95
5-BTV 10-80m Vertical	108.95
4-BTV 10-40m Vertical	87.95
G6-440 440 MHz Base Vertical	99.95
G7-144 2-meter Base Vertical	115.95
G6-144B 2m Base Vertical	87.95
MO-1/MO-2 Masts	21.50
BM-1 Bumper Mount	14.95
MOBILE RESONATORS Standard	
10 and 15 meter	11.95 17.95
20 meters	15.50 21.85
30 and 40 meters	17.95 25.95
75 meters	19.95 36.95

HY-GAIN ANTENNAS

3915 TH7DX 7-ele 10-15-20m	CALL
3935 TH5DX 5-ele 10-15-20m	CALL
3955 Explorer 14 10-15-20m	CALL
2035 3-element 2-meter Beam	CALL
2085 8-element 2-meter Beam	CALL
2145 14-element 2-meter Beam	CALL
BN86 Beam Balun	CALL
V2S 2-meter Vertical	CALL
V4S 440 MHz Vertical	CALL

AEA ISOPOLES

144 2-meter Antenna	42.50
220 220 MHz Vertical	42.50
440 440 MHz Vertical	58.50

MORE ANTENNAS

AVANTI HM 151.3G 2m On-glass	31.95
LARSEN LM-150 5/8 Mag Mount	39.95
MINIQUAD HO-1	141.95
BUTTERNUT HF6V 10-80m Vert	115.95
BUTTERNUT HF4B 2-ele Beam	189.95
BUTTERNUT 2M CVS 2m	42.75
VOCOM 5/8-wave 2m Handheld	15.95

ANTENNAS FOR OSCAR

Cushcraft 416TB Twist	58.95
Cushcraft A14410T 10-10-10	46.95
Cushcraft A14420T 20-10-10	64.95
Cushcraft A0P1 Package	137.95
KLM 2m-14C 2m 14-14-14 Circular	88.95
KLM 435-18C 18-18-18 Circ Polar	111.19
KLM 2m-22C 22-22-22 Circ 2m	109.00

Unarco-Rohn

Limited Quantities

Self-supporting towers:

HBX40 40-foot with Base	209.95
HBX48 48-foot with Base	279.95
HBX56 56-foot with Base	349.95
HDBX40 Higher load with Base	259.95
HDBX48 Higher load with Base	339.95

Other BX, HBX, HOBX In stock

Guyed foldover towers:

FK2558 58-foot, 25G	940.00
FK4554 54-foot, 45G	1295.00

Other sizes at similar savings.
Foldovers shipped freight paid,
10% higher west of the Rockies.

Straight Sections:

20G Straight Section	39.95
25G Straight Section	49.95
45G Straight Section	110.95

Complete Tower Packages:

25G	45G
40'	Call Call
50'	Call Call
60'	Call Call

Each package includes top section, mid section, base, rotor shell, guy brackets, guy wire, turnbuckles, equalizer plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages are shipped freight collect FOB our warehouse.

HY-GAIN TOWERS

HG37SS 37-foot tall	CALL
HG52SS 52-foot tall	CALL
HG54HD 54-foot/higher load	CALL
HG70HD 70-foot/higher load	CALL

Order Hy-Gain tower, Hy-Gain antenna, and Hy-Gain rotor and receive free shipping on all.



W36 36-foot tall	549.00
WT51 51-foot tall	929.00
LM354 54-foot/higher load	1575.00
DX86 86-foot/motor/higher load	CALL

Shipping not included. Shipped direct from factory to save you money.

CABLE BY SAXTON

RB213 Mil Spec	29¢/ft
RG8/U Foam 95% Shield	25¢/ft
8-wire Rotor 2 #18, 6 #22	17¢/ft
Mini-8 95% Shield	13¢/ft

Cablewave Hardline CALL

ROTATORS

Alliance HD73	105.00
Hy-Gain CD45 II	CALL
Hy-Gain Ham IV	CALL
Hy-Gain Tailtwister T3X	CALL
Hy-Gain Heavy-duty 300	CALL
Kenpro KR500 Elevation Rotor	159.95

MIRAGE

B23A 2m Amplifier 2-30	84.95
B1016 2m Amplifier 10-160	242.95
B3016 2m Amplifier 30-160	199.95
D1010 10-100 Amp for 430-50	269.95
D1010N UHF Amp/N connectors	279.95
B215 2m Amp; 2 in, 150 out	245.95
A1015 6m Amp; 10 in, 150 out	242.95

AMERITRON HF AMPS

ATR15 Ant Tuner 1500 watt	289.95
ATR10 Ant Tuner 1 kW	242.95
RGS8 Remote Coax Switch	113.95
NEW AL1200 1.5 kW Amp	1399.95
NEW AL80A 1200 watt Amp	659.95
AL84 HF Amp 160-15	389.95

This is a partial list—
IF YOU DON'T SEE
WHAT YOU WANT... CALL

DAIWA

LA-2065R 2m Amp, 2 in, 60 out	125.95
LA-2035R 2m Amp with preAmp	74.95

VOCOM AMPLIFIERS

2 watts in, 30 watts out 2m Amp	69.95
2 watts in, 60 watts out 2m Amp	107.95
2 watts in, 120 watts out 2m Amp	189.95
200mW in, 30 watts out 2m Amp	84.95

KENWOOD TL922 2kW CALL

ASTRON POWER SUPPLIES

RS7A	49.95	RS20M	104.95
RS12A	69.95	RS35M	149.95
RS20A	89.95	VS20M	124.95
RS35A	133.95	VS35M	169.95
RS50A	189.95	RS50M	209.95

BENCHER PADDLES

Black/Chrome	41.95/53.95
--------------	-------------

B & W

375 6-position Coax Switch	24.50
376 5-position Coax Switch	24.50
425 1 kW Low Pass Filter	28.50
593 3-position Coax Switch	25.25
595 6-position Coax Switch	29.95
AP-10 5-band Apartment Antenna	39.95
370-15 All-band Dipole Antenna	129.95

—Other antennas in stock—

DAIWA

CN-520/CN-540 Meters	59.95/69.95
CN-620B Meters	106.00
CN-630 Meter	126.00
CN-720B 2kW HF Watt Meter	120.00
CNW-419 Antenna Tuner 500 W	174.95
CNV-518 Antenna Tuner 2.5 kW	279.95
CN410M SWR/wt mtr 3.5-150 MHz	64.95
GS201 2-position Switch	21.95
CS401 4-position Switch	64.95

TELEX HEADPHONES

Procom 350 ultra light set	58.95
Procom 250 soft phone/mike	72.90
Procom 450 padded phones	35.50
Procom 400 desk mike	57.75
Procom 460 padded phones	37.20
SWL-610 light headphone	8.75
G-610 light headphone	7.95

Others in stock. Please Call

BIG DISCOUNTS

MFJ PRODUCTS

989 3 kW Antenna Tuner	295.95
962 1.5 kW Tuner swch/meter	189.95
949C 300-watt Deluxe Tuner	129.95
941D 300-watt Tuner swch/meter	89.95
1020A Active Antenna	69.95
202B Noise Bridge	48.95
752B Dual Tunable SSB/CW Filter	79.95
Keyers—407, 422, 484	CALL
Other MFJ products in stock	CALL

AMPHENOL CONNECTORS

831SP PL259 silver	1.10
831SP 1050 Nickel PL259	0.75
8251 1 Type N RG8	2.50
2900 S0239-BNC	2.99
3112 BNC RG59	1.35
312 BNC RG58	1.25
83185 Reducer RG58	0.25
83168 Reducer RG59/miln 8	0.25
831R UHF panel	0.79

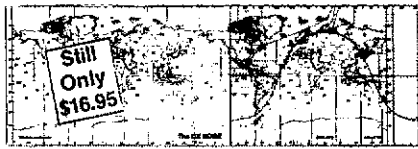
Special discounts on 100-piece purchases

Call Book Sale
Geographic Reg \$25— Sale \$18
Name Index Reg \$25— Sale \$18
Buy Both for \$30

For Orders and Quotes Call Toll Free: 800-336-4799
In New England Call 800-237-0047 In Virginia Call 800-572-4201

ege, inc.

Looking for DX? You need The DX EDGE®



Large Plastic Slide Version

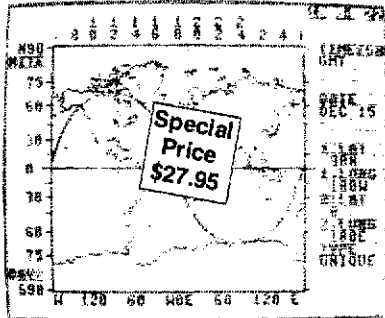
You'll use it everyday. Used around the world.

- Times, bands, places for best DX
- Daylight/darkness areas of the world at any time of day, any time of year
- Sunrise/sunset times anywhere
- Gray line/Long path
- Local times
- Ideal for 40, 80, 160.
- Great circle slide to show beam direction. \$3 each. Specify your latitude.

Great Help for Poor Low Sunspot Conditions

All ppd. in U.S., Canada. Add \$4.00 elsewhere, air mail. Add tax in NYS. U.S. 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 is a trademark of Commodore Electronics Ltd.



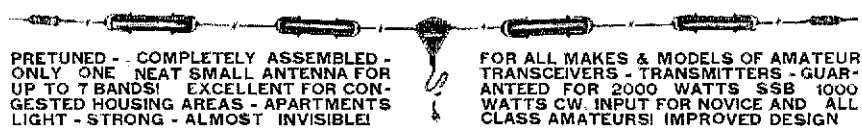
Commodore 64™ Version

- Also for C-128 (in C-64 mode)
- Real time DX help in the finest graphics
- 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

Palos Verdes club, K5KT, also a key field appointee. I'm proud to have the league's First Vice President, W6EJJ, in my section. Congrats to the Board for their selection, and congrats to Jay for accepting the challenge. San Gabriel Valley firms will find an active club in their area: the SGVRC. Call on 147.7654 for info. Thanks to the Monterey Park Club for including AK6V and myself to the meeting. N6ARJ of ANSAT advises that all the "hot" satellite info can be obtained via PACKET RADIO; not only on N6BGW-9 but also on the K6DSQ HF/VHF GateWay. Julian also sends that info to N1DL host on the east coast. By presiding, the So. Cal. DX Club will have hosted the 37th Annual DX convention in Visalia; this popular club does a great job in every respect. The W6FNO/R system continues to provide emergency services. Thanks to K6ZDL for the following January emergency reports: vehicular-180, fire-6 and medical 4 for a grand total of 190 calls; W6FNO/R is on 146.824-. W6OXX is the new LAOCARF Chairman; W6BQO is the Sec/Treas. Welcome to the Westside Amateur Radio Club forming in the WLA/Santa Monica area. The biggest public service event lately was the L.A. Marathon; K6NF and over 250 volunteers showed their interest in filling the communications needs on March 9. Yours truly was a net control for one of the seven nets and had a ball! W6VJL says, "Next time you hear a VHF contest on, don't be timid! Find out your GRID SQUARE and give out a few points. You don't have to be in the contest, nor do you have to send in a report." ARRL VHF QSO Party is listed in Contest Corral elsewhere this issue. Good news for the cw operators. W6ADO is sending cw practice on 7099 kHz daily at varying speeds. You will hear W6ADO most of the day and are constantly being challenged. The club has sorted various type of lists, such as sailing, machine, marine and several other types. This makes for a well rounded type of operator, who in real life, will encounter these types of sending. His Vibroplex type is very interesting. Those who have time to spend an hour copying W6ADO everyday will find significant improvement of their cw skills. Traffic: K6UYK 893, W6INH 478, N6LHE 121, W6BVPY 58, W6ORF 24, W6DFWZ 16.

ORANGE: SM, Joe H. Brown, W6UBQ—SEC: JIM, A6BN. STM: ERNIE, W6GQA. OOC: ALEX W6RIE, SGL: LOREN, N6HIQ. TC: JOHN, KDXG. PIO: JOE, W6DXT. ACC: PHILL, K6BFRW. OBM: BROOKS, K6GGG. NEW OFFICERS, Highes Fullerton Employees ARC, Pres. Chris NX6W, VP Jim NW6S, Treas. Rich WD6Y, Sec. Keith N6KFB. Congratulations. Rcvd info on the Club Challenge 80s competition congratulations are in order for the West Coast ARC. The club recruited the highest total number (88) new ARRL members. The club gets one radio system as top prize for the effort. Morongo Basin MARC GRAM, Election Rot. Pres. Karen W6BFWZ, VP, John K6GYC, Sec. Robert W6HOC. Amateur of the year Im MARC, Harry Botorff KF6JD. GREAT! The Marino Valley ARA is going great guns. field day planning, ARRL Affiliation in the works. T-Hunts and a repeater, 146.055 up 600. Officer Pres, JD NK7W, VP, Monty N6LRY. Sec/Treas, K6GMA. The MVARA is now a year old. Welcome aboard. Riverside County Amateur Radio Association has become involved in packet radio, now has new digipeater in service (145.05 MHz). The club is Webch your systems at 135 each Wed. Chuck K6NU, RCARA VEC reports 102 tested, 235 test elements administered, and up-graded 89. On behalf of the South Orange Amateur Radio association membership and it's Board: Thanks to Hal W6ACB and Eleanor for a job better than "Well done." The wit and charm he brought to the position as editor of the PHOPAGATOR will be missed. Good luck new editor, Lynn W6UUT. A Hospital Amateur Radio Support Group is being formed in the Coachella Valley. CVARC sez three hospitals have given a green light to the program. Become involved Call Hazel, NR6P, 619-347-4294. Congratulations to the Lopez, K6CJ, ex-hairman on his Coachella Planning commission. (AEC) Don, N6JFM from the Lee Deforest RC has been working on a regional deployment concept. Whereas, amateur radio operators could very well serve in the area of their homes in the event of an emergency situation. The phone tree is also being re-structured in accordance with this concept. EG/PIO words of wisdom. Public relations—A biggie this year! Up to this time, we all have been satisfied with the personal satisfaction derived from our public effort. It appears that we might even consider that public relations is a derivative of bragging. Well, so be it! Amateur Radio needs to be seen and heard. Smoke Signals from the FRG, T-Hunt activity, Greg, N6JFM, Chris, W6OQC, the Jan 88 winners, Welcome to new hunters, Dave, N6MJN, and Fichard, K6B6UZ. A gift from the Ladies Amateur Radio Association puts REHAB Radio computer setup on its very own desk. OOC activity, Alex provided programs for Beach dities wireless Soc (Hed Cross Comm), Ladies Amateur Assoc (TFC handling and NTS). One case of Amateur-to-Amateur interference was resolved. Cable TV QRM in the Tustin area was eliminated on 2m and 220 by working with cable operators and Orange Co Supervisor of Cable TV Franchise, Lt. Activity, John, presentation for Victor ARC (Direction of Radio Technology). Completed survey of RACER equipment at Orange Co EOC. Attended City of Orange Council Meeting. Ordinance did not pass, a more restrictive ordinance is under study. Not a good day for Amateur Radio. NTS Report from STM Ernie.

ALL BAND DIPOLE TRAP ANTENNAS!



PRE-TUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 7 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS LIGHT - STRONG - ALMOST INVISIBLE!

FOR ALL MAKES & MODELS OF AMATEUR TRANSCEIVERS - TRANSMITTERS - GUARANTEED FOR 2000 WATTS SSB 1000 WATTS CW. INPUT FOR NOVICE AND ALL CLASS AMATEURS! IMPROVED DESIGN

COMPLETE AS SHOWN with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof, resonant traps 1"X6"- you just switch to band desired for excellent worldwide operation - transmitting and receiving! Low SWR over all bands - Tuners usually NOT NEEDED! Can be used as inverted V's - slopers - in attics, on building tops or narrow lots. THE ONLY ANTENNA YOU WILL EVER NEED! FOR ALL DESIRED BANDS - WITH ANY TRANSCEIVER - NEW - EXCLUSIVE! NO BALUNS NEEDED!

80-40-20-15-10 Meter Bands	4 traps	91 ft. long	Model 1080D	\$129.95
40-20-15-10 Meter Bands	4 traps	45 ft. long	Model 1040D	\$199.95
80-40-30-20-15-12-10 Meter Bands	12 traps	71 ft. long	Model 8321D	\$299.95
40-30-20-15-12-10 Meter Bands	10 traps	37 ft. long	Model 4321D	\$259.95

SEND FULL PRICE FOR POSTPAID INSURED, DEL. IN USA. (Canada is \$10.00 extra for postage - clerical/customs etc.) or order using VISA - MASTER CARD - AMER. EXPRESS. Ph 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days (per cks 15 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

NEW PRODUCT RELEASE

VRC-100
Microprocessor Repeater Controller
with 100% DUTY CYCLE
POWER

Full Feature Repeater
Controller for under
\$600

- Autopatch/Reverse Autopatch
- Polite ID, CW messages
- Paging
- Clock & Calendar
- Logic input and outputs
- Exclusive & Quick "Macro" commands
- Control receiver interface
- CTCSS Port
- Fully Remotely Programmable

SATISFACTION GUARANTEED
Complete 30 Day Money Back Guarantee

Full 2 Year Warranty On Parts & Labor

Credit Card Orders
Call Toll Free
1-800-621-8387 ext. 244
8 am - 5 pm Mountain Time
Monday thru Friday

S-COM P.O. Box 8921 Fort Collins, CO 80525

Desk Top or Rack Mount

To Order, Send \$595 plus \$7.50 shipping & handling for complete controller, documentation, power supply, telephone cord and all connectors.

VISA M.C. Discover AmEx

Account # _____ Exp. _____

Check Name _____

Money order Address _____

City _____ State _____ Zip _____

NET FREQ TIME SES ONI TFC NM
SCN/1 3598 1830 28 257 244 WF80
SCN/2 3598 2015 26 150 44 WF80
SCN/V 148.645 2100 28 370 312 WA6QCA
RTTY/V 145.12 0900 66 421 97 KA6HJK
PSHP: WF6C WA6QCA, W6BQZ, KA6HJK Traffic: WF6C 543, KA6HJK 182, WA6QCA 135, W6BQZ 117, N6GOT 106, ADBA 94, K6ZCE 90, K6DD 70, W6RE 35, K6JT 33, W6CPB 25

SAN DIEGO: SM, Arthur P. Smith, W6INI—TC: N6NR. STM: N6GV, SEC: W6INI. PIO: K6GLP. 1988 National Convention, Sept 5 in San Diego will feature Tony Eklund, W6RE as banquet speaker. K6GLF has been appointed to Blue Ribbon Committee to recommend revisions in organization and procedures for handling of volume traffic in disasters. San Diego County Earthquake Preparedness Committee will have Amateur Radio representation via the Section Manager. Club challenge: Why not "adopt" a school and run licensing classes at a time and on a day students can attend? Upgrade: N6LYX to Gen. 1988 club officers: S D Rptr Assn Pres WR6HW, VP W6BURS, Sec W6OQC, Treas N6ICQ, Escondido ARS Pres W6GQV, VP K6BQDQ, Sec N6HAW, Treas N6JHR. Packagers needed for ARES. Contact W6TQC (277-6779) for info. New ARES members: K6DZ, K6HLL, K6ICT, N6JUB, N6KGV, WA6JUS, N6MGT, N6MX8, K6PZE, N6DAD ran a successful 1985 Toys for Tots campaign. Nice going Margy! K6PD has a new shack built to his specs onto his house. NCTN: 27 sessions, 88 msgs, ARES CW: NCS WA6IK reports 4 sessions with 18 ck-ins. Traffic: KU6D 159, N6GW 57, WA6IK 4.

SANTA BARBARA: SM, Byron Looney, K6FI—With Spring comes Bike-a-thons, Walk-a-thons, Marathons and support communications. Some smaller groups avoiding liability and increased insurance problems by not organizing into clubs. Somehow, this doesn't seem to speak well for our society.

WACOM DUPLEXERS

Our Exclusive Bandpass-Reject Duplexers
With Our Patented

B_p B_r CIRCUIT® FILTERS

provide superior performance especially at close frequency separation.

Models available for all commercial and ham bands within the frequency range of 30 to 960 MHz.



CALL
817/848-4435



WACOM PRODUCTS, INC.

P.O. BOX 21145

WACO, TEXAS 76702 • 817/848-4435

The RC-85 Repeater Controller . . . the affordable controller for any repeater.

The RC-85 controller offers the high tech basics of repeater control. Of course, much of what we consider 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. And since your repeater talks, it's friendly and fun to use.

The patch includes ten emergency autodial numbers, and 190 user loadable autodial slots. With toll restrict, "cover tone", and more.

The remote base capability lets you connect a transceiver to your repeater, for remotely commanded linking to other repeaters and simplex channels. With full frequency control! Frequency agile linking is invaluable in public service communications.

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, remote control logic outputs for controlling other equipment at the site.

There's never been a better time to upgrade your repeater system with ACC's products, unmatched in the industry in quality, sophistication, and performance. With well written, illustrated, easy to read manuals, training tapes, and telephone support.

Please call or write now for the rest of the story on all our repeater products, including controllers, digital voice storage units, and other Touch-Tone control products.

You'll be GLAD you did.



advanced
computer
controls, inc.

10816 Northridge Square
Cupertino, California 95014

(408) 749-8330

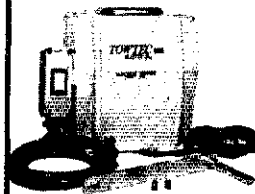
AMATEUR RADIO MAIL LISTS

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



TIRED OF CRANKING?

Motorize Your Tower With Our Electric Hoist/Winch

- STURDY — RELIABLE — EASILY INSTALLED
- IN USE ON E-Z WAY, HEIGHTS, TRI-EX, TRISTAO, ROHN, ALUMA, VERSATOWER, WILSON, TEL-TOW'R, PIPES, ETC.

TOWTEC CORP.
118 ROSEDALE RD., YONKERS, N.Y. 10710

\$410 after
May 31.

SALE \$370

+Freight
Tel. (914) 779-4142

THE VHF SHOP ORDERS & QUOTES ONLY 1-800-HAM-7373

ASTRON — SALE!			
RS-7A	45.00	RS-35A	123.74
RS-12A	62.75	RS-35M	138.00
RS-12M	70.55	VS-36M	156.85
RS-20A	79.85	RS-50A	179.85
RS-20M	95.45	RS-50M	203.85
VS-20M	114.55	VS-50M	227.85

KLM			
2M16L8X	220-22L8X	432-30L8X	90.00
2M14C	85.00	2M20C	108.00
435-18C	110.00	435-40C	144.00

KENPRO ROTORS			
KR400/KR500	125.00/154.00		
KR-5400/KR-5600	247.00/309.00		

HENRY AMPS			
2 KD CLASSIC	965.00		
2002A/2004A Less Relay	1250/1350.		
3002A/3004A Less Relay	2100/2100.		

NYE-VIKING			
MB-V-A	\$489.95		

MIRAGE			
A1015 - 235.00		C-22A - 85.00	
B23A - 83.00		C-106 - 169.00	
B216 - 245.00		C-1012 - 245.00	
R108 - 149.95		D-24N - 177.50	
R1016 - 205.00		D-1010N - 279.50	
B3016 - 199.00		D-3010N - 251.00	
MP-1 - 99.00		MP-2 - 89.00	

FOR THE BEST DEAL IN TOWN CALL THE BEST NUMBER AROUND 1-800-HAM-7373

CUSHCRAFT AOP-1 OSCAR PAK-133.00 RINGO RANGER II (2-220-440)-33.00
KENWOOD TS-940S/AT - CALL US! YAESU FT-757G - CALL US!
KENWOOD TR2600A HT. - CALL US! YAESU FT-726R - CALL US!

KENWOOD
FACTORY AUTHORIZED DEALER
CALL US FOR AMERICA'S LOWEST PRICE ON ALL YOUR KENWOOD NEEDS

CUSHCRAFT			
215WB - 73.00	A-3	200.00	
4218XL - 91.00	A-4	267.00	
R-3 - 250.00	40-200	267.00	

OTHER MODELS IN STOCK - CALL

CUE DEE THE SWEDISH BOOMER
USED BY MANY TOP '10' CONTESTERS
144-15AN 2MTR18EL 75.00

PARABOLIC			
1296-28 1W TRANSVERTER	339.00		
1296-144 3W UP CONV.	319.00		
1296 DUAL TUBE AMP CAVITY	439.00		
2PORT POWER DIVIDERS (2-220-432)	50.00		
4PORT POWER DIVIDERS (2-220-432)	56.00		
1296 2PORT DIVIDER	57.00		
1296 4PORT DIVIDER	62.00		
1296/96 DISH FEEDS	89.00		
2304 DISH FEEDS	89.00		
1296 SLUG TUNERS	65.95		

YAESU — FACTORY AUTHORIZED DEALER CALL FOR THE BEST DEAL AROUND ON 'THE RADIO' FULL LINE

MUTEK LTD.			
DO YOU OWN AN ICOM VHF XCUR?			
DO YOU WANT TO IMPROVE THE RECEIVER?			
TRY OUR MUTEK FRONT END BOARD - YOU'LL BE GLAD YOU DID!			
RPCB21 1251 RD FRONT END	143.00		
FOR ICOM 211 OR 251			
RPCB21 FRONT END FOR ICOM 271A OR 271H	143.00		
RPCB22 FRONT END FOR YAESU 221/225	168.00		
SLNA 508 6MTR PREAMP	84.00		
SLNA 1445 2MTR PREAMP	84.00		
ISQWRT SWITCHED. N.F. < 1db. GAIN 15db			
SRLA144E 2MTR MAST MOUNT R.F SWITCHED PREAMP 250W THRU POWER. N.F. < 1db15db	169.00		
GLNA 432E 70CM MAST MOUNT R.F SWITCHED PREAMP 50W THRU N.F. < 1db WITH G = 15db	172.00		
GFBNA 144E 2MTR MAST MT PREAMP. 1KW SEQUENCER G = 15db N.F. < 1db WITH AMP SEQUENCER	289.00		
GLNA 432E 70cm MAST MT PREAMP. 500W THRU. G = 15db N.F. < 1db. WITH AMP SEQUENCER	298.00		

2 volt outlets are here Call for Quotes

SSB ELECTRONIC

K9001 8 To 10 DBM RCV CONV	115.00
K2001 2 To 10 DBM RCV CONV	115.00
K1001 10cm To 10 DBM RCV CONV	115.00
K2010 23cm To 10 or 2 CONV G.F. FRONT END AND DBM	155.00
TV-144-28-10 10W 2MTX XVRTR	209.00
TV-432-28-10 10W 70cm XVRTR	299.00
TV-220-28-10 10W 14M XVRTR	259.00
DX-144 PREAMP N.F. < 4db	130.00
DX-220 PREAMP N.F. < 5db	145.95
DX-432 PREAMP N.F. < 5db	190.00
(10W DAYTON 188S N.F. CONTEST)	
DX-1296S PREAMP N.F. < 5db	165.00
DX-2320 PREAMP N.F. < 5db	165.00
PA-2310 1296/1296 10W LINEAR AMP	275.00
L1-205 1296 10W LINEAR TRANSVERTER	810.00
2M1F	
LGM-24 1296-2 OSCAR MODEL XMIT CONV 1W	
OUTPUT 2M1F	209.00
MICROLINE 13 1/2W 2.3GHZ XVRTR SYSTEM 2M1F	610.00
MICROLINE 13 3W 2.3GHZ XVRTR SYSTEM 2M1F	575.00
SLA-13 2304 3W AMP	385.00

FREE UPS On Mutek And SSB Products!

TONNA 902 ANTENNAS ARE HERE CALL FOR QUOTES
OTHER GREAT, HIGH PERFORMANCE ANTENNAS BY TONNA (CALL FOR SPEC. SHEET!!)

5 EL 6 METER YAGI	69.95	13 EL 2MTR YAGI	69.95	1294 1296 Quad Array	339.95
21 EL 70cm YAGI	56.95	23 EL 1296/96 YAGI	46.95	19 EL 70cm YAGI	44.95
(ATV MODELS IN STOCK)		1296 2PORT DIVIDER	57.00	6MTR 2MTR OSCARTWIST	65.95
70cm OSCARTWIST	58.95	55 EL 1296 SUPER YAGI	69.95	2 x 9 EL (186)	
2 x 19 EL (38el)					

9 + 19 el OSCAR ANTENNA 2M & 70cm ON A COMMONBOOM-GREAT
WATCH OUR AD FOR NEW LINES!! (FOR STACKING 75.42)

RD - 1, Box 570
Berwick, PA 18603

HOURS: Monday thru Friday 10:00 a.m. - 4:00 p.m.
Saturdays 10:00 a.m. - 1:00 p.m.

See You At Dayton! MC/VISA/CC.

Keep More Presidents In Your Pocket



High Volume Means Lowest Prices, And Big Savings For You. We Stock All Items For Fast Delivery.

- CABLE • WIRE • ANTENNAS • ROTORS • GOODIES**
- RG-213 MIL SPEC, 97% SHIELD . . . 28.5¢/ft.
 - RG-214 MIL SPEC, DBL SILVER SHIELD . . . \$1.50/ft.
 - RG-174 MIL SPEC, 97% SHIELD . . . 10¢/ft.
 - RG-8X (MINI 8) FOAM, 95% SHIELD . . . 12.5¢/ft.
 - RG-8U FOAM, 95% SHIELD . . . 24.5¢/ft.
 - RG-58AU MIL SPEC, 97% SHIELD . . . 12¢/ft.
 - RG-11AU MIL SPEC, 97% SHIELD . . . 28¢/ft.
 - RG-59U MIL SPEC, 97% SHIELD . . . 12¢/ft.
 - 300 OHM KW TWIN LEAD . . . 16¢/ft.
 - 450 OHM HD LADDER LINE, POLY INS. . . 10¢/ft.
 - 450 OHM HD LADDER LINE, BARE, 250ft ROLL \$27.00
 - 4 CONDUCTOR ROTOR CABLE . . . 9¢/ft.
 - 6 CONDUCTOR ROTOR CABLE . . . 14¢/ft.
 - 8 CONDUCTOR ROTOR CABLE (2#18/6#22) . . . 16.5¢/ft.
 - 8 CONDUCTOR ROTOR CABLE HD (2#16/6#18) . . . 34¢/ft.
 - 14 GA STRANDED COPPERWELD, 70 FT. ROLL \$6.50
 - 14 GA STRANDED COPPERWELD, 140 FT. ROLL \$12.00
 - 14 GA HD STRANDED COPPER . . . 10¢/ft.*
 - 12 GA HD SOLID COPPERWELD . . . 10¢/ft.*
 - 14 GA HD SOLID COPPERWELD . . . 8¢/ft.*
 - 18 GA HD SOLID COPPERWELD . . . 4¢/ft.*
- *SOLD IN CONTINUOUS LENGTHS TO 5000 FT. IN 50 FT. MULTIPLES ONLY
- ALLIANCE U110/HD73 Rotors . . . \$45.95/\$104.95
 - AVANTI HM 151.3G ON GLASS 2M ANT . . . \$30.95
 - AVANTI HMR450.9G ON GLASS . . . \$32.00
 - BUTTERNET HF2V 40 & 80 Mtr Vertical . . . \$108.95
 - BUTTERNET HF6V 6 BAND Vertical . . . \$119.95
 - TBR160S/RMK-11/ STRII . . . \$47.50/\$41.95/\$29.95
 - BUTTERNET 2M2CV/2M2CV-5 . . . \$41.95/\$48.95
 - BUTTERNET HF4B Compact 4 Band Beam . . . \$175.95
- BONUS-FREE SHIPPING ON BUTTERNET HF ANTENNAS AND BUTTERNET ACCESSORIES PURCHASED WITH AN HF ANTENNA (Cont. USA Only)**
- B & WAC3.5-30 ALL BAND FOLDED DIPOLE . . . \$139.50
 - CUSHCRAFT A3/A4 . . . \$203.95/\$263.95
 - CUSHCRAFT R3 VERTICAL . . . \$254.95
 - OTHER CUSHCRAFT . . . IN STOCK
 - HY-GAIN HAM IV/TX ROTORS . . . \$245.95/\$295.95
 - HY-GAIN THSMK25/THTDXS . . . \$429.95/\$497.95
 - HY-GAIN EX-14/QK710 . . . \$339.95/\$484.95
 - LARSEN LM-150-M 2mtr MAG MT ANT . . . \$38.95
 - MINI PRODUCTS HQ-1 MINI QUAD . . . \$140.95
 - MOSLEY TA-33J/TA33 . . . \$173.95/\$235.95
 - MOSLEY CL-33/CL-36 . . . \$260.95/\$350.95
 - MOSLEY PRO-37 . . . \$460.95
 - YAN GORDEN ALL BANDER . . . \$25.95
 - YAN GORDEN SD-40 DIPOLE KIT . . . \$25.95
 - YAN GORDEN SD-80 DIPOLE KIT . . . \$28.00
 - YAN GORDEN PD 80-10 DIPOLE KIT . . . \$34.00
 - YAN GORDEN PD 80-40 DIPOLE KIT . . . \$32.95
 - ALPHA DELTA PRODUCTS AT DISCOUNT PRICES
 - AMPHENOL PL-259 . . . 89¢/ea.
 - COAX SEAL, ROLL . . . \$1.95
 - VAN GORDEN HI-Q 1 BALUN . . . \$11.95
 - VAN GORDEN HI-Q CENTER INSULATOR . . . \$5.95
 - W2AU 1-1 or 4-1 BALUN . . . \$15.50
 - W2AU TRAPS 10/15/20/30/40 . . . \$33.95/pr.
 - W2AU END-insulator . . . \$1.50
 - B&W 375 or 376 COAX SWITCH . . . \$23.00
 - B&W 593/595 COAX SWITCH . . . \$25.00/\$29.00
 - DAIWA CS201/CS401 SWITCH . . . \$21.95/\$63.95

- TOWERS**
- HY-GAIN TOWERS SHIPPED FREE!**
- HG-37SS/HG52SS . . . \$785.00/\$1145.00
 - HG-54-HD/HG70HD . . . \$1765.00/\$2825.00
- UNIVERSAL ALUMINUM TOWERS DISCOUNT PRICES**
- NOW STOCKING PHILLYSTRAN GUY CABLE!**
- HPTG 2100 (2100# RATING) . . . 27¢/ft.
 - HPTG 4000 (4000# RATING) . . . 47¢/ft.
 - 9901 CABLE END . . . \$7.50/ea.
 - SOCKET FAST POTTING COMPOUND . . . \$14.50
- ASTRON POWER SUPPLIES**
- R57A/R512A . . . \$44.99/\$61.99
 - RS20A/RS20M . . . \$79.50/\$95.99
 - RS35A/RS35M . . . \$122.95/\$137.99
 - RS50A/RS50M . . . \$178.99/\$202.95
- TEN-TEC**
- CORSAIR II . . . \$1144.95
 - 925D ARGOSYII . . . \$565.95
 - CENTURY 22 . . . \$345.95
 - 229 1KW ANTENNA TUNER . . . \$265.95
 - 4229 1KW ANTENNA TUNER KIT . . . \$195.95
- MFJ**
- 941D/949C ANTENNA TUNERS . . . \$87.50/\$127.50
 - 401/407 KEYS . . . \$43.95/\$69.95
- MANY OTHER MFJ PRODUCTS IN STOCK**
- NYE VIKING**
- M85A TUNER . . . \$485.95
 - 2KW LOW PASS FILTER . . . \$27.95
- AMERITRON**
- AL-80A LINEAR . . . \$655.95
 - AL-84 LINEAR . . . \$371.00
 - AL-1200 LINEAR . . . \$1397.00
 - ATR-15 1500W TUNER . . . \$297.00
 - ATR-10 1000W TUNER . . . \$250.00
 - RCS-4 REMOTE COAX SWITCH . . . \$122.95

- DAIWA CN520/620/630 . . . \$57.97/\$105.95/\$138.95
- ALPHA DELTA MACC 4pos/8pos . . . \$53.95/\$71.50
- BENCHER PADDLES BLACK/CHROME . . . \$39.50/\$49.50
- SHURE 444D Dual IMP DESK MIC . . . \$51.95
- HEIL SOUND PRODUCTS . . . IN STOCK
- PALOMAR ENGINEERS PRODUCTS . . . IN STOCK

La Cue™ NEW PRODUCT
Our own 2 element
160.75/80.40 Meter Sloper Antenna
OWN THE BEST FOR ONLY . . . \$39.95

PLEASE! ORDERS ONLY
800-637-3300

LET'S TALK! FOR INFORMATION, THANK YOU!
814-536-5500

SHIPPING CHARGES ADDITIONAL EXCEPT AS NOTED. PRICES SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION



La Cue Inc., 132 Village St., Johnstown, PA 15902

Store hours Monday - Friday, 8:30-5:00, Saturday 8:30-12:00 • Please send stamp for flyer • We Export!

Among the many who have upgraded, special congrats to K6KGF, hard working EC of Santa Barbara County South, WK6K and associates did a packet presentation for Bakersfield club with Estero Club scheduled for April. Ops working for Caltrans are urged to register with their Emergency Planning Branch, Jim Piazza, Caltrans is convinced they will need our help for emergency communications. Serious storms on the central coast during February with Ventura and Santa Barbara ops standing by for flood duty but we lucked out. Traffic: N6HYM 60, W6BWKQ 38, K6VD 27.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—STM: AE5I, ASMI/ACC: N5IV, SGL: W5UXP, BM: W5QXK, RFI: W5UJBP, TC: W5LNL, PIO: K5HGL. The following is a by-county listing of our ARES Emergency Coordinators in our Section: Anderson: K5KXG, Archer: W5IGV, Armstrong: W55AJC, Bell: N5FFY, Borden: N5HFF, Brown: K55LD, Burger and better than: K5WQU, Castro: W5WVY, Childress: N5CAN, Clay: K5RE, Cochran: W5NGX, Coke: K5OQP, Collingsworth: W5BME, Comanche: W5PCJ, Cooke: W5HWL, Dallam: N5BNU, North Dallas and Richardson: K5DTN, Cities of Addison, Carrollton, and Farmer's Branch: W5ONG, City of Mesquite: K5EVF, City of Irving: K5HE, Deaf Smith: K5BNO, Delta: K5CHU, Denton: W5KYU, Donley: W5RBC, Eastland: K5BNO, Ector: N55FI, Ella: K5ASU, Erath: W5ZMW, Fannin: W5FRC, Floyd: K5HKN, Franklin: K55TE, Freestone: W5BMTU, Gray: W55OTF, Grayson: N25K, Hale: K5CPU, Hall: W5BME, Haskell: W5YSZ, Henderson: W5BVTZ, Hill: K55QY, Hockley: W5NGX, Hood: W5GCP, Hopkins: W55EB, Howard: W55EFJ, Hunt: K5SCU, Hutchinson: N5GT, Iron: K5JEZ, Jack: A5EB, Johnson: W5SULA, Lamar: N5FVN, Lamb: K5ELU, Lipscomb: N5AE, Loving: K5RYS, Lubbock: K55CZY, Lynn: K5JZ, McLennan: N5AJP, Midland: W55GKE, Montague: K55BL, Moore: W55OMZ, Morris: K5DPI, Nacogdoches: K5MSU, Nolan: K5ISD, Ochiltree: K5IS, Palo Pinto: W5A1ZB, Panola: K5ASHA, Parker: W5QGC, Potter: N5IMO, Hains: A5EU, Randall: N5IMO, Red River: K5BRLK, Rockwall and City of Garland: W55BU, Runnels: K55OGP, Rusk: W55ONC, Scurry: N5HFF, Shackelford: N55LW, Smith: K55AJC, Somervell: K5LJC, Stephens: K55OQ, Swiss: K55GV, Tarrant: K5AVA, Taylor: N5ANO, Tittus: W55GFP, Tom Green: K5WV, Van Zandt: A55U, Wichita: W5UTA, Wilbarger: W55IOR, Winkler: K5RYS, Wise: W55OVS, Yoakum: W55QVU, Young: W55QJ. If your county was not listed, this means there is no EC currently appointed. Please volunteer your services if interested. My address is at the bottom of page 8 of this issue. If you are in a county with an active EC, please contact him and sign up in your local ARES group. We are in the midst of tornado season, and your help with emergency preparedness is needed. The Ham-Com is moving to Arlington this year, and promises to be bigger and better than ever, with the flea market and commercial exhibits all in one area. Lots of interesting seminars are planned, as well as many social activities. I hope to see you there! It's the first weekend in June, as usual. PSHR for Feb.: K5SWRA K5EVI AE5I K5UPN K5BSUL K55QYV W55MP K5A5PT. Traffic: W5TNT 332, K5BSUL 309, K55RC 202, K5UPN 179, N5BT 174, K5SPT 163, W54HML 147, AE5I 121, W9OYL 119, W5QU 69, W55MP 57, K5SWRA 46, K5EVI 42, K55QYV 36, K5A5ZK 26, N5HEN 21, K55QGF 20, K5PC 2.

OKLAHOMA: SM, Dave Cox, N55N—ASM: K5WG, SEC: W5ZTN, STM: K55V, ACC: N5JY, BM: W5AS, PIO: W55IFB, OOC: K55WG, ECL: W5N2S, TC: W55MJ. Upon reading this installment of Section News, many of you are, no doubt, still recuperating from another fantastic hamfest in Mooreland. Kudos to the Great Plains ARC and others for staging such an enjoyable event again this year. Kudos also to the bayton area hams for bringing back their annual swapfest. ARRL State Convention is just around the corner; to be held this year in conjunction with the Green County Hamfest, which has been moved to Tulsa, and will be staged at VoTec's southeast campus, May 17-18. We're right in the middle of tornado season, and I hope we've prepared well this year. Statewide emergency HF frequency is 3900 kHz. The Okla. Traffic and Weather Net meets on 3900 kHz M-S at 2345Z. The Okla. RACES Net meets on 3995 Sundays at 2100Z. All RACES members are invited to check in. Any DX clubs out there? Please contact N5BN with details you know or any. New Appointees: FIA-W55YU; ORS-N5SN; Traffic: K55CP 365, W55SRX 267, N55I 168, W55A 134, K55EK 126, W55RB 108, N55W 105, K55V 97, N55IK 92, W55VXU 88, N55X 84, W55REC 75, N55O 73, W55OUV 62, N55N 48, W55IFB 38, N55L 28, W55ZQ 26, K55GB 26, W55AG 26, W55VOR 25, W55LV 23, K55AY 21, N55S 6, K55WGS 5, N55WN 4, N55Y 4, A5A0 4, N55Y 4. (Jan.) N55Y 4.

SOUTHERN TEXAS: SM, Arthur P. Ross, W5KR—SEC: K55KRI, STM: K55EW, ACC: N5TC, PIO: W55UZB, TC: N5ZU, ACC: K55V, OOC: W55VJL. Congratulations to new OOs W54PPE and N55I. San Antonio ARC bulletin reports upgrades of W55FMG and W55QWR to Extra; W55HFF, W55HNA and N55HF to Advanced; and K55PYF to Technician. DRNS Mgr W55YDD reports 100% message pass in February; Southern Texas ORP election represented 100% by W55LW, W55EPA, W55FQU, W55CTZ, K55CB, N55V, K55KQ, W55Z, N55DFQ, N55U, W55AC and W55YDD. ORS K55RG has completed OSK modification of SB-200 linear amplifier; also holding down RN5 Cycle 4 Net Mgr job pending completion of election. South Texas Amateur Hpr Society (STAR5) in Harlingen held a hugely successful STARFEST in February; West Gulf Division Director W5EDZ spoke on ARRL plans and held ARRL forum; he also presented plaques to W5KR as Rio Grande Valley Amateur of the Year and for years of service to Amateur Radio and ARRL, ORS W55LV reports 6 bulletins, 25 satellite bulletins, W55E2 and SM W55KR, along with more than 100 persons in propagation forecasts. 4X bulletin, ORP bulletin given 81 readings on 8 nets, ORS and VE N5ZU. Sequin reports W55DOM upgraded to Extra and has applied for VE accreditation; GVAEN helped out in State CD exercise Twister II; new Technician calls are N5IVU and N5IWI. CAND Mgr W55LV reports 99 messages in February; DRNS Represented 100% by STX stations W55AC, K55KQ, N55V, W55FQU, N55U, W55EPA, N55DFQ, W55YDD and W55LV. El Paso ARC celebrated the dedication of their beautiful new club house with an open house and special ceremony attended by an El Paso city official, West Gulf Division Director W5EDZ and SM W55KR, along with more than 100 persons. Traffic: W55YDD 627, W55K 248, N55DFQ 244, W55LV 240, W55CTZ 198, W55EPA 178, W55QVU 171, AC5Z 113, W55GKH 75, W55Z 50, N55U 44, W55WCY 32, K55EW 32, K55ZR 20, N55CRU 20, W55VJL 19, W55UZB 15, N55J 12, KC5T 6. (Jan.) J55K 77, K55VD 22.

SWITCH TO SAFETY!

High power to get you out. Battery saver to keep you there.

Where other HTs don't make it, Yaesu's 2-meter FT-209RH and 440-MHz FT-709R keep going strong. Here's why:

Our 2-meter model offers you 5 watts output. And our 440-MHz model offers 4½ watts.

Yet there's no excessive battery drain, thanks to a unique user-programmable Power Saver. When activated, it puts the rig "to sleep" while monitoring, and "wakes it up" when the squelch breaks. Thus, you can listen for hours while keeping plenty of power in reserve.

And despite the wealth of advanced features, operation is actually simple and intuitive. That's why our radios are so much easier to "learn" than any other advanced HT.

At the push of a button, you can recall the information you've independently stored in each of the ten memories: receive frequency, standard or non-standard offset, even tone encode/decode.

Monitoring your favorite repeaters or simplex frequencies is just as easy. Just touch a button to scan all memory channels, selected ones, or all frequencies between adjacent memories. And use the priority feature to return automatically to a special frequency.

Bring up controlled-access machines with the optional plug-in subaudible tone encoder/decoder, independently programmed from the keyboard for each channel. Then use the decode function to listen for tone-encoded signals on selected channels — without a lot of chatter.

Finally, both HTs cover 10 MHz, and come complete with a 500-mAh battery, charger and soft case. Options include a VOX headset and hard leather case.

So next time you visit your dealer, pick up Yaesu's 2-meter FT-209RH or 440-MHz FT-709R. Because they not only get you out, they keep you there too.

YAESU

Our 30th Anniversary.

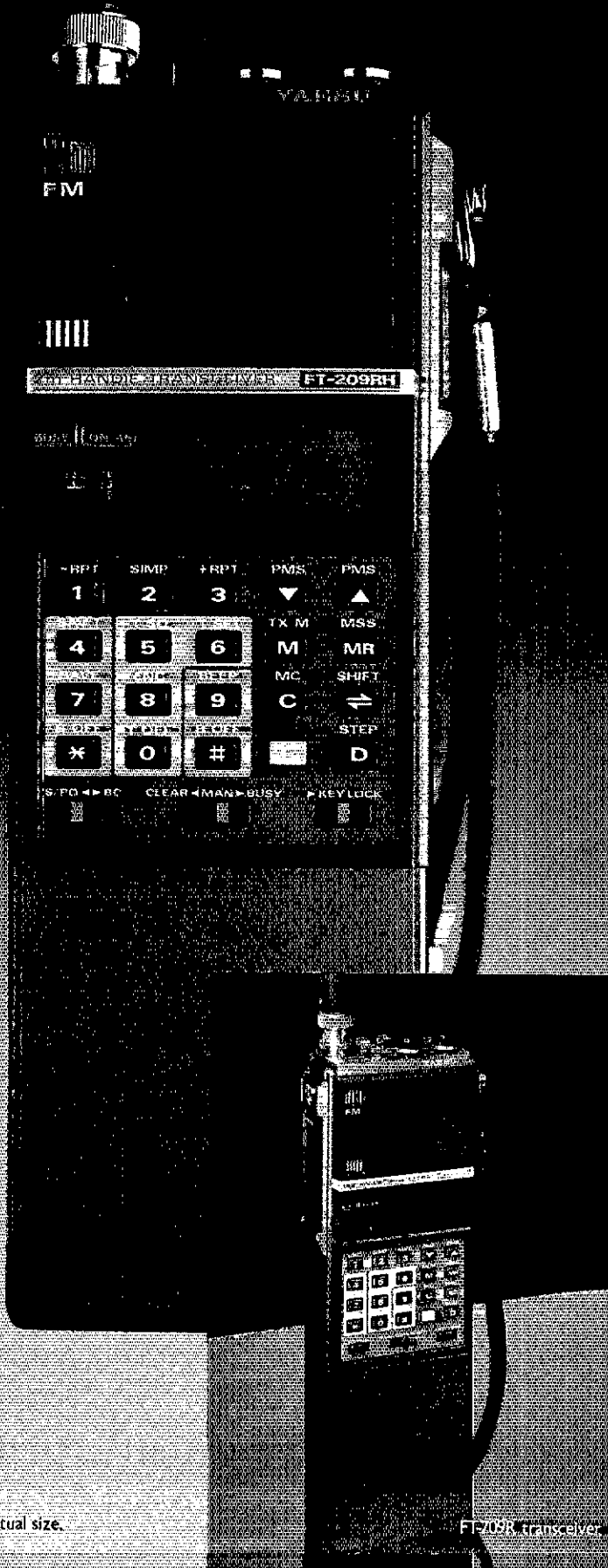
Yaesu USA

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

Yaesu Cincinnati Service Center

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

Prices and specifications subject to change without notice.



FT-209RH shown actual size.

FT-709R transceiver.



ALINCO ELECTRONICS INC.

ALR-206T
List \$345.00

Introductory Sale \$289.95

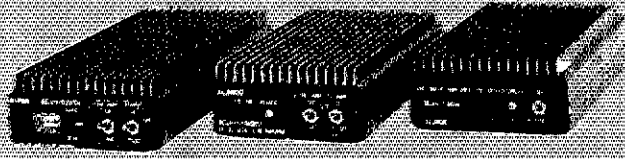


- Unique Control Knob
- Completely Programmable From Microphone
- 25 Watt High - 5 Watt Low •10 Channel Memory
- Built In Lithium Back Up Battery
- Up/Down Control On Microphone
- Built In Sub Audible Control
- Many Features, See Your Dealer

Introductory Sale \$279.95



ALM-203T List \$345.00
2m FM Handheld Transceiver
Don't decide on a handheld until you have seen Alinco's newest!
Lightweight, low spurious emission and powerful.
Transmit RF at 9.6V-Low Power = .4 watt
at 9.6V-High Power = 3. watt
at 13.8 V-Low Power = .5 watt
at 13.8 V-High Power = 5. watt



Linear Amps

2m and 70cm Micro Linear Amplifiers. Each of these amps include a heavy duty heat sink, a protection circuit and low pass filter for a clean signal. On one you get a GaAsFET RX preamp and even an RF meter on one.
List Prices From \$69.95 to \$158.00.



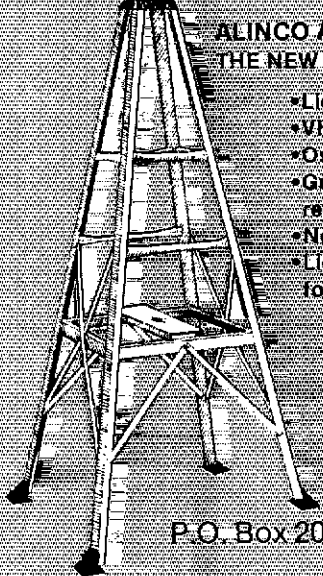
Power Supplies

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

ALINCO ANNOUNCES THE PERFECT MATCH FOR MEDIUM SIZE ANTENNA SYSTEMS. THE NEW ALINCO TOWERS ARE IDEAL FOR MOUNTING:

- Light-Weight Beams
- VHF UHF Antennas
- Oscar Antenna Systems
- Guy points when added support is required
- No rivets - all steel bolts
- Light-weight aluminum construction for easy installation and durability

- All towers have four legs for easy mounting. Along with ALINCO's unique dual wall construction for unparalleled strength
- Rotor mounts inside the ALINCO Tower with provisions for top mounted thrust bearing



THRUST BEARING
MODEL AAZ-7A
\$36.00



CONSTRUCTION OF LEGS

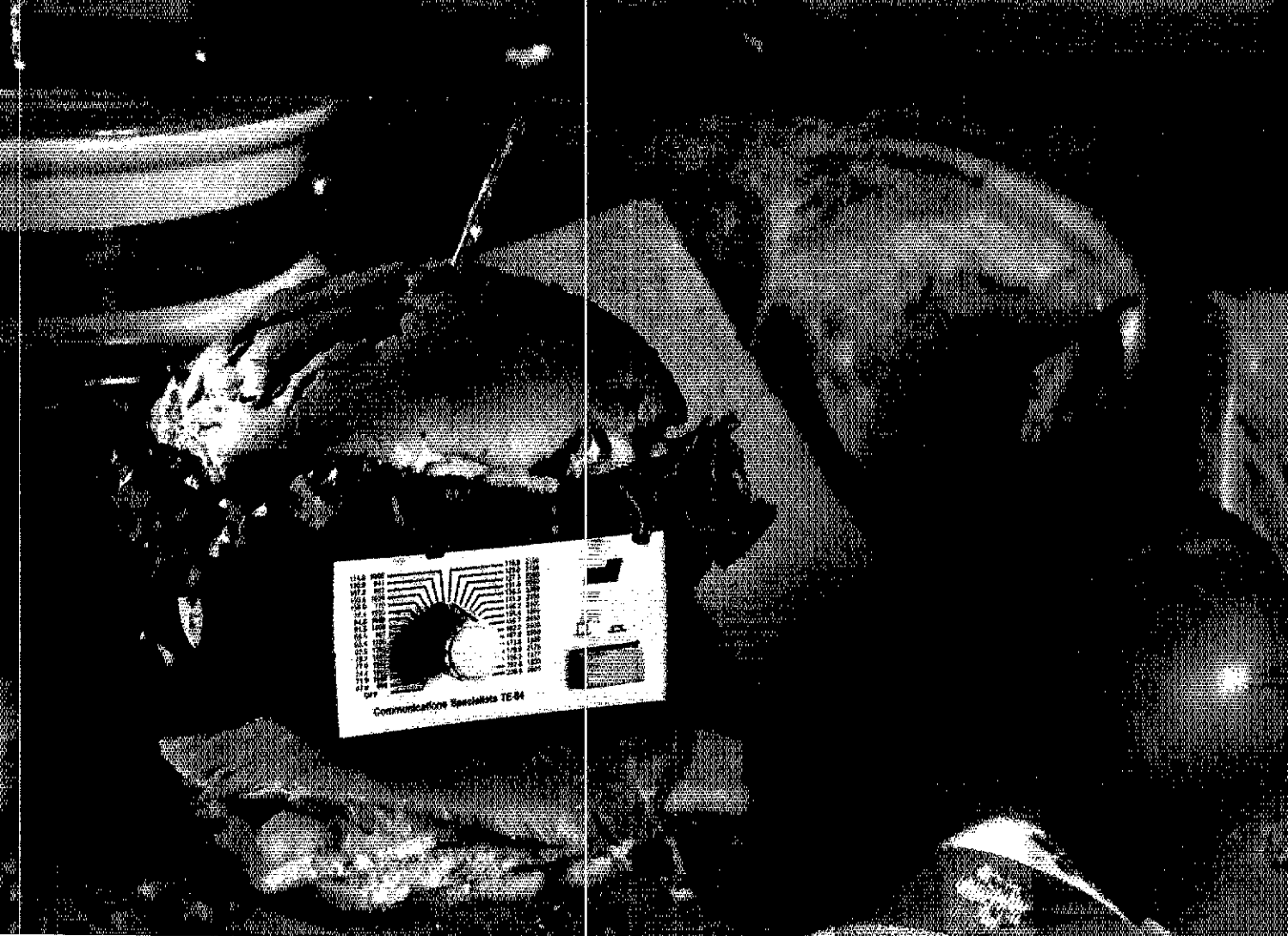


ROTATOR
MODEL AAZ-7 \$121.00

Contact your nearest dealer or Call Alinco for the location closest to you.

ALINCO ELECTRONICS INC.

P.O. Box 20009 • Reno, Nev. 89515 Phone (702) 359-1414 • Telex 4993999 EGELECTR
44 Glen Carran Circle • Sparks, Nev. 89431



Food for thought.

Our new Universal Tone Encoder lends its versatility to all tastes. The menu includes all CTCSS, as well as Burst Tones, Touch Tones, and Test Tones. No counter or test equipment required to set frequency-- just dial it in. While traveling, use it on your Amateur transceiver to access tone operated systems, or in your service van to check out your customers' repeaters; also, as a piece of test equipment to modulate your Service Monitor or signal generator. It can even operate off an internal nine volt battery, and is available for one day delivery, backed by our one year warranty.

- All tones in Group A and Group B are included.
- Output level flat to within 1.5db over entire range selected.
- Separate level adjust pots and output connections for each tone Group.
- Immune to RF
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak
- Instant start-up.
- Off position for no tone output.
- Reverse polarity protection built-in.

Group A

67.0 XZ	91.5 ZZ	118.8 2B	156.7 5A
71.9 XA	94.8 ZA	123.0 3Z	162.2 5B
74.4 WA	97.4 ZB	127.3 3A	167.9 6Z
77.0 XB	100.0 1Z	131.8 3B	173.8 6A
79.7 SP	103.5 1A	136.5 4Z	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
85.4 YA	110.9 2Z	146.2 4B	192.8 7A
88.5 YB	114.8 2A	151.4 5Z	203.5 M1

- Frequency accuracy, $\pm .1$ Hz maximum - 40°C to + 85°C
- Frequencies to 250 Hz available on special order
- Continuous tone

Group B

TEST-TONES:	TOUCH-TONES:	BURST TONES:			
600	697 1209	1600	1850	2150	2400
1000	770 1336	1650	1900	2200	2450
1500	852 1477	1700	1950	2250	2500
2175	941 1633	1750	2000	2300	2550
2805		1800	2100	2350	

- Frequency accuracy, ± 1 Hz maximum - 40°C to + 85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

Model TE-64 \$79.95

 **COMMUNICATIONS SPECIALISTS**

426 West Taft Avenue, Orange, California 92667
(800) 854-0547/ California: (714) 998-3021



The Total Mobile Antenna System

Reduced size yet high performance HF antennas are becoming increasingly popular among today's radio amateurs, and ICOM is proudly responding to those needs with a deluxe antenna system: The AH-2. This all band and fully automatic antenna package is especially designed for luxury style mobiling, portable activities such as vacationing, or operating from environmentally sensitive areas such as apartments or condos.

Mobiling in top fashion hasn't been more attractive, and ICOM's "all in one" design boasts numerous advantages over conventional "mixed components" type setups. Whether pursuing fixed station or mobile activities, the flexibility and convenience of this fully remote controlled and automatically tuned antenna opens new horizons in limited antenna HF operations. Since the AH-2 system is packed with unique features and is a relatively new idea, we would like to discuss its innovative designs in a step-by-step manner.

There are five components in the ICOM AH-2 system. The package can be purchased complete or minus the mobile mount and whip for auto or fixed station use as desired. The full system consists of a small rig-attached control unit, a remote actuated and microprocessor controlled antenna tuning unit, an approximate nine-foot stainless steel whip, a universal and heavy duty auto frame mount, and an interconnecting cable set.

An optional OPC-137 cable interface is available for the IC-751 or IC-745 HF transceivers. When using the system's stainless whip, operation on all amateur bands between 3.5 and 30MHz is possible. When the radiating whip is replaced with a random wire 40 feet or longer, 1.8MHz operation is also possible. During operation, you merely select a band and frequency, push the remote unit's "tune" button, and one of over 260,000 LC combina-

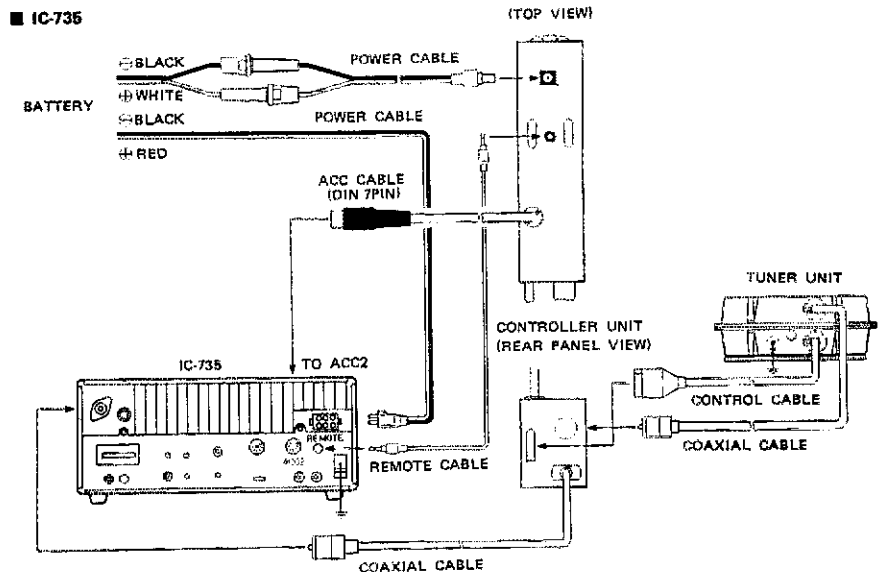
tions is digitally selected for optimum transmit antenna performance. Tuning actions require only ten watts of RF power, and the resulting SWR is 1.5:1. Usual tuning time is less than six seconds. The antenna tuning unit's microprocessor stores that LC data in one of eight internal memories, so that information is recalled in less than two seconds when the HF transceiver retunes a preselected range. An additional microprocessor in the rig-attached remote control unit handles automatic transceiver tune mode switching and the RF power output control.

Notice the tuner's capabilities are used during **both transmit and receive**. Its four sensors (impedance, phase, forward and reflected power) are designed to optimize **both single longwires and whips or random wires shorter than ¼ wavelength**: a difficult task for many automatic tuners. Notice, also, the precise use of microprocessor selected fixed capacitors rather than motor driven variables. This overall concept

provides superb antenna tuning and the highest possible performance.

The system's whip and mount truly give new clarity to the terms "universal" and "heavy duty." They can be quickly installed on a TV mast, boat or one of today's "bumperless" autos. The mount's bracket bolts to an existing hole in an auto's rear frame, a very strong pipe bolts into the bracket, and the antenna's base section bolts to the pipe's remaining end. The pipe's length is fully adjustable to fit various autos. The antenna base section, incidentally, stands 15 inches tall and weighs approximately nine pounds. "Rugged" is truly an understatement!

Whether assembled as an all-band mobile system or employed in fixed station use when large arrays are unfeasible, ICOM's dual microprocessor controlled AH-2 will keep you communicating in high style. ICOM is bridging new areas in communications, and wants **you** to enjoy this leading edge in modern technology!

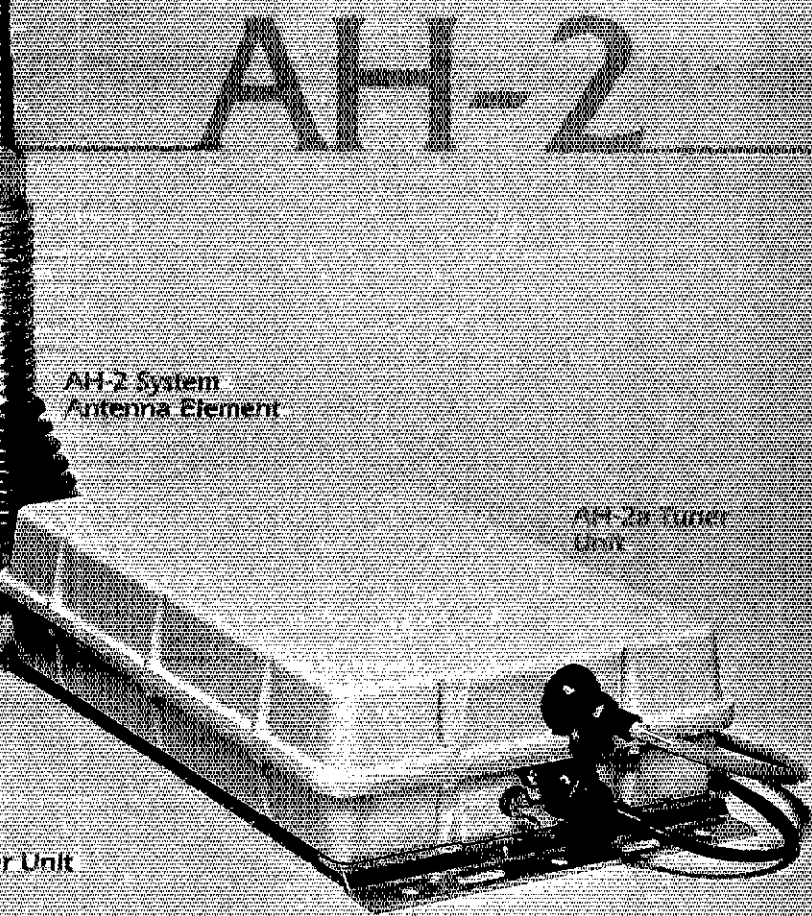


ICOM Automatic HF Antenna Tuner

AH-2



IC-735 Air Band
HF Transceiver

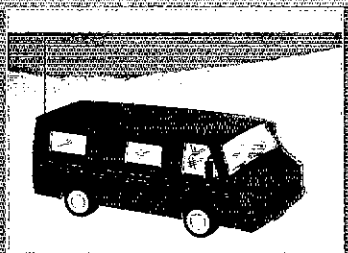


AH-2 System
Antenna Element

AH-2a Tuner
Unit

AH-2a
Controller Unit

ICOM presents the AH-2 automatic antenna tuning system for the IC-735 all band HF transceiver. The AH-2 is ideal for mobile operators since there is no manual antenna tuning needed...an advantage in inclement weather. Also, the AH-2 system enables auto tuning in areas where antennas are limited, such as apartments and condominiums.



use to match frequencies from 3.5MHz to 30MHz. The system includes an antenna element, and the AH-2a tuner and controller units.

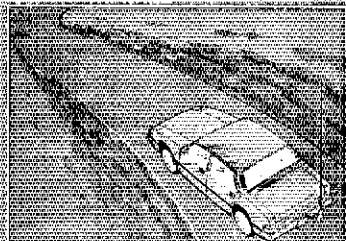
The AH-2a Tuner Unit enables optimum matching conditions via its built-in 8-bit microcomputer and LC (coil/capacitor) circuit. More than 250,000 LC combinations are possible.

The AH-2a Controller Unit easily attaches to the side of the IC-735 HF transceiver. By simply pushing the TUNE button on the front

panel of the AH-2a controller unit, the controller automatically tunes from 10 to 80 meters in less than six seconds. It can also be used on the 160 meter band with an extension of the stainless steel whip.

The AH-2a tuning unit is housed in a durable, weather-resistant case and is capable of storing tuning information for eight different frequencies. Retrieving tuning data from the memories is accomplished in less than one second!

The AH-2a can be purchased separately to accommodate the ham who already has a bumper mount and whip antenna, or the apartment/condo dweller who wants to match a random wire.

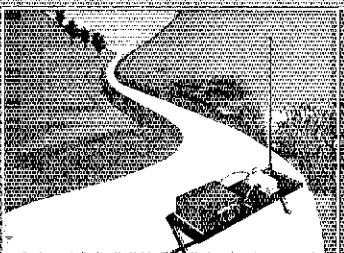


The antenna element includes sturdy bumper mounts which hold the 107 inch stainless steel whip in place, plus all the necessary hardware.

For the ideal mobile station, look at the IC-735 transceiver and the AH-2 automatic antenna system...they're quite a match.



The ICOM AH-2 System combines advanced matching techniques and rugged construction for indoor or outdoor



ICOM

First in Communications

ICOM America, Inc., 7380-116th Ave. NE, Bellevue, WA 98004 / 4331 Towerwood Drive, Suite 307, Dallas, TX 75234

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. AH21285

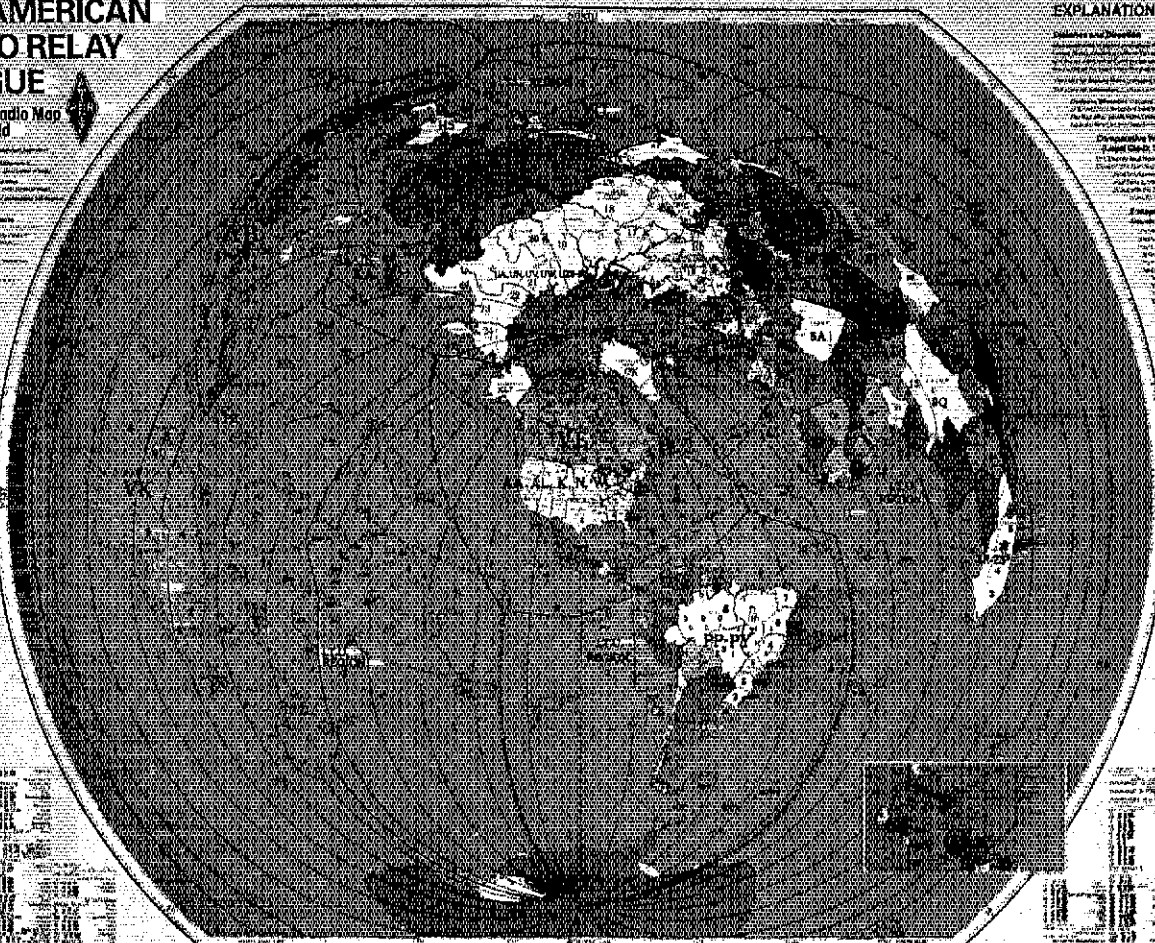
THE AMERICAN RADIO RELAY LEAGUE

Amateur Radio Map
of the World

1. Contour Interval
2. Scale
3. Symbols
4. Work Time
5. Other

COUNTRY INDEX

Table listing countries and their call districts, including ITU and CQ zones.



EXPLANATION

Call Districts
Call districts are shown on the map by a number and a letter. The number indicates the ITU Region and the letter indicates the call district. For example, 1A is the call district for the United States.

ITU Regions
The world is divided into three ITU Regions: 1 (North America), 2 (Europe, Africa, and Asia), and 3 (Australia and Oceania).

Work Time
Work time is shown by a shaded area on the map. It indicates the time of day when the map is valid for use.

Other
Other markings on the map include great circle bearings centered on the United States, and various symbols for radio-related information.

COUNTRY INDEX

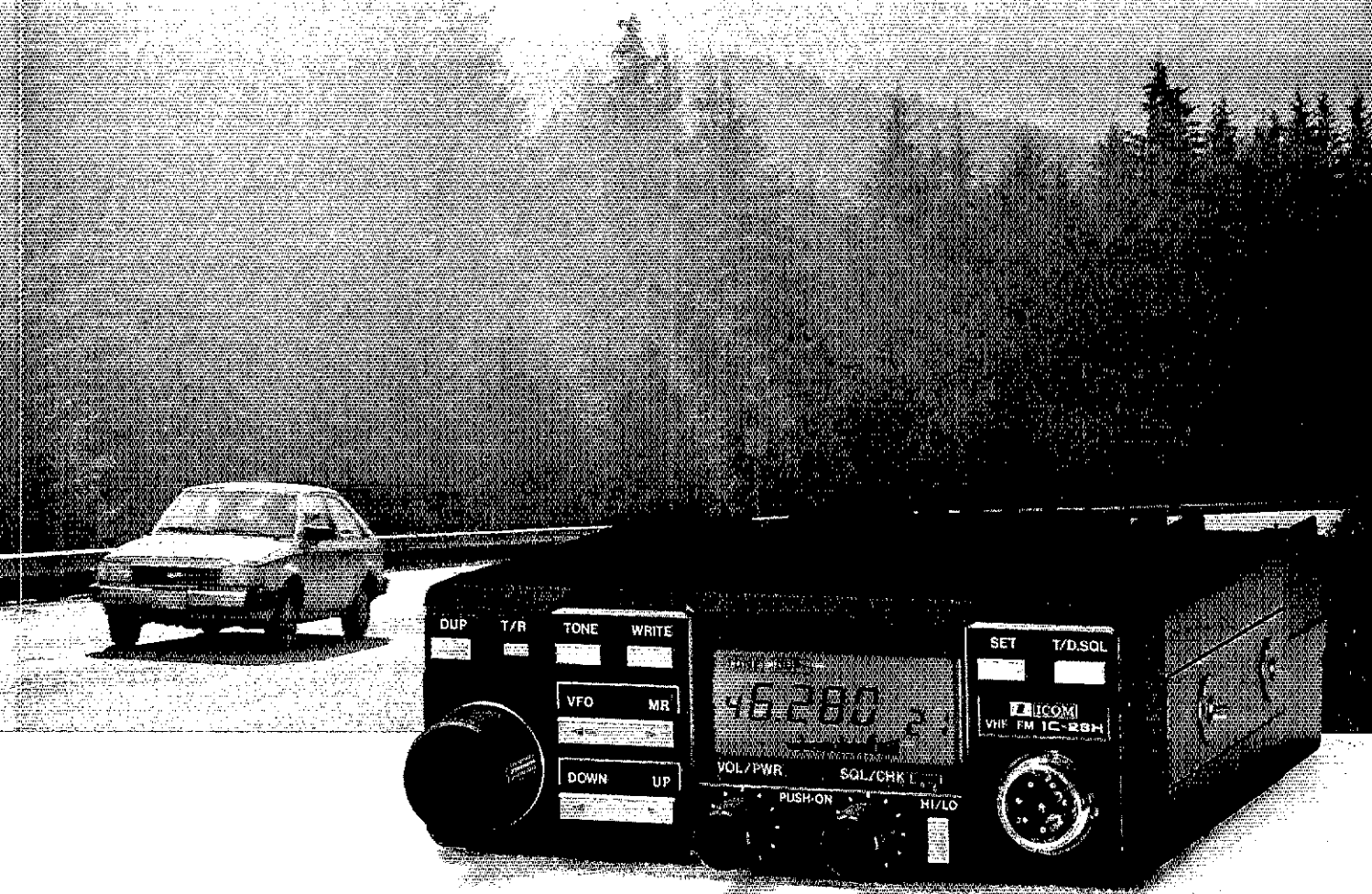
Country	Prefix	ITU Zone	CQ Zone
Afghanistan	3X	3.1	3.1
Algeria	3A	3.1	3.1
Angola	3B	3.1	3.1
Argentina	3C	3.2	3.2
Australia	3D	3.3	3.3
Austria	3E	3.1	3.1
Bahamas	3F	3.2	3.2
Bahrain	3G	3.1	3.1
Bangladesh	3H	3.1	3.1
Barbados	3I	3.2	3.2
Belgium	3J	3.1	3.1
Belize	3K	3.2	3.2
Bhutan	3L	3.1	3.1
Bolivia	3M	3.2	3.2
Bosnia and Herzegovina	3N	3.1	3.1
Brazil	3O	3.2	3.2
Bulgaria	3P	3.1	3.1
Canada	3Q	3.1	3.1
Chad	3R	3.1	3.1
China	3S	3.1	3.1
Colombia	3T	3.2	3.2
Costa Rica	3U	3.2	3.2
Cuba	3V	3.2	3.2
Czech Republic	3W	3.1	3.1
Denmark	3X	3.1	3.1
Dominican Republic	3Y	3.2	3.2
Ecuador	3Z	3.2	3.2
Egypt	4A	3.1	3.1
El Salvador	4B	3.2	3.2
Equatorial Guinea	4C	3.1	3.1
Eritrea	4D	3.1	3.1
Estonia	4E	3.1	3.1
Ethiopia	4F	3.1	3.1
Finland	4G	3.1	3.1
France	4H	3.1	3.1
Gabon	4I	3.1	3.1
Gambia	4J	3.1	3.1
Germany	4K	3.1	3.1
Ghana	4L	3.1	3.1
Greece	4M	3.1	3.1
Guatemala	4N	3.2	3.2
Haiti	4O	3.2	3.2
Honduras	4P	3.2	3.2
Hungary	4Q	3.1	3.1
India	4R	3.1	3.1
Indonesia	4S	3.1	3.1
Iran	4T	3.1	3.1
Ireland	4U	3.1	3.1
Israel	4V	3.1	3.1
Italy	4W	3.1	3.1
Jamaica	4X	3.2	3.2
Japan	4Y	3.1	3.1
Jordan	4Z	3.1	3.1
Kazakhstan	5A	3.1	3.1
Kenya	5B	3.1	3.1
Korea	5C	3.1	3.1
Kuwait	5D	3.1	3.1
Kyrgyzstan	5E	3.1	3.1
Laos	5F	3.1	3.1
Latvia	5G	3.1	3.1
Lebanon	5H	3.1	3.1
Lesotho	5I	3.1	3.1
Lithuania	5J	3.1	3.1
Luxembourg	5K	3.1	3.1
Macao	5L	3.1	3.1
Madagascar	5M	3.1	3.1
Mali	5N	3.1	3.1
Malta	5O	3.1	3.1
Mexico	5P	3.2	3.2
Moldova	5Q	3.1	3.1
Mongolia	5R	3.1	3.1
Montenegro	5S	3.1	3.1
Morocco	5T	3.1	3.1
Mozambique	5U	3.1	3.1
Nepal	5V	3.1	3.1
Netherlands	5W	3.1	3.1
New Zealand	5X	3.3	3.3
Nicaragua	5Y	3.2	3.2
Niger	5Z	3.1	3.1
Nigeria	6A	3.1	3.1
North Macedonia	6B	3.1	3.1
North Korea	6C	3.1	3.1
Norway	6D	3.1	3.1
Oman	6E	3.1	3.1
Pakistan	6F	3.1	3.1
Panama	6G	3.2	3.2
Papua New Guinea	6H	3.3	3.3
Paraguay	6I	3.2	3.2
Peru	6J	3.2	3.2
Philippines	6K	3.1	3.1
Poland	6L	3.1	3.1
Portugal	6M	3.1	3.1
Romania	6N	3.1	3.1
Russia	6O	3.1	3.1
Rwanda	6P	3.1	3.1
Saudi Arabia	6Q	3.1	3.1
Senegal	6R	3.1	3.1
Serbia	6S	3.1	3.1
Seychelles	6T	3.1	3.1
Singapore	6U	3.1	3.1
Slovakia	6V	3.1	3.1
Slovenia	6W	3.1	3.1
South Africa	6X	3.1	3.1
South Korea	6Y	3.1	3.1
Spain	6Z	3.1	3.1
Sri Lanka	7A	3.1	3.1
Sudan	7B	3.1	3.1
Sweden	7C	3.1	3.1
Switzerland	7D	3.1	3.1
Taiwan	7E	3.1	3.1
Tanzania	7F	3.1	3.1
Togo	7G	3.1	3.1
Tonga	7H	3.3	3.3
Turkey	7I	3.1	3.1
Turkmenistan	7J	3.1	3.1
Uganda	7K	3.1	3.1
Ukraine	7L	3.1	3.1
United Arab Emirates	7M	3.1	3.1
United Kingdom	7N	3.1	3.1
United States	7O	3.1	3.1
Uruguay	7P	3.2	3.2
Uzbekistan	7Q	3.1	3.1
Venezuela	7R	3.2	3.2
Vietnam	7S	3.1	3.1
Yemen	7T	3.1	3.1
Zambia	7U	3.1	3.1
Zimbabwe	7V	3.1	3.1

NEW EDITION!

136 CHANGES • A BIG 30"x40" DETAILED CARIBBEAN INSERT

The ARRL Amateur Radio Map of the World has just been updated from the 1980 version by the League and Rand McNally. The colors are brighter and bolder, and we have added an enlarged and detailed insert of the Caribbean. The country index lists countries alphabetically by prefix and shows ITU and CQ Zones as well as continent. On the map itself you will find ITU Regions, time zones and great circle bearings centered on the United States as well as prefixes and call districts. This new edition will brighten any ham shack wall! Price is \$8.00.

The American Radio Relay League, Inc.
225 Main Street
Newington, CT 06111 USA



ICOM IC-28H ON THE ROAD FOR LESS

- Compact Size
- Simple to Operate
- Large LCD Readout
- 25 or 45 Watts
- Packet Compatible
- 21 Memory Channels

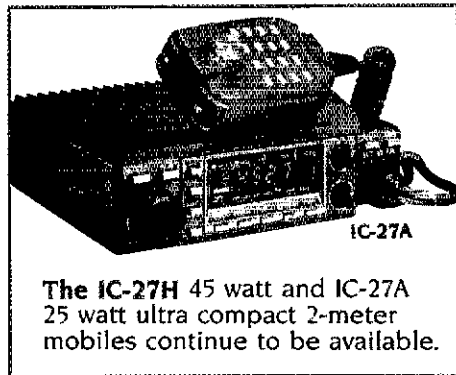
The IC-28H has all the features you need for carefree 2-meter mobile operation. The only thing it doesn't have is a big price.

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). 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



The IC-27H 45 watt and IC-27A 25 watt ultra compact 2-meter mobiles continue to be available.

inches deep). Great for mobile installations where space is limited.

21 Memory Channels. To store your favorite frequencies, 21 memory channels are provided. 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 12 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, HM-16 speaker mic and HS-15/HS-15SB flexible mic and PTT switchbox.

 **ICOM**
First in Communications

ANTENNA BOOKS

!

Because of space limitations in *QST*, we don't have room to run all of the good antenna articles that are submitted. The solution to this problem? **THE ARRL ANTENNA COMPENDIUM!** You'll find 178 pages packed with new material on quads, loops, log periodic arrays, other beam antennas, multiband antennas, verticals, reduced size antennas, plus such interesting topics as: Mr. Smith's "Other" Chart and Broadband Rigs; Available Power, SWR and Loading; Baluns: What They Do and How They Do It; The Horizontal Dipole Over Lossy Ground; and Antenna Polarization. Copyright 1985. Paperbound: **\$10.00** in the U.S., **\$11.00** elsewhere.

THE ARRL ANTENNA BOOK The best and most highly regarded antenna information available. The 14th Edition contains 328 pages of propagation, transmission line and antenna fundamentals. You can update your present antenna system with practical construction details of antennas for all amateur bands - 160 meters through microwaves. There are also antennas described for mobile and restricted space use. Tells how to use the Smith chart for making antenna calculations and covers test equipment for antenna and transmission line measurements. Over 600,000 copies of previous editions sold. Copyright 1982. Paperbound: **\$8.00** in the U.S., **\$8.50** elsewhere. Clothbound: **\$12.50** in the U.S., **\$13.50** elsewhere.

HF ANTENNAS FOR ALL LOCATIONS by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; the Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound **\$12.00**.

Add \$2.50 (\$3.50 for UPS) shipping and handling charge.



THE AMERICAN RADIO RELAY LEAGUE, INC.

**225 MAIN STREET
NEWINGTON, CT 06111**

ICOM Dual Bander

IC-3200A



The Most Compact Dual Bander at the Smallest Price

Finally there's a compact full featured 25 watt FM dual bander that's simple in design and operation, plus very affordable...the IC-3200A.

Dual Bands. The IC-3200A covers both the 2-meter (140,000-150,000MHz) and 70cm (440,000-450,000MHz) bands. The IC-3200A also features fully programmable offsets in 5KHz steps for MARS and CAP repeater operation.

25 Watts. The IC-3200A delivers 25 watts of output on both bands. Or the low power can be adjusted to one to ten watts.

Compact. The IC-3200A is only 5 1/2" W x 2" H x 8 1/2" D.

Simple to Operate. With only 14 front panel controls, the IC-3200A is by far the easiest dual bander to use.

Memory Lockout. For scanning only certain memory channels, ICOM utilizes a memory skip (M SKIP) function.

10 Tunable Memories. To store your favorite frequencies, 10 memories are provided. Each memory will store the receive frequency, transmit offset, offset direction and PL tone. Each memory can be tuned up or down when

selected, yet automatically returns to the original frequency when reselected. All memories are backed up with a lithium battery.

Scanning. The IC-3200A has four scanning systems... memory scan, band scan, program scan and priority scan.

Other Outstanding Standard Features:

- New LCD display, easy to read in bright sunlight
- Tone encoder (all PL/subaudible tones built-in)
- IC-HM14 mic with up/down scan and DTMF

- One antenna connector (Duplexer already installed)
- Variable tuning increments: 5 and 15KHz (2-meters), 5 and 25KHz (70cm)
- Frequency dial lock
- Dual VFO's
- Mounting bracket

Optional Accessories. An optional IC-PS30 system power supply, voice synthesizer, and IC-SP10 speaker are available.

See the IC-3200A at your local ICOM dealer for the best buy on a full featured dual bander.

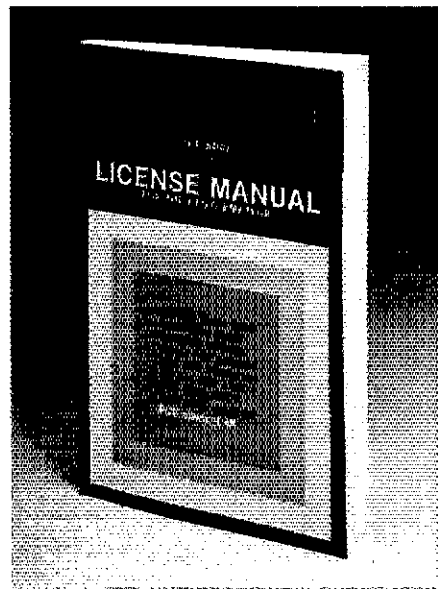
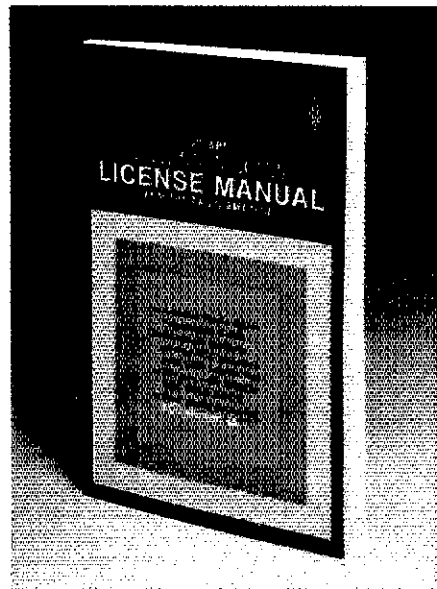
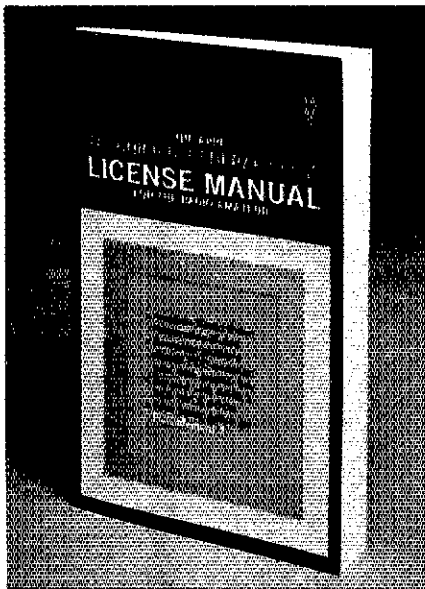


ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234

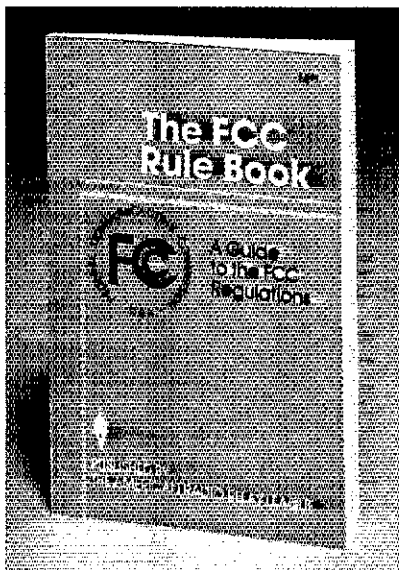
All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 3200A1B5



NEW 5th EDITION FCC RULE BOOK!

The revised bright green **FCC Rule Book** is now available. It includes the new spread-spectrum rules and the full text of PRB-1 concerning federal preemption of state and local antenna regulations. Changes in amateur frequency allocations are covered. *Every* amateur needs a current copy of the most up-to-date FCC rules and interpretations. **The FCC Rule Book** fills this need by presenting in-depth explanations of the domestic and international regulations covering Amateur Radio. The new 5th edition is must reading!

The ARRL 1986-1987 Technician/General Class License Manual was recently revised to include the question pool now in use. Like the other books in our **License Manual Series**, we begin each chapter with a list of key words. The reader is directed to study small groups of questions as the appropriate portions of the text are covered. **Tune in the World with Ham Radio** for the beginner was just revised also and has all of the up-to-date information the student needs in order to pass the Novice exam.



Tune in the World with Ham Radio 1986 edition
 Kit with book and and cassette . . #0232 \$10
 Book only #0240 \$ 7

License Manual Series
 Technician/General Class #0143 \$ 5
 Advanced Class #016X \$ 5
 Extra Class #0178 \$ 5
 FCC Rule Book #0216 \$ 4

Code Proficiency
 Code Kit #5501 \$ 8
 Morse University 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*

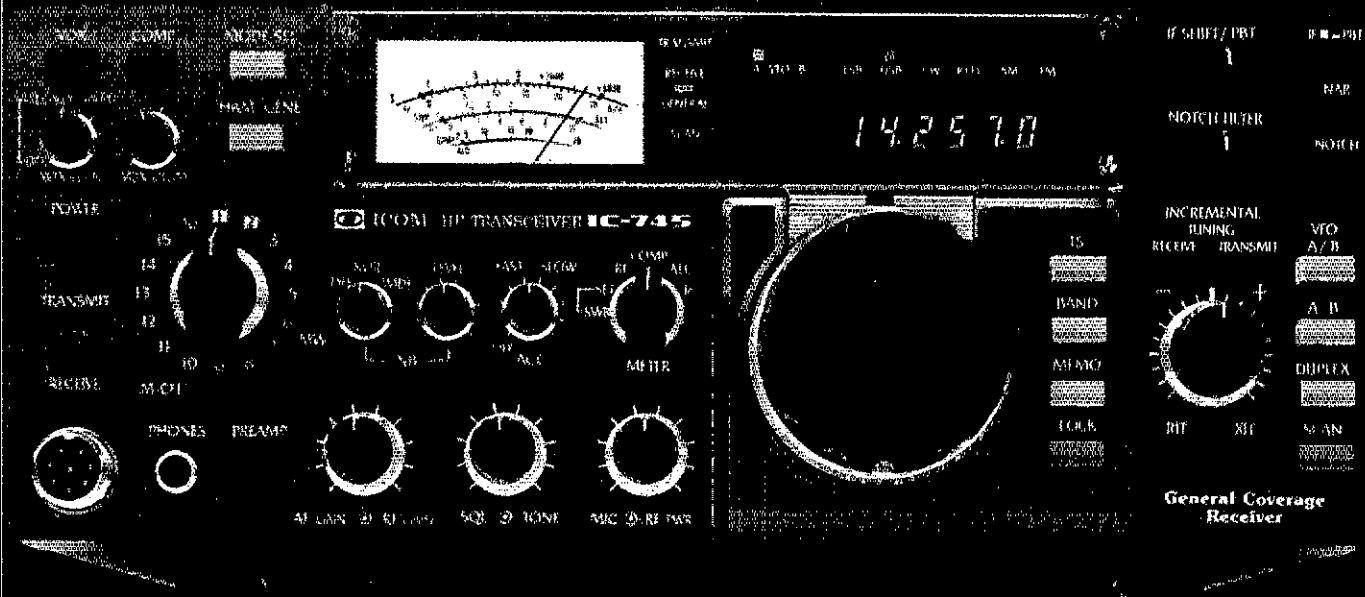
Orders must include \$2.50 shipping for book rate or \$3.50 for UPS.

The American Radio Relay League, Inc.
 225 Main Street
 Newington, CT 06111



COM HF Transceiver

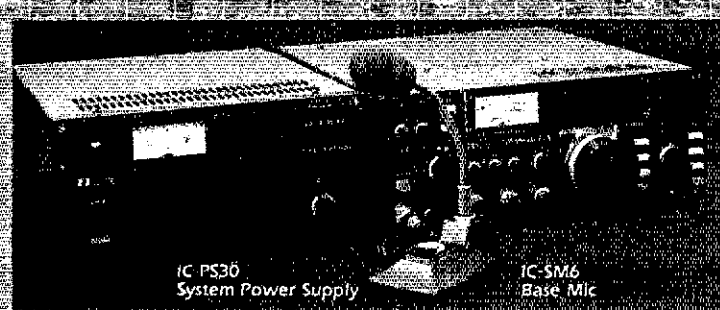
IC-745



High Performance Maximum Flexibility

The IC-745 is a full featured, high performance HF base station transceiver with a 100dB dynamic range receiver. PLUS features usually found only in more expensive units.

- Compare these exceptional standard features:
- 100KHz - 30MHz Receiver
 - 100 Watt RF output / 100% Duty Cycle
 - Passband Tuning AND IF Shift
 - Adjustable Noise Blanker (width and level)
 - Adjustable AGC
 - Receiver Preamp
 - 16 tunable Memories with lithium battery backup



- Wide selection of filters and filter combinations (opt.)
- Continuously adjustable transmit power
- 10Hz/50Hz/1KHz Tuning rates with 1MHz band steps
- IC-HM12 Microphone with Up/Down Scanning

- Other Standard Features**
- Included as standard are many of the features most asked for by experienced ham radio operators: dual VFO's, RF speech compressor, tunable notch filter, program band scan, memory scan, all-mode squelch and VOX.

Options: Internal IC-PS35 power supply, external IC-PS15 or IC-PS30 system supply, IC-SMB two-cable desk mic, EX241 marker, EX242 FM module, EX243 electronic keyer, IC-SM6 desk mic, and a variety of filters:

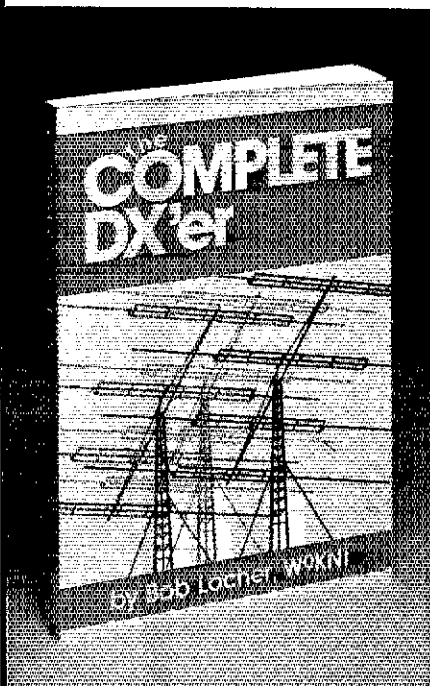
Filter	Width	Center Freq. MHz
FL45	500 Hz	5.000
FL54	270 Hz	8.000
FL52A	21 kHz	17.455
FL52A	500 Hz	17.455
FL53A	250 Hz	17.455

The IC-745 is the only transceiver today that has so much flexibility at a surprisingly low price. See it at your local ICOM dealer.



ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234
 All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 745185

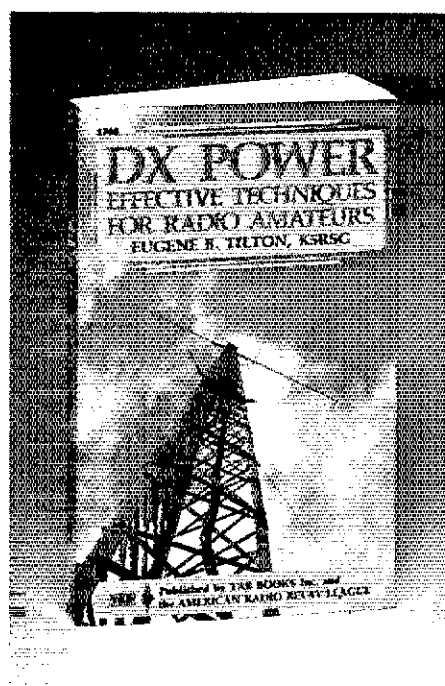
DX POWER IS HERE!



The second great book on DXing is now available! *DX Power* by Eugene B. Tilton, KSR5G tells how to get started working DX and survive in the DX'er's highly charged and competitive world. You'll find tips on cracking pileups, propagation, operating aids, and station design. 244 pages, co-published by ARRL and Tab Books.

The Complete DX'er by Bob Locher, W9KNI covers all important aspects of the DX'er's life both in and out of the pileups: the art of listening, the chase, the capture and the quest for the elusive QSL. Gives advice on equipment and antenna selection. Contains 187 pages of practical information.

Both books are written by avid DX'ers, and you shouldn't be without either of these books. Both are paperbound and sell for \$10.00 each. Add \$2.50 (\$3.50 for UPS) per order for shipping and handling.

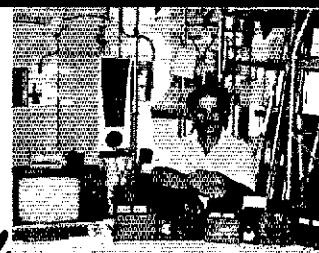


ARRL 225 MAIN ST., NEWINGTON, CT 06111



Rob, WA3QLS

Delaware Amateur Supply



Paul, WA3QPX

71 Meadow Road, New Castle, Del. 19720

302-328-7728

Factory Authorized Dealer!

9-5 Daily, 9-8 Friday, 9-3 Saturday

**KENWOOD YAESU ICOM TENTEK
MICROLOG KDK SANTEC KANTRONICS
AEA, AMERITRON, AND MUCH MORE!**

Large Inventory, Daily UPS Service

800-441-7008

Katherine, KA3IYO

New Equipment Order & Pricing

Prices are subject to change without notice or obligation. Products are not sold for evaluation.

**NO Sales Tax in Delaware! one mile off I-95
SERVICE, USED GEAR INFO: 302-328-7728**



IC-02AT

ICOM 2-Meter Handhelds

If you want a 2-meter handheld with exceptional features, quality built to last and a wide variety of interchangeable accessories, take a look at the ICOM IC-02AT and IC-2AT handhelds.

Frequency Coverage. The IC-02AT covers 140,000 through 151.550MHz and the IC-2AT, 141.500 through 149.994MHz, both include frequencies for MARS operation.

IC-02AT Features. ICOM's top-of-the-line IC-02AT handheld has the following outstanding features:

- DTMF direct keyboard entry
- LCD readout
- 5 watts standard, 5 watts optional (with IC-BP7 battery pack)
- 10 memories which store duplex offset and PL tone (odd offset can be stored in last 4 memories)
- Frequency dial lock
- Three scanning systems: priority, memory, and programmable band scan (selectable increments of 5, 10, 15, 20 or 25KHz)

IC-2AT Features. The IC-2AT is ICOM's most popular handheld on the market. The IC-2AT features a DTMF pad, 15 watts output and thumbwheel frequency selec-

tion. The IC-2A is also available and has the same features as the IC-2AT except DTMF.



Accessories. A variety of slide-on battery packs are available for the IC-02AT and IC-2AT, including the new long-life 800mAh IC-BP8 which can be used with both handhelds.

Other accessories include the HS-10 boom headset, HS-10SB PTT switchbox, HS-10SA VOX unit (for IC-02AT) and an assortment of battery pack chargers.

The IC-02AT and IC-2AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and ear plug. See the IC-02AT and IC-2AT 2-meter handhelds at your local ICOM dealer.

Often imitated,
never duplicated.



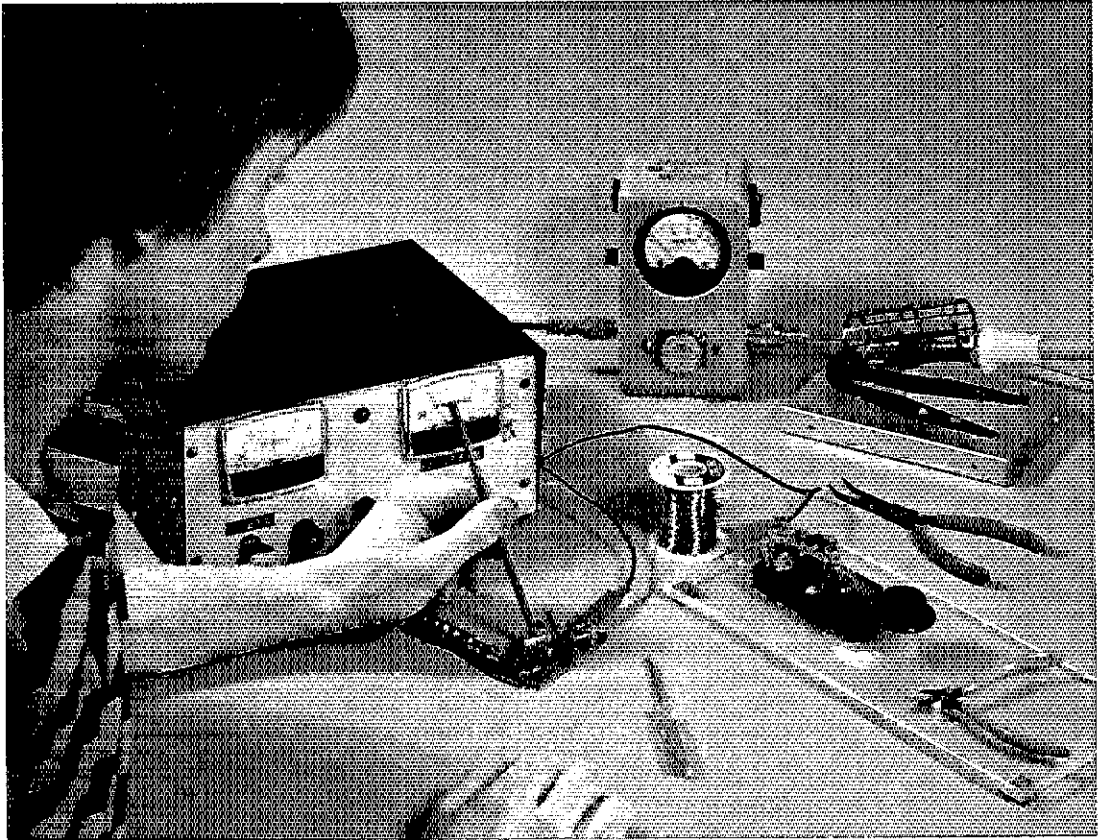
First in Communications

\$5.00

ARRP NOTEBOOK

By Doug DeMaw, W1FB

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

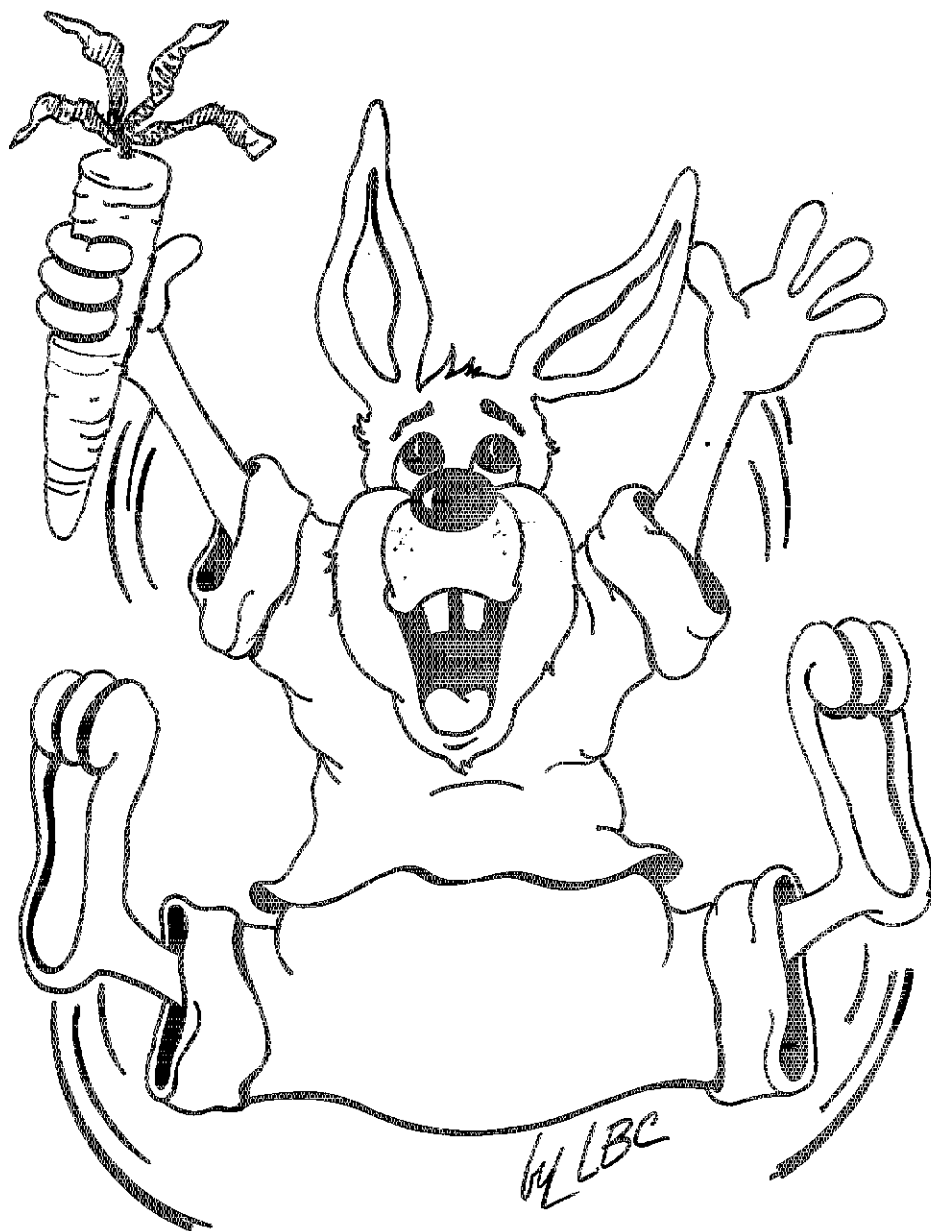


HAPPINESS IS A FRESH CARROT AND...

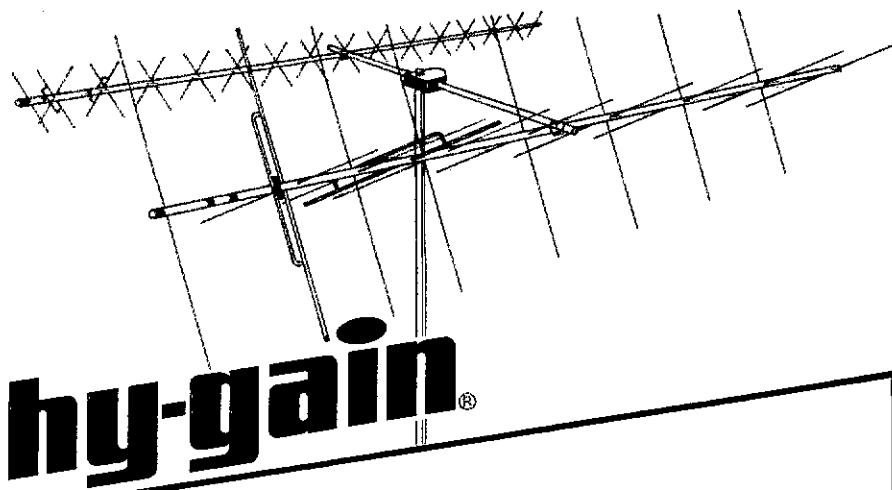
Doug DeMaw's QRP Notebook!

Doug DeMaw, W1FB, has been writing articles about QRP operating and equipment construction for many years. In this new ARRL publication, Doug presents construction projects for the QRP operator, from a simple one-watt crystal-controlled transmitter to more complex transceiver designs. Rather than simply presenting a collection of completed units, Doug guides you through the projects "building-block" style. This way, you gain an understanding of how the circuits operate and learn how the building blocks might be put together in other configurations.

Experimentation and low-power operating go hand in hand. Construction of a complete modern transceiver is a major undertaking, but some of the circuits in this book can be put together in an evening or a weekend from a few dollars' worth of parts. Once built, the equipment can be tested and improved as your understanding and skill grow. Many of the simpler circuits can be used later as parts of the more complex projects. The **QRP Notebook** will be available during mid-April. 112 pages #0348 copyright 1986 \$5 Postage and handling \$2.50 (\$3.50 for UPS)



THE AMERICAN RADIO RELAY LEAGUE, INC.
225 MAIN STREET
NEWINGTON, CT 06111



hy-gain®

Link up with OSCAR

The new OSCAR system is modular so you can pick and choose the antenna you want. Each comes complete with the necessary phasing lines, relays and hardware:

435 ANTENNA • 145.9 ANTENNA

Of course, your best choice is the complete system, matched and balanced for superior performance.

- The flexible design with switchable up/down link antennas is suitable for worldwide application. Includes left and right circularity switching to reduce fading (less than 3 dB ellipticity).
- High efficiency "T" matched driven element.
- True RF switching relays are rated at 200 watts and improve the VSWR for higher efficiency.
- Weather-protected, encapsulated feed points for long life. The 2 meter antenna has a SO-239 connector. The 70 cm antenna has a Type N connector.
- The heavy-walled fiberglass cross boom maintains the integrity of the circularity pattern and eliminates the interaction problems so common with metal booms.
- MIL-spec coax balun with Teflon dielectric and outer covering. A silver plated braid shield and center conductor assure minimum attenuation and long life.
- The 70 cm antenna is based on 4.2 wave length NBS design (NBS Tech Note 688).
- The 2 meter antenna has logarithmic element spacing for high attenuation of side lobes.
- For years of maintenance-free operation, the elements come with stainless steel positive locking rings and UV stabilized insulators.
- The mechanically well balanced antennas require only a small turning radius and exert minimal stress on the elevation rotator.

Hy-Gain, with the quality you've come to rely on, is now ready to "LINK UP WITH OSCAR". Complete data available at your amateur radio dealer or write Amateur Radio Department, Telex/Hy-Gain, 9600 Aldrich Avenue South, Minneapolis, MN 55420.

Or call us toll-free at

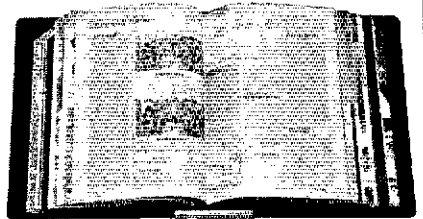
1-800-328-3771

(In Minnesota call 612-887-5528)

TELEX *hy-gain*

TELEX COMMUNICATIONS, INC.

QST PROTECTOR!



You have an investment in your copies of QST. Protect this investment with sturdy QST binders.

Binder for QST prior to January, 1976: \$9.00. Binder for QST beginning with the January, 1976 issue: \$10.00. Available in the U.S. Possessions and Canada.

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST.
NEWINGTON, CT 06111

EVERY ISSUE OF QST on Microfiche!!!

We are now accepting orders for the entire run of QST from December 1915 thru December, 1985.

Now you can have access to the treasures of QST without several hundred pounds of back issues and the space they take on the shelf. Our 24x microfiche have 98 pages each and will fit in a card file on your desk. We offer a hand held viewer for \$50.00 and a desk model for \$135.00 (or use your library).

The price is \$350 for over 1600 microfiche. Please include \$5 for shipping (USA).

Your full satisfaction is guaranteed or your money back. VISA/Mastercard accepted.

BUCKMASTER PUBLISHING
'Whitehall' — Route 3, Box 56
Mineral, Virginia 23117



703: 894-5777



KENWOOD

...pacesetter in Amateur radio

NEW!
Computer Interface!

“DX-cellence!”

TS-940S

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

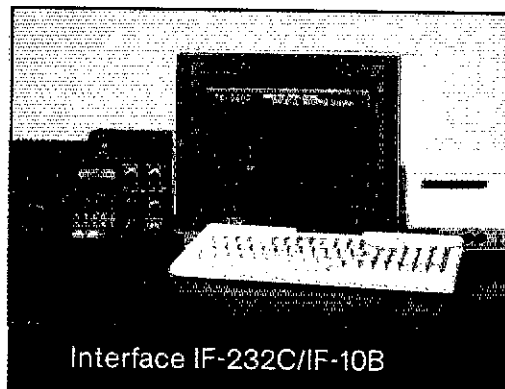
- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel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

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

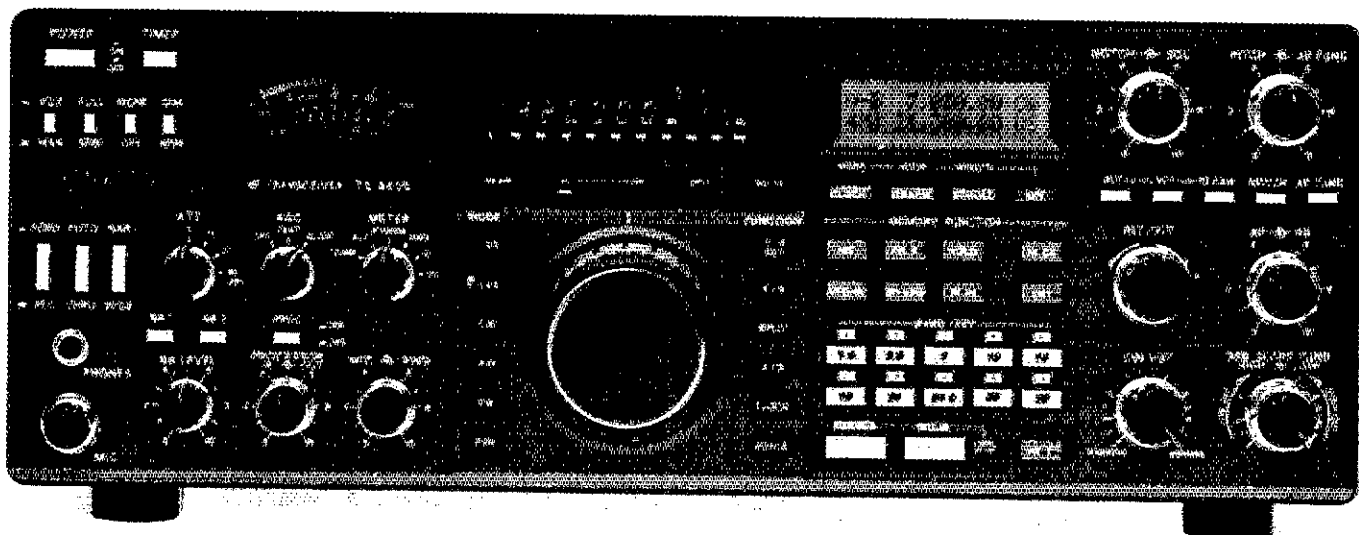
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top “quality Kenwood” sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **QRM-fighting features.** Remove “rotten QRM” with the SSB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

Optional accessories:

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



speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-42S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.



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



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

KENWOOD

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

DX

Alpha Delta Model DX-A 160-80-40 METER QUARTER WAVE

TWIN SLOPER ANTENNA

The Model DX-A combines the tremendous firepower of the quarter wave sloper with the wide bandwidth of a half wave dipole. Simple to install, quick to tune. Proven longhaul DX performance.

- Installs like an inverted-V dipole. One leg for 80 meters (67') and the other leg for 160/40 meters (55'). Fed with a single 50 ohm coax. SO-239 connector provided on mounting bracket.
- Configuration provides wide bandwidth on all three bands. Typically 70 kHz on 160 meters, 200 kHz on 80 meters and full band on 40 meters. Much wider than most other loaded slopers, dipoles or verticals. Tuner usually not required.
- Model DX-A also operates on 30-17-12 meters. VSWR of less than 2.5:1. Easily matched with a tuner.
- High-power operation. Rated at 1500 watts P.E.P. output. No traps to break

- down. A single "ISO-RES" Isolator-resonator is used in the 160/40 meter leg.
- Current lobe up high for maximum radiation and excellent DX performance. Can be installed from 25 to 40' high.
- The Model DX-A Antenna is fully assembled, uses all stainless steel hardware, a UV-protected "ISO-RES" coil, #12 copper wire and is rated for severe environments. Specially coated wire disappears from your neighbors' view.

\$49⁹⁵

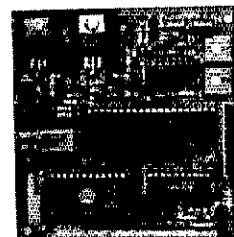
Available from your local Alpha Delta Dealer or add \$4.00 shipping and handling (USA only).

ALPHA DELTA COMMUNICATIONS, INC.

P.O. Box 571 Centerville, OH 45459
(513) 435-4772 Orders • (513) 376-4180 Antenna Tech Info

current solutions to current problems

MICROCOMPUTER REPEATER CONTROL



\$129

Introducing the MICRO REPEATER CONTROLLER RPT-2A, a new concept in LOW COST, EASY TO INTERFACE, microcomputer repeater control. Replace old logic boards with a state of the art microcomputer that adds NEW FEATURES, HIGH RELIABILITY, LOW POWER, SMALL SIZE, and FULL DOCUMENTATION to your system. Direct interface (drop in) with most repeaters. Detailed interface information included. Original MICRO REPEATER CONTROL article featured in QST Dec. 1983.

- *TWO CW ID MESSAGES
- *TIME OUT TIMER
- *PRE-TIMEOUT WARNING MSG
- *POST TIMEOUT CW MSG
- *COURTESY BEEP
- *AUXILIARY INPUTS
- *RECONFIGURABLE-COR INPUT
- *HIGH CURRENT PTT INTERFACE
- *SINE WAVE TONE GENERATOR
- *LOW POWER 8-15 VDC @ 200 mA
- *SIZE 3.5" x 3.5"
- *ALL CONNECTORS INCLUDED

RPT-2A KIT ONLY . . . \$129 plus \$3.00 shipping

PROCESSOR CONCEPTS

P.O. BOX 32908
MINNEAPOLIS, MN 55432-0908
612-780-0472 7 PM - 10 PM WEEKDAYS
CALL OR WRITE FOR FREE CATALOG AND SPECIFICATIONS

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

the HAM STATION

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

Stores Hours
MON-FRI 9AM-6PM
SAT 9AM-3PM

WARRANTY SERVICE CENTER FOR:
ICOM, YAESU, TEN-TEC



COD WELCOME
Send SASE For Catalog

MOST ORDERS SHIPPED
SAME DAY



IC 735 12 Tunable Memories
General Coverage



Special Pricing On
ICOM 751
100% Duty Cycle



IC 751



FM240

16 Memories
25 Watts

Touchtone Speaker Mic
Free External Speaker



TEN-TEC

2510 Mode B
Satellite Station
Now On Sale



FT270RH

10 Memories
45 Watts
With FTS-8
Order Now

5 Watts
Free FTS-6
10 Memories
Call For Your
Special Price

FT209RH



AEA • ARRL • ALINCO • ALLIANCE • ALPHA DELTA • AMECO • AMERITRON • ANTENNA SPECIALISTS • ASTHON • B&W • BENCHER • BUTTERNUT
• CSI • CALLBOOK • COMMUNICATION SPECIALISTS • CUSHCRAFT • DAIWA • DATASCAN • HEIL • HUSTLER • HYGAIN • ICOM • KDK • KLM • KAN
TRONICS • KEN PRO • LARSEN • MFJ • MICROLOG • MIRAGE • NYE • ROHN • SANTEC • SHURE • TEN TEC • TOKYO HY-POWER • UNADILLA • VALOR
• VIBROPLEX • WELZ • YAESU

ORDERS AND PRICE CHECKS ONLY, PLEASE
INFORMATION AND INDIANA
SERVICE DEPT.

1-800-523-7731
812-422-0231
812-422-0252

KENWOOD

...pacesetter in Amateur radio

The Smallest HT!

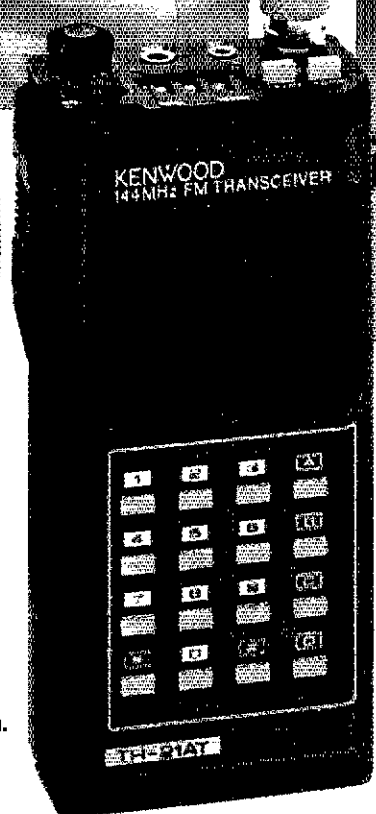
TH-21AT/31AT/41AT

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

- **High or low power.**
Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.
- **Pocket portability!**
Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) with PB-21.
- **Expanded frequency coverage (TH-21AT/A).**
Covers 141,000-150,995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.
TH-31AT/A: 220,000-224,995 MHz in 5 kHz steps.
TH-41AT/A: 440,000-449,995 MHz in 5 kHz steps.



- **Easy-to-operate, functional design.**
Three digit thumbwheel frequency selection and handy top-mounted controls increase operating ease.



- **Repeater offset switch.**
TH-21AT/A: ± 600 kHz, simplex.

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

TH-41AT/A: ± 5 MHz, simplex.

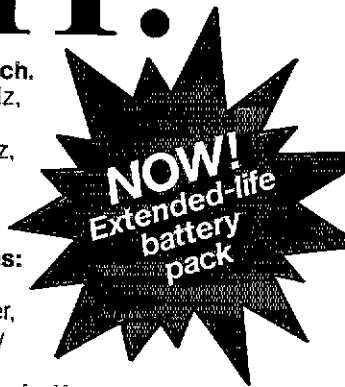
- **Standard accessories:**
Rubber flex antenna, earphone, wall charger, 180 mAh NiCd battery pack, wrist strap.

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

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

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

The high impact case is scuff resistant, to retain its attractive styling, even with hard use. See your authorized Kenwood dealer and take home a pocketful of performance today!



Optional accessories:

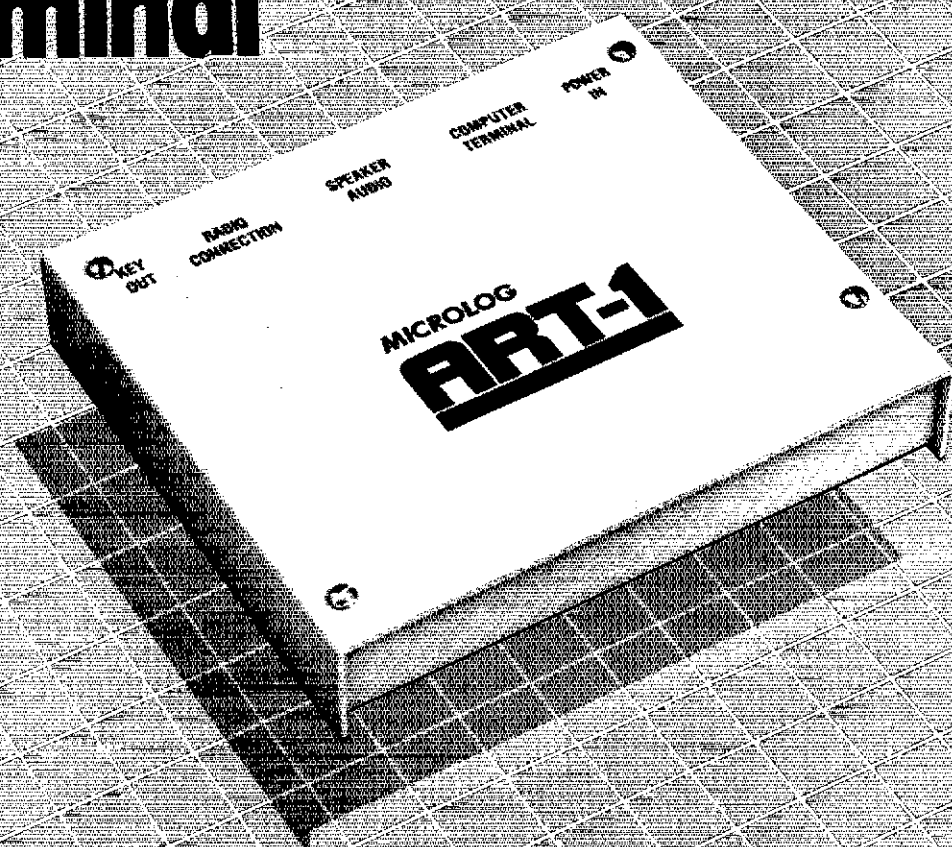
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 NiCd 180 mAh battery
- PB-21H NiCd 500 mAh battery
- DC-21 DC-DC converter for mobile use
- BT-2 manganese/alkaline battery case
- EB-2 external C manganese/alkaline battery case
- SC-8/8T soft cases
- TU-6 programmable sub-tone unit
- AJ-3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

KENWOOD

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

TH-series transceivers shown with optional StubbyDuk antenna. TH-31AT shown with PB-21H. Specifications and prices are subject to change without notice or obligation. Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

All Mode Communication Terminal



When is Microlog going to get into Packet?

Thanks for waiting, you'll be glad you did. We've packed a lot into the ART-1, because we knew you wanted a truly ALL-MODE Remote Terminal, without any extra pieces or RATT'S nest of wiring required, and, 'NO COMPROMISE' performance. Start now with full capability Receive & Transmit on RTTY, CW, & AMTOR for \$199, and later add Packet capability *inside* the shielded, all-metal ART-1 case. Plug in the ART-1 with one cable to your computer, make the connections to your radios, and forget it. All control functions and tuning indicators are via the keyboard and video. Small enough to go anywhere, and available now for your Commodore 64/128. Packet operation uses either TAPR compatible, or easy Microlog direct control commands not possible with conventional ASCII terminals. Packet option includes a separate internal computer enhanced demodulator optimized for 1200 baud, and *dual-radio* support for HF & VHF. It's like having two interactive terminals. (What good is a multimode unit that can only connect to ONE

radio?) You've come to expect performance and value from MICROLOG, the ART-1 delivers!

Here are a few of its many features:

- on screen tuning indicators • full or split-screen on all modes • auto-load memories
- output to commodore printers • full speed operation, morse to 99 wpm. Baudot to 132 wpm, ASCII to 300 Baud • 4 mode AMTOR
- WRU • independent RX/TX normal/invert
- pitch reference CW tuning • real-time disk communication • break buffer • random code generator • RX/TX of basic programs • 24 hr. clock • no extra power supply needed when used with Commodore Computers • unshift on space • foxtest and more.

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

18713 Mooney Drive Gaithersburg, Md. 20879
301 258-8400

KENWOOD

...pacesetter in Amateur radio

Handy Handful...

TR-2600A/3600A

Kenwood's TR-2600A and TR-3600A feature DCS (Digital Code Squelch), a new signaling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different DCS combinations possible.



• Simple to operate

Functional design is "user friendly." Built-in 16-key autopatch encoder, TX STOP switch, REVERSE switch, KEYBOARD LOCK switch, high efficiency speaker.

• Large LCD

Easy to read in direct sunlight or in the dark with convenient dial light that also illuminates the top panel S-meter.

• Extended frequency coverage

Allows operation on most MARS and CAP frequencies. Receive frequency range is 140-160 MHz. (TR-3600A covers 440-450 MHz.)

• Programmable scan

Channel scan or band scan, search for open or busy channels.

• SLIDE-LOC battery case

• 10 Channels

10 memories, one for non-standard repeater offsets.

• 2.5 watts high power, 350 mW low

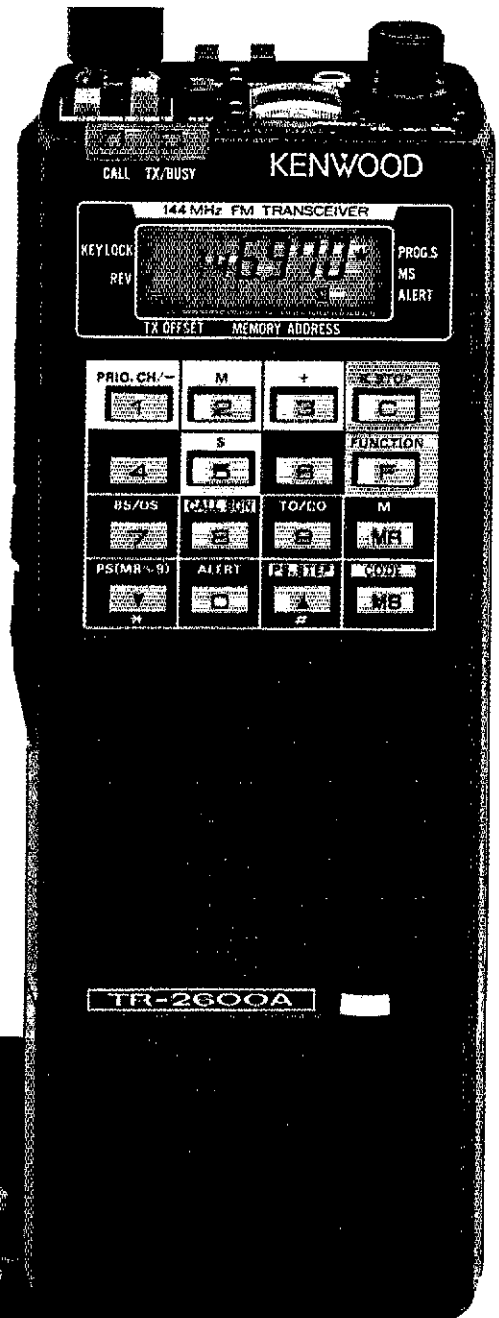
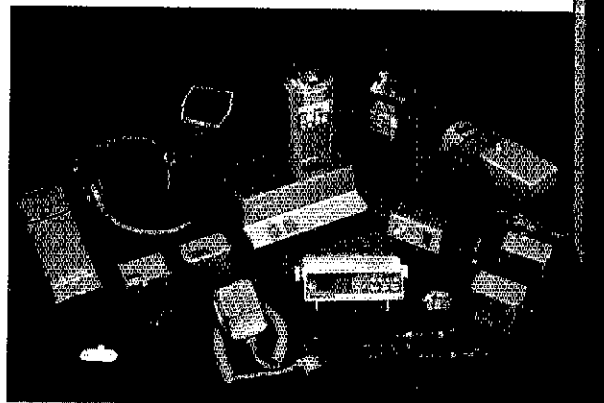
TR-3600A has 1.5 watts high or 300 mW low.

The Kenwood TR-2600A and the TR-3600A pack "big rig" features into the palm of your hand. It's really a "handy handful!"

Optional accessories:

- TU-35B built in programmable sub-tone encoder
- VB-2530 2-m 25 W RF power amp.
- ST-2 base stand/charger
- MS-1 mobile stand/charger
- PB-26 Ni-Cd battery
- DC-26 DC-DC converter
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- LH-3 deluxe leather case
- SC-9 soft case with belt hook
- BT-3 AA manganese/alkaline battery case
- EB-3 external C manganese/alkaline battery case
- RA-3 2-m telescoping antenna
- RA-5 2-m/70-cm telescoping antenna
- AX-2 shoulder strap w/ant. base
- CD-10 call sign display
- BH-2A belt hook

More TR-2600A and TR-3600A information is available from authorized Kenwood dealers.



KENWOOD

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

TR-2600A shown. TR-3600A is available for 70 cm operation.

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

NEW! Lower Price Scanners

Communications Electronics,™ the world's largest distributor of radio scanners, introduces new lower prices to celebrate our 15th anniversary.

Regency® MX7000-EA

List price \$699.95/CE price \$399.95/SPECIAL
10-Band, 20 Channel • Crystalless • AC/DC
Frequency range: 25-550 MHz, continuous coverage and 800 MHz, to 1.3 GHz, continuous coverage. The Regency MX7000 scanner lets you monitor military, F.B.I., Space Satellites, Police and Fire Departments, Drug Enforcement Agencies, Defense Department, Aeronautical AM band, Aero Navigation Band, Fish & Game, Immigration, Paramedics, Amateur Radio, Justice Department, State Department, plus thousands of other radio frequencies most scanners can't pick up. The Regency MX7000 is the perfect scanner for intelligence agencies that need to monitor the new 800 MHz. cellular telephone band. The MX7000, now at a special price from CE.

Regency® Z60-EA

List price \$299.95/CE price \$179.95/SPECIAL
8-Band, 60 Channel • No-crystal scanner
Bands: 30-50, 88-108, 118-136, 144-174, 440-512 MHz. The Regency Z60 covers all the public service bands plus aircraft and FM music for a total of eight bands. The Z60 also features an alarm clock and priority control as well as AC/DC operation. Order today.

Regency® Z45-EA

List price \$259.95/CE price \$159.95/SPECIAL
7-Band, 45 Channel • No-crystal scanner
Bands: 30-50, 118-136, 144-174, 440-512 MHz. The Regency Z45 is very similar to the Z60 model listed above however it does not have the commercial FM broadcast band. The Z45, now at a special price from Communications Electronics.

Regency® RH250B-EA

List price \$613.00/CE price \$329.95/SPECIAL
10 Channel • 25 Watt Transceiver • Priority
The Regency RH250B is a ten-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to ten frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH250 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A UHF version of the same radio called the RU150B covers 450-482 MHz, but the cost is \$449.95. To get technician programming instructions, order a service manual from CE with your radio system.

NEW! Bearcat® 50XL-EA

List price \$199.95/CE price \$114.95/SPECIAL
10-Band, 10 Channel • Handheld scanner
Bands: 29.7-54, 136-174, 406-512 MHz. The Uniden Bearcat 50XL is an economical, hand-held scanner with 10 channels covering ten frequency bands. It features a keyboard lock switch to prevent accidental entry and more. Also order part # BP50 which is a rechargeable battery pack for \$14.95, a plug-in wall charger, part # AD100 for \$14.95, a carrying case part # VC001 for \$14.95 and also order optional cigarette lighter cable part # PS001 for \$14.95.

NEW! Regency® XL156-EA

List price \$239.95/CE price \$129.95/SPECIAL
6-Band, 10 Channel • No-crystal Scanner
Search • Lockout • Priority • AC/DC
Bands: 30-50, 144-174, 440-512 MHz. Cover your choice of over 15,000 frequencies on 10 channels at the touch of your finger. Display messages. External speaker jack. Telescoping antenna. External antenna jack. AC/DC.

NEW! Regency® R1060-EA

List price \$149.95/CE price \$92.95/SPECIAL
6-Band, 10 Channel • Crystalless • AC only
Bands: 30-50, 144-174, 440-512 MHz. Now you can enjoy computerized scanner versatility at a price that's less than some crystal units. The Regency R1060 lets you in on all the action of police, fire, weather, and emergency calls. You'll even hear mobile telephones.

Bearcat® DX1000-EA

List price \$649.95/CE price \$349.95/SPECIAL
Frequency range 10 KHz. to 30 MHz. The Bearcat DX1000 shortwave radio makes tuning in London as easy as dialing a phone. It features PLL synthesized accuracy, two time zone 24-hour digital quartz clock and a built-in timer to wake you to your favorite shortwave station. It can be programmed to activate peripheral equipment like a tape recorder to record up to five different broadcasts, any frequency, any mode, while you are asleep or at work. It will receive AM, LSB, USB, CW and FM broadcasts.

There's never been an easier way to hear what the world has to say. With the Bearcat DX1000 shortwave receiver, you now have direct access to the world.

NEW! Regency® HX1200-EA

List price \$369.95/CE price \$214.95/SPECIAL
8-Band, 45 Channel • No Crystal scanner
Search • Lockout • Priority • Scan delay
Sidelit liquid crystal display • EAROM Memory
New Direct Channel Access Feature
Bands: 30-50, 118-136, 144-174, 406-420, 440-512 MHz. The new handheld Regency HX1200 scanner is fully keyboard programmable for the ultimate in versatility. You can scan up to 45 channels at the same time including the AM aircraft band. The LCD display is even sidelit for night use. Order MA-256-EA rapid charge drop-in battery charger for \$84.95 plus \$3.00 shipping/handling. Includes wall charger, carrying case, belt clip, flexible antenna and nicad battery.

NEW! Bearcat® 100XL-EA

List price \$349.95/CE price \$203.95/SPECIAL
9-Band, 16 Channel • Priority • Scan Delay
Search • Limit • Hold • Lockout • AC/DC
Frequency range: 30-50, 118-174, 406-512 MHz. The world's first no-crystal handheld scanner now has a LCD channel display with backlight for low light use and aircraft band coverage at the same low price. Size is 1 1/8" x 7 1/2" x 2 1/8". The Bearcat 100XL has wide frequency coverage that includes all public service bands (Low, High, UHF and "T" bands), the AM aircraft band, the 2-meter and 70 cm. amateur bands, plus military and federal government frequencies. Wow...what a scanner! Included in our low CE price is a sturdy carrying case, earphone, battery charger/AC adapter, six AA Ni-cad batteries and flexible antenna. Order your scanner now.

Bearcat® 210XW-EA

List price \$339.95/CE price \$209.95/SPECIAL
8-Band, 20 Channel • No-crystal scanner
Automatic Weather • Search/Scan • AC/DC
Frequency range: 30-50, 136-174, 406-512 MHz. The new Bearcat 210XW is an advanced third generation scanner with great performance at a low CE price.

NEW! Bearcat® 145XL-EA

List price \$179.95/CE price \$102.95/SPECIAL
10 Band, 16 channel • AC/DC • Instant Weather
Frequency range: 29-54, 136-174, 420-512 MHz. The Bearcat 145XL makes a great first scanner. Its low cost and high performance lets you hear all the action with the touch of a key. Order your scanner from CE today.

TEST ANY SCANNER

Test any scanner purchased from Communications Electronics™ for 31 days before you decide to keep it. If for any reason you are not completely satisfied, return it in original condition with all parts in 31 days, for a prompt refund (less shipping/handling charges and rebate credits).

NEW! Bearcat® 800XLT-EA

List price \$499.95/CE price \$317.95
12-Band, 40 Channel • No-crystal scanner
Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz. The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9 1/4" x 4 1/4" x 1 1/4".

OTHER RADIOS AND ACCESSORIES

Panasonic RF-2600-EA Shortwave receiver \$179.95
RD95-EA Uniden Remote mount Radar Detector..... \$128.95
RD55-EA Uniden Visor mount Radar Detector..... \$98.95
RD9-EA Uniden "Passport" size Radar Detector..... \$239.95
BC210XW-EA Bearcat 20 channel scanner SALE..... \$209.95
BC-WA-EA Bearcat Weather Alert™..... \$49.95
DX1000-EA Bearcat shortwave receiver SALE..... \$349.95
PC22-EA Uniden remote mount CB transceiver..... \$99.95
PC55-EA Uniden mobile mount CB transceiver..... \$99.95
R1060-EA Regency 10 channel scanner SALE..... \$92.95
MX3000-EA Regency 30 channel scanner..... \$188.95
XL156-EA Regency 10 channel scanner SALE..... \$129.95
UC102-EA Regency VHF 2 ch. 1 Watt transceiver..... \$124.95
RH250B-EA Regency 10 ch. 25 Watt VHF trans..... \$329.95
RH600B-EA Regency 10 ch. 60 Watt VHF trans..... \$454.95
RU150B-EA Regency 10 channel UHF transceiver..... \$449.95
RP410-EA 10 ch. handheld no-crystal trans..... \$399.95
LC10-EA Carrying case for RP410 transceiver..... \$34.95
MA181-EA Ni-Cad battery pack for RP410 trans..... \$34.95
P1405-EA Regency 5 amp regulated power supply..... \$89.95
P1412-EA Regency 12 amp reg. power supply..... \$184.95
BC10-EA Battery charger for Regency RP410..... \$84.95
MA256-EA Drop-in charger for HX1000, HX1200..... \$84.95
MA257-EA Cigarette lighter cord for HX1200..... \$19.95
MA917-EA Ni-Cad battery pack for HX1200..... \$34.95
EC10-EA Programming tool for Regency RP410..... \$24.95
SMRH250-EA Service man. for Regency RH250..... \$24.95
SMRU150-EA Service man. for Regency RU150..... \$24.95
SMRP410-EA Service man. for Regency RP410..... \$24.95
SMMX7000-EA Svc. man. for MX7000 & MX5000..... \$19.95
SMMX3000-EA Service man. for Regency MX3000..... \$19.95
B-4-EA 1.2 V AAA Ni-Cad batteries (set of four)..... \$9.95
F8-EA Frequency Directory for Eastern U.S.A..... \$12.95
FB-WA-EA Frequency Directory for Western U.S.A..... \$12.95
TSQ-EA "Top Secret" Registry of U.S. Govt. Frequ..... \$14.95
TIC-EA Techniques for Intercepting Comm..... \$14.95
RRF-EA Railroad frequency directory..... \$10.95
CIE-EA Cover Intelligent. Elect. Eavesdropping..... \$14.95
A60-EA Magnet mount mobile scanner antenna..... \$35.00
A70-EA Base station scanner antenna..... \$35.00
USAMM-EA Mag mount VHF/UHF ant. w/ 12' cable..... \$39.95
USAK-EA 1/2" hole mount VHF/UHF ant. w/ 17' cable..... \$35.00
USATLM-EA Trunk lip mount VHF/UHF antenna..... \$35.00
Add \$3.00 shipping for all accessories ordered at the same time.
Add \$12.00 shipping per shortwave receiver.
Add \$7.00 shipping per scanner and \$3.00 per antenna.

BUY WITH CONFIDENCE

To get the fastest delivery from CE of any scanner, send or phone your order directly to our Scanner Distribution Center™. Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically unless CE is instructed differently. A \$5.00 additional handling fee will be charged for all orders with a merchandise total under \$50.00. Shipments are F.O.B. Ann Arbor, Michigan. No COD's. Most products that we sell have a manufacturer's warranty. Free copies of warranties on these products are available prior to purchase by writing to CE. Non-certified checks require bank clearance.

Mail orders to: Communications Electronics,™ Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add \$7.00 per scanner for U.P.S. ground shipping and handling in the continental U.S.A. For Canada, Puerto Rico, Hawaii, Alaska, or APO/FPO delivery, shipping charges are three times continental U.S. rates. If you have a Visa or Master Card, you may call and place a credit card order. Order toll-free in the U.S. Dial 800-USA-SCAN. In Canada, order toll-free by calling 800-221-3475. Telex CE anytime, dial 810-223-2422. If you are outside the U.S. or in Michigan dial 313-973-8888. Order today.

Scanner Distribution Center™ and CE logos are trademarks of Communications Electronics Inc.
† Bearcat is a registered trademark of Uniden Corporation.
‡ Regency is a registered trademark of Regency Electronics Inc. AD #040186-EA

Copyright © 1986 Communications Electronics Inc.

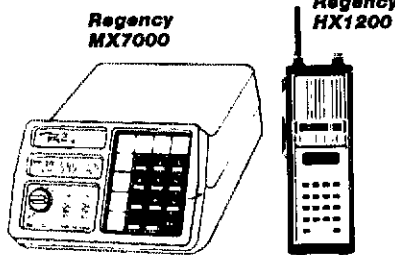
For credit card orders call
1-800-USA-SCAN

**COMMUNICATIONS
ELECTRONICS INC.**

Consumer Products Division
P.O. Box 1045 □ Ann Arbor, Michigan 48106-1045 U.S.A.
Call 800-USA-SCAN or outside U.S.A. 313-973-8888



Regency
RH250



Regency
MX7000



Regency
HX1200

KENWOOD

...pacesetter in Amateur radio

Here Now!
TM-3530A
220 MHz

Power-Full...70 Watts!

TM-2570A/2550A/2530A/3530A

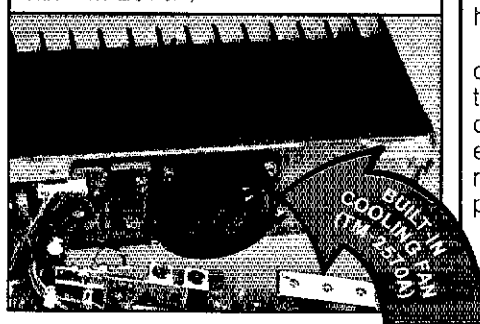
Sophisticated FM transceivers

Kenwood sets the pace again! The all-new "25-Series" brings the industry's first compact 70-watt 2-meter FM mobile transceiver. There is even an auto dialer which stores 15 telephone numbers! There are four versions to choose from: The TM-2570A 70-watt, TM-2550A 45-watt, TM-2530A 25-watt and the TM-3530A 220 MHz, 25-watt.

- First 70-watt FM mobile (TM-2570A)
- First mobile transceiver with telephone number memory and auto-dialer (up to 15 seven-digit phone numbers)
- Direct keyboard entry of frequency
- Automatic repeater offset selection—**a Kenwood exclusive!**
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- 23 channel memory for offset, frequency and sub-tone
- Big multi-color LCD and back-lit controls for excellent visibility

- Front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz** (optional)
- 16-key DTMF pad, with audible monitor
- Center-stop tuning—**another Kenwood exclusive!**
- Frequency lock switch
- **New** 5-way adjustable mounting system
- **Unique** offset microphone connector—relieves stress on microphone cord

Large heatsink with built-in cooling fan (TM-2570A)

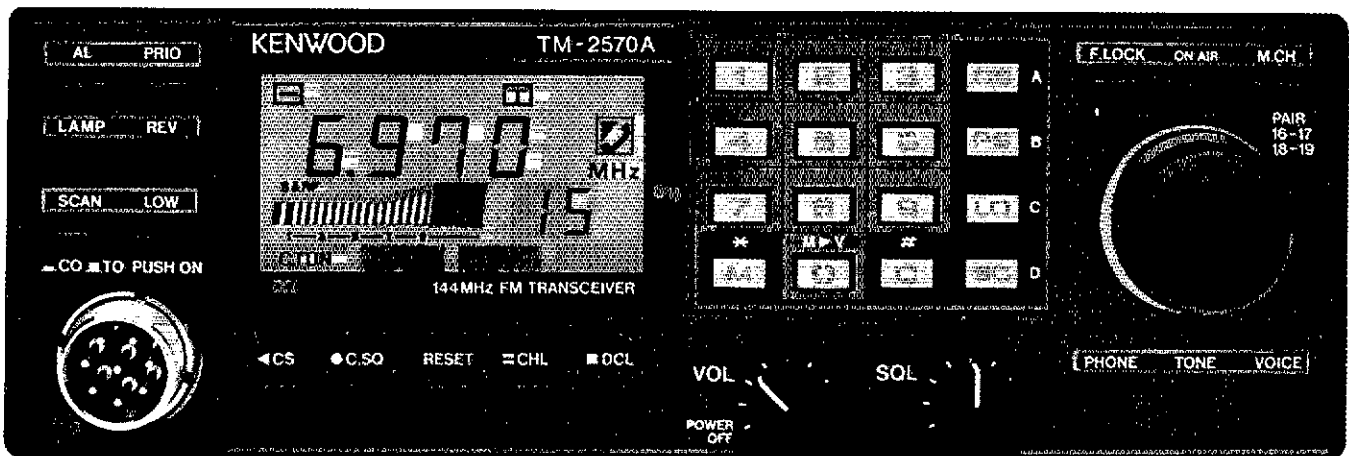


- High performance GaAs FET front end receiver
- HI/LOW Power switch (adjustable LOW power)
- TM-3530A covers 220-225 MHz

DCL 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-2K extra DC cable
- PG-3A DC line noise filter
- MB-10 extra mobile bracket
- CD-10 call sign display
- PS-430 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-48 extra DTMF mic. with UP/DWN switch
- MC-42S UP/DWN mic.
- MC-55 (8-pin) mobile mic. with time-out timer
- SP-40 compact mobile speaker
- SP-50 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

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

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

AMATEUR ELECTRONIC SUPPLY - USED GEAR

- ★ 10 day Trial (pay only Shipping Charges)
- ★ 30 day Warranty
- ★ Full Trade-in within 3 months on New Gear

AMERITRON		E-TEK	
ATR-8 Ant tuner	\$ 69 m	FR-4 Dig disp; Drake 4-line	\$ 49 m
AMP SUPPLY		ETO	
LA-1000T Amp DEMO	399 ⁹⁵ m	Alpha 76A Linear	1249 mw
LA-1000A Amplifier	289 f	Alpha 76CA Linear	1795 e
AT-1200 Tuner	99 f	Alpha 374A Linear	1599 m
BIRD		HAL	
500C Element	\$ 29 w	RKB-1 RTTY keyboard	\$ 39 m
COLLINS		DS-3000KSR Term vers 2	349 m
75S-3 Ham Rcvr	\$269 f	DS-3000KSR Term vers 3	399 e
32S-1 Transmitter	169 m	RS-2100 RTTY scope	229 f
32S-3 Transmitter	299 mf	ARQ-1000 Error terminal	569 m
312B-3 Speaker	29 m	CWR-6850 Term/CRT/kybrd	499 m
312B-4 Station control	189 mt	HENRY RADIO	
KWM-2 Xcvr	439 mfc	TP-400 DC ps; Drake IR-4	\$ 29 v
516F-2* AC supply	149 mfcv	ICOM	
PM-2* AC supply	119 f	IC-701AC Xcvr w/ps	\$399 v
*Not sold separately		IC-720 Xcvr	489 m
CC-1 Carrying case	49 f	IC-720A Xcvr	529 mfcv
KWM-380 snc52/blower/mars		IC-720A/cw filt/mem ps	569 m
warc; 1.8 filt/update 4/84	1895 m	IC-720A/cw filt/am hit	569 m
DAIWA		IC-730 Xcvr	450 mf
CNW-419 Ant tuner	\$129 m	IC-730/cw filter	479 mf
DENTRON		IC-730/ssb filt/marker	499 c
160-10AT Ant tuner	\$ 89 ic	IC-740/cw filt/fm/int ps	639 c
GILA-1000 Linear	229 f	IC-740/2 cw filt/fm/int ps	669 f
MLA-2500 Linear	589 f	IC-751/2 cw filters	869 f
DIGIMAX		PS-15 Power supply	99 m
D-1200 Freq counter	\$199 m	PS-20 Power supply	159 mf
DRAKE		PS-55 Power supply	115 w
R-4 Ham Rcvr	\$129 m	EK-2 Relay box	29 m
R-4C Ham Rcvr	249 mc	AT-500 Ant tuner	299 f
MS-4* Speaker	19 mwfv	IC-2KL Amplifier	1069 v
*Not sold separately		R-70 SW Rcvr	389 cv
4NB Noise blanker	49 f	IC-25A 2m FM (red LED)	199 c
FL-250 250 Hz filter	35 m	IC-25A 2m FM (grn LED)	219 c
FL-500 500 Hz filter	35 m	IC-27H 2m FM Xcvr	269 f
SC-2 2m rcv conv	49 w	IC-251A 2m Xcvr	369 m
SC-6 6m rcv conv	49 w	IC-260A 2mSSB/FM Xcvr	269 c
CPS-1 Conv ps	19 wf	IC-271A 2m Xcvr	469 mw
SCG-1 VHF calib	19 wf	IC-280 2m FM Xcvr	129 c
CC-1 Conv console	29 wf	IC-290H 2m Xcvr	369 mv
R-7 Shortwave receiver	649 m	IC-47A 440 FM Xcvr	299 mf
T-4X Transmitter	149 mwfv	IC-451A 440-450 Xcvr	469 f
I-4XB Transmitter	169 fcv	SM-5 8-pin desk mic	25 m
T-4XC Transmitter	219 mf	KDK	
RV-3 Remote VFO	59 f	FM-2030 2m FM Xcvr	\$169 e
TR-4 Xcvr	189 mw	KENWOOD	
TR-4C Xcvr	229 mwfc	R-599A Ham Rcvr	\$129 m
TR-4CW Xcvr	289 m	R-599D Ham Rcvr	189 m
TR-4CW/RIT Xcvr	329 w	T-599D Transmitter	199 m
FF-1 Fixed freq adapt	29 w	TS-120S Xcvr	329 m
AC-3* AC supply	49 mwfv	PS-30 Power supply	99 c
AC-4* AC supply	69 mwfcv	AT-130 Ant tuner	99 m
*Not sold separately		TS-430S/am/ssb filts	599 f
TR-5 Xcvr	329 m	TS-520 Xcvr	349 fv
TR-7 Xcvr	469 mf	TS-520/CW filter	379 v
TR-7/500 Hz filter	499 m	TS-520S Xcvr	369 wfc
TR-7/nb/aux/5.1.8/6/warc	629 m	TS-520SE Xcvr	399 mc
TR-7/fan/aux/500/1.8/6	649 m	TS-520SE/CW filter	429 m
PS-7* Power supply	149 mfc	VFO-520 Remote VFO	89 f
*Not sold separately		VFO-520S Remote VFO	99 w
PS-7S Power supply	89 m	TS-530S Xcvr	469 c
FA-7 Fan	19 m	TS-660 15-6m Xcvr	469 m
RV-7 Remote VFO	99 f	TS-670 40-6m Xcvr/fm/gc	499 v
SP-75 Speech proc	79 m	TS-820 Xcvr	399 m
SL-1800 1.8 KHz filter	35 m	TS-830S Xcvr	589 w
SL-6000 6 KHz filter	35 m	TS-830S Xcvr DEMO	699 m
L-75 Linear	569 c	DFC-230 Dig freq control	119 f
TR-6/NB 6m Xcvr	349 m	DFC-230 (new close-out)	169 ⁹⁵ mf
LA-7 Line amp	29 f	TS-930S Xcvr w/tuner	969 mfcv

TS-940S w/tuner DEMO	1599 m	FT-301D Dig Xcvr	269 f
R-300 SW receiver	149 f	FV-700DM Remote VFO	89 m
R-600 SW receiver	229 w	FT-901DM Xcvr	499 mfc
R-820 Rcvr/2 z w filts	450 f	FT-902DM Xcvr	699 mv
TS-700A 2m Xcvr	269 mfc	FV-901DM Remote VFO	169 mc
TS-711A 2m Xcvr	549 w	SP-102P Speaker/patch	55 c
TR-780 2m/430 Xcvr	499 f	FC-102 Ant tuner	159 m
TR-7600 2m FM Xcvr	119 f	FT-107M Xcvr	369 m
IR-7625 2m FM Xcvr	169 e	FT-107M/internal ps	499 v
TR-7930 2m FM Xcvr	249 m	FP-107E External ps	89 m
TR-8400 440 FM Xcvr	189 m	FP-757GX Power supply	99 mwfc
TR-3600 440 FM HT	229 m	FC-757AT Auto tuner	189 w
MC-50 Desk mic	29 mf	FT-980 Xcvr	969 wfc
MC-60A Desk mic	55 w	SP-980P Spkr/patch	55 w
MICROLOG		FRB-1 Relay box	9 mf
ACT-1 Term/batt back up		FT-ONE/fm/ram/4 filts	1299 mw
high speed printer output	\$269 m	FT-ONE/fm/ram/4 filts/lot 10	1469 e
PANASONIC		FRG-7 SW Rcvr	169 m
RF-6300 SW receiver	\$269 w	FRG-7700 SW Rcvr	289 m
ROBOT		FRA-7700 indoor act ant	19 mf
800C Terminal	\$289 v		
TEMPO			
AC One AC supply	\$ 69 m		
TEN-TEC			
505 Argonaut Xcvr	\$199 m		
509 Argonaut Xcvr	229 v		
210 1A supply	19 m		
251 9A supply	49 m		
525 Xcvr	349 m		
525/audio filter	369 m		
525D Dig Xcvr	449 f		
570 Century/21 Xcvr	189 mc		
979 Power supply	69 f		
Triton II Xcvr	199 f		
540 Xcvr	269 v		
544 Dig Xcvr	329 e		
240 160m conv	69 f		
545 Omni-A Xcvr	269 m		
546 Omni-D Xcvr	349 f		
546C Omni-D series C	499 v		
546C/1.8 filter	529 m		
560 Corsair Xcvr	699 mv		
560/500 Hz CW filter	729 m		
560/2 cw/1.8 filters	789 m		
561 Corsair II Xcvr	899 m		
580 Xcvr	369 m		
262G Power supply	89 ve		
255 Power supply	119 m		
260 Power supply	129 mf		
280 Power supply	99 v		
263 Remote VFO	139 f		
229 Ant tuner	169 f		
444 Hercules Linear	999 mf		
214 Desk mic	29 w		
215 Desk mic	25 m		
700A Hand mic	19 w		
700C Hand mic	19 m		
USI			
PI-3 12" amber monitor	\$ 69 m		
1400C 14" color monitor	169 m		
VOCOM			
FR-101S/6/2/fm/cw/am	\$249 m		
FL-101 Transmitter	229 m		
FT-101 Xcvr	379 c		
FT-101B Xcvr	389 mc		
FT-101E Xcvr	449 m		
FT-101EE/CW filter	429 m		
FT-101EX Xcvr	389 mf		
FT-101F Xcvr	449 c		
FT-101ZD Xcvr	469 mf		
FT-101ZD Mk III Xcvr	529 m		
FV-101Z Remote VFO	69 wf		
FV-101DM Remote VFO	69 m		
YO-100 Monitor scope	149 w		

FRA-7700 Indoor act ant	19 mf
FRT-7700 Ant tuner	39 m
FRV-7700F VHF conv	59 m
FRG-8800 SW receiver	389 m
430/726 Module; 726R	189 m
FT-620B 6m Xcvr	269 m
FT-221 2m Xcvr/dig disp	299 v
FT-225RD 2m Xcvr	429 m
FT-480R 2m Xcvr	299 m
FT-2700RH 2m/440 Xcvr	369 f
FT-720RU 440 FM Xcvr	169 e
FP-80 4.5A ps	24 w
FT-404R/TTP 440 FM HT	99 e

SATELLITE TV EQUIPMENT

AMPLICA

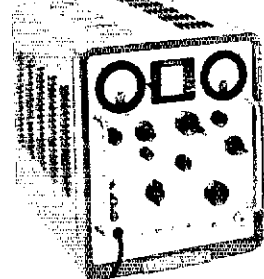
100" LNA \$ 29 m

300A rcvr/18" drive/85" LNA 599 m

3-13-86

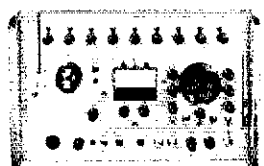
(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary. In some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. (2) We reserve the right to sell certain power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) Sometimes used gear is serviced after we receive your order. Please allow for a few days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment specials, Closeouts, etc.

USED AES SHOP TEST EQUIPMENT

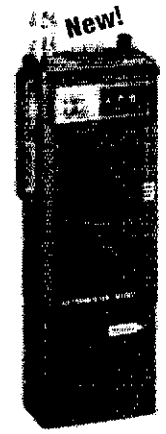


HEWLETT-PACKARD
608E 10-480MHz sig gen 995

For information on this equipment, call Paul Sirbinski at the Milwaukee Store.



SINGER-GERTSCH
FM-100S w/RFM-10A, FIM-3 & ODM-1 3695
OAM-1 AM module/FM-10C 195



DAIWA CLOSEOUT

MT-20A Ultra Compact and Lightweight 2m FM Handheld

- 144-148 MHz in 5 kHz steps with +5 kHz upshift and ± 600 kHz offsets.
- 3-digit thumbwheel frequency dial
- 1.5W output (HI), 150mW (LOW).
- 'S'/batt. check meter, dial light
- Only 6 3/8" x 2 1/2" x 1 1/2" d, 15 oz.
- 8.4V/270mAh rechargeable battery, wall charger, flexible antenna, belt handstrap and earphone.

Closeout Price • \$129⁹⁵
Extra rechargeable battery \$32⁹⁵

Location	Local Phone	Nationwide	In-State
m = Milwaukee, WI 53216; 4828 W. Fond du Lac Ave ...	(414) 442-4200	1-800-558-0411	1-800-242-5195
w = Wickliffe, OH 44092; 28940 Euclid Ave.....	(216) 585-7388	1-800-321-3594	1-800-362-0290
f = Orlando, FL 32803; 621 Commonwealth Ave	(305) 894-3238	1-800-327-1917	1-800-432-9424
c = Clearwater, FL 33515; 1898 Drew Street.....	(813) 461-4267		
v = Las Vegas, NV 89106; 1072 N. Rancho Drive.....	(702) 647-3114	1-800-634-6227	
e = Chicago, IL Erickson Communications (Associate)...	(312) 631-5181		




KENWOOD

...pacesetter in Amateur radio

Dependable Duo!

TS-830S HF transceiver.

The "Pacesetter" has become a legend in DX and contest circles.

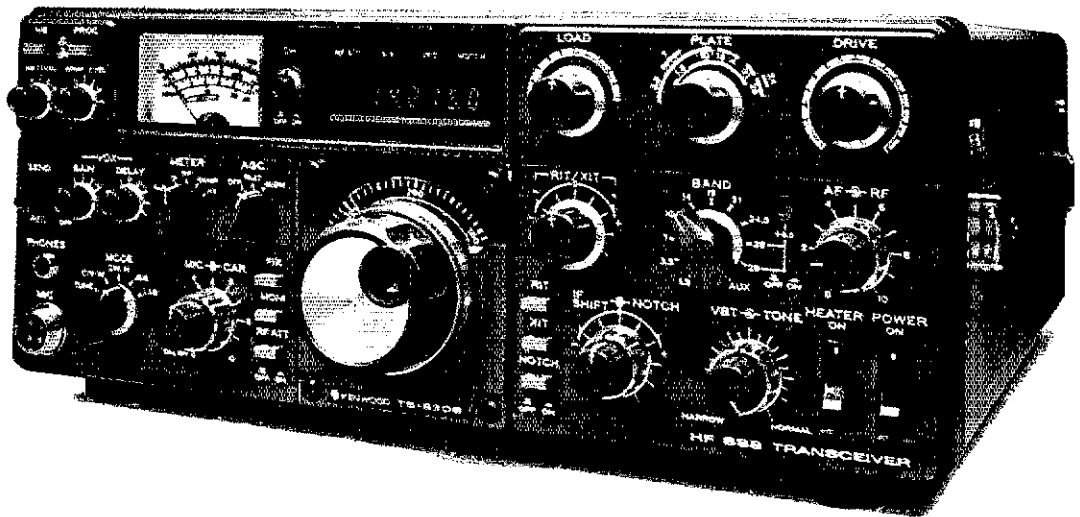
- Covers all 10 Amateur bands (50 kHz extended coverage).
- Wide receiver dynamic range, junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter high-Q active circuit in 455-kHz second IF.
- Noise-blanker threshold level control.
- IF shift (passband tuning).
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- SSB monitor circuit.

- Built-in digital display, (fluorescent tube), with analog dial.
- Narrow/wide filter selection on CW.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner/SWR/power meter.

- SP-230 external speaker.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.



TS-530SP HF transceiver.

This "Cents-ational" HF transceiver is recognized worldwide for superior and dependable performance.

- 160-10 meters, LSB, USB, CW, all Amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.

- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- IF shift tunes out interfering signals.

- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220 W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.

- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone.
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.

More information on the TS-830S and TS-530SP is available from authorized Kenwood dealers.



KENWOOD

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

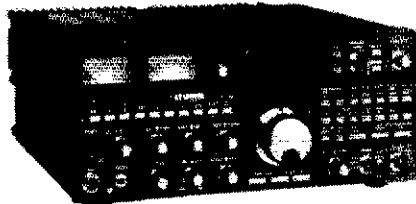
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

YAESU ★ Large Stock ★ Low Prices ★ Top Trades at AES®

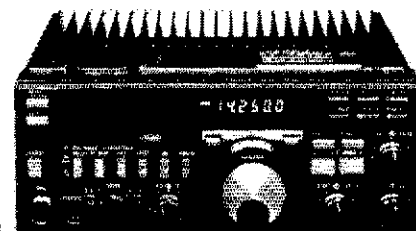
Call TOLL FREE for DISCOUNT Prices or TRADE-IN quote on your clean, late model equipment



- HF Equipment** LIST
- FT-ONE Xcvr/Rcvr/4 filters/RAM/FM..... \$2859.00
 - KY-ONE Keyer unit 45.00
 - DC-ONE DC cable for FT-ONE 15.00
 - SP-102 Speaker with audio filter 59.95
 - SP-102P Speaker/patch 99.95
 - MD-1B8 Desk microphone 69.00
 - MH-1B8 Mobile microphone 20.00



- HF Equipment** LIST
- FT-980 9-band CAT Xcvr/SW Rcvr..... \$1795.00
 - SP-980 Speaker with audio filter 89.95
 - SP-980P Speaker/patch 99.95
 - FC-757AT Automatic ant. tuner w/memory 289.95
 - FAS-1-4R Remote antenna selector..... 49.00
 - E-980 Interface cable; FT-980/757AT .. 46.50
 - XF-8.9HC 600 Hz CW filter (1st IF) 45.95
 - XF455.8MCN 300 Hz CW filter (2nd IF) ... 59.95
 - XF8.9B/XF8.9GA AM filter 45.00
 - KY-ONE Keyer unit 45.00
 - MD-1B8 Desk microphone 69.00
 - MH-1B8 Mobile microphone 20.00
 - FIF-65 Computer interface; Apple IIe..... 59.00
 - FIF-80 Interface; NEC PC-8001 119.00
 - FIF-232C for VIC-20/TI/most RS-232 69.95
 - FRB-1 External relay box 19.95
 - GC-980 General coverage kit..... 12.95



- HF Equipment** LIST
- FT-757GX 9-band Xcvr/SW Rcvr/mic..... \$899.95
 - FP-757GX Compact power supply 189.95
 - FP-757HD Heavy duty supply with fan.... 199.95
 - FP-700 Power supply 179.95
 - FC-757AT Automatic ant. tuner w/memory 289.95
 - FAS-1-4R Remote antenna selector..... 49.00

- FT-757GX accessories:** LIST
- SP-102 Speaker with audio filter \$ 59.95
 - SP-102P Speaker/patch 99.95
 - MD-1B8 Desk microphone 69.00
 - FRB-757 External relay box..... 10.95
 - MMB-20 Mobile mount 24.00
 - FTV-707 VHF/UHF Transverter, no module 129.00
 - 2M/FTV 2m module only 154.00
 - 6M/FTV 6m module only 110.00
 - 70 cm/FTV 430 module only 255.00
 - FIF-65A Interface; Apple IIe 55.00
 - FIF-232C for VIC-20/TI/most RS-232..... 69.00

- Misc. Accessories** LIST
- 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 19.00
 - YH-77 Lightweight headphones..... 19.00
 - FF-501DX Low pass filter..... 34.00

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 \$925.00
 - HF/726 10-12-15m unit 225.95
 - 6M/726 6m unit..... 215.95
 - 430/726 430-440 MHz unit (OSCAR)..... 299.95
 - 440/726 440-450 MHz unit (FM band)..... 299.95
 - SU-726 Satellite duplex module 109.95
 - XF-455MC 600 Hz CW filter 60.00
 - MD-1B8 Desk microphone 69.00
 - SP-102 Speaker w/audio filter 59.95
 - DC-726 DC cable for FT-726R..... 10.05



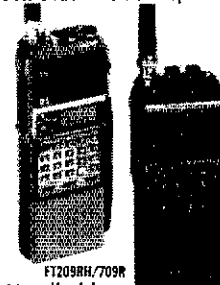
FT-270RH* 45w 2m FM Xcvr w/TTP mic..... 439.95



- FT-2700RH* 25w 2m/440 FM w/TTP mic ... 599.95
- FTS-8* Encoder/decoder 49.00
 - FVS-1 Voice synthesizer 29.00
 - FSP-2 4 ohm remote speaker 21.00
 - SP-55 Compact remote speaker 25.00

* FTS-8 encoder/decoder FREE with purchase of FT-270RH or FT-2700RH

- VHF/UHF - continued** LIST
- YH-1 Headset with boom mic only \$ 19.00
 - SB Switchbox only 20.00
 - YH-1SB Headset/mic/switchbox combination 39.00
 - MF-1A3B Flexible visor mount mic only..... 25.00
 - SB Switchbox only 20.00
 - FTR-2410 2m 10w repeater (special order) 1075.00
 - FTR-5410 440 10w repeater (special order) 1249.00



* FTS-6 encoder/decoder FREE with purchase of FT-209RH or FT-709R

- Handhelds** LIST
- FT-209RH* 5w 2m FM HT/TTP/batt/cgr..... \$359.95
 - FT-709R* 4w 440 FM HT/TTP/batt/cgr..... 349.95
 - FT-103R/TTP 2.5w 220 FM HT/batt/cgr/TTP 279.95
 - FT-203R/TTP 2.5w 2m FM HT/batt/cgr/TTP 259.95
 - FT-703R/TTP 2.5w 440 FM HT/batt/cgr/TTP 299.95

- Accessories for 09-series/03-series**
- FTS-6* Encoder/decoder 49.00
 - FBA-5 Alkaline battery holder 12.00
 - FNB-3 425ma 10.8v battery 49.00
 - FNB-4 extra 500ma 12v battery 59.00
 - NC-9B Wall charger for FNB-3 10.00
 - NC-15 Desk quick charger/AC ps 79.00
 - NC-18B Wall charger for FNB-4 10.00
 - MH-12A2B Speaker/microphone 35.00
 - MMB-21 Mobile bracket 15.00
 - PA-3 Mobile adapter and charger 39.00
 - TA-2 2m 19" telescoping whip ant 11.00
 - YH-2 VOX headset 20.00



- Receivers** LIST
- FRG-8800 150 KHz-29.999 MHz Shortwave \$599.95
 - FRA-7700 Indoor active receive antenna 49.00
 - FRT-7700 Antenna tuner..... 59.00
 - FRV-8800 118-174 MHz VHF converter ... 99.00
 - FIF-232C Interface; VIC-20/TI/RS-232.... 69.00
 - SP-102 Speaker with audio filter 59.95
 - FF-5 500 KHz low-pass filter (for VLF)..... 20.00
 - DC-8800 DC kit for FRG-8800..... 3.50
 - FRG-9600 60-905 MHz receiver 679.95
 - VU-9600 NTSC video unit..... 25.00
 - SP-55 Compact remote speaker 25.00

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

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

Please use WATS lines for Quotes and Ordering only. Use Regular lines for other Info and Service dept.

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

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

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS

CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181

Outside Ohio 1-800-321-3594

Outside Florida 1-800-327-1917

No Nationwide WATS

Outside Nevada 1-800-634-6227

15 min. from O'Hare!



ST-20T

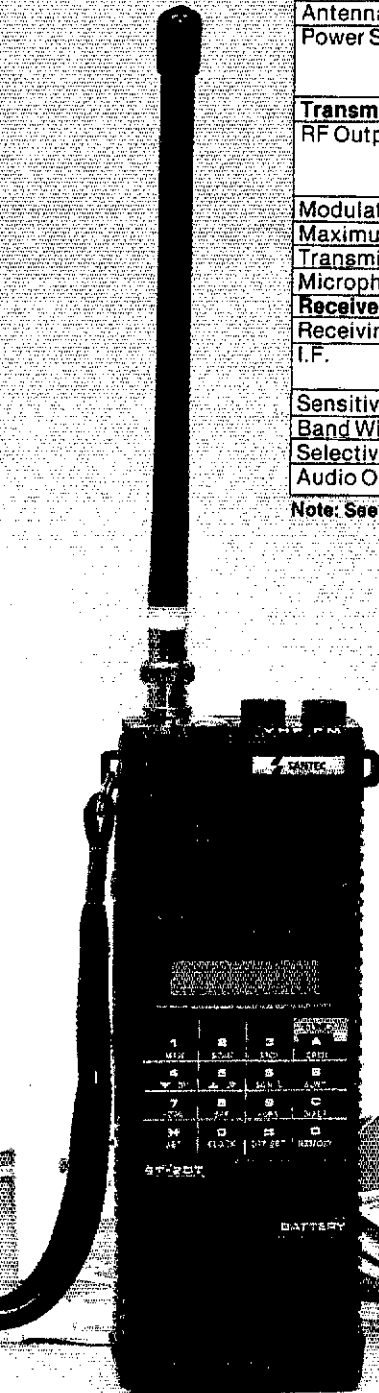
a SMART Radio ... the INTELLIGENT Choice

	VHF FM TRANSCEIVER MODEL ST-20T	UHF FM TRANSCEIVER MODEL ST-40T
Suggested Retail	\$349.95	Coming 1st Quarter 1988
Frequency Range	142.000 to 150.995 MHz	440 MHz to 449.975 MHz
Type of Emission	F3	F3
Memory Channels	10 Channels	10 Channels
Antenna Impedance	50 ohms	50 ohms
Power Source	9.6V NiCd battery pack 9V Dry battery pack D.C. 8.4-16V	9.6V NiCd battery pack 9V Dry battery pack D.C. 8.4-16V
Transmitter		
RF Output Power	5.0 Watts (H), nominal at 12V 3.5 Watts (H), nominal at 10.5V 0.5 Watts (L), nominal at 10.5V	3.0 Watts (H), nominal at 10.5V 0.5 Watts (L), nominal at 10.5V
Modulation	Frequency modulation	Frequency modulation
Maximum Deviation	± 5 KHz	± 5 KHz
Transmit Spurious	- 60 dB	- 60 dB
Microphone	Electret Condenser Microphone	Electret Condenser Microphone
Receiver		
Receiving Methods	Double superheterodyne	Double superheterodyne
I.F.	1st 16.9MHz 2nd 455KHz	1st 21.4MHz 2nd 455KHz
Sensitivity	Less than - 0.25uV at 12dB SINAD	Less than - 0.25uV at 12 dB SINAD
Band Width	± 7.5 KHz at 6dB down	± 7.5 KHz at 6dB down
Selectivity	± 15 KHz at 60dB down	± 15 KHz at 60dB down
Audio Output Power	400mW at 8 ohm	400mW at 8 ohm

Note: See Accessory List for ST-200 for Compatible Accessories.

- TWO SEVEN-DIGIT AUTO DIAL MEMORIES • ONE HAND, ONE FINGER SIMPLIFIED KEYBOARD ENTRY OF INFORMATION • 142-150.995 OPERATION FOR M.A.R.S. AND OR C.A.P. • TEN MEMORY CHANNELS FOR 10 DIFFERENT REPEATER OPERATIONS PLUS 'SCANLOCK' FOR LOCKOUT OF ANY ONE CHANNEL OR MULTIPLE CHANNELS WITHOUT REPROGRAMMING • SANTEC'S MULTIPLE MODES OF SCANNING • 3.5-5 WATTS OUTPUT • DIRECT 12 V.D.C. OPERATION • SUB-AUDIBLE TONE COMPUTER CONTROLLED • MICROPROCESSOR CONTROLLED ENCODE/DECODE OPTION AVAILABLE • TIME OF DAY QUARTZ CLOCK • ANALOG METER MOUNTED FOR BEST D.F. ING • AUTOMATIC ENTRY OF STANDARD OFFSET FOR BAND WITH EACH NEW ENTRY • ANY CTCSS TONE IN ANY MEMORY CHANNEL • SLIDE ON/OFF BATTERY PACK COMPATIBILITY
- SANTEC/ENCOMM, INC.'S TWO YEAR EXTENDED SERVICE PERIOD AT NO EXTRA COST •

Come See Us At Our New Location At Dayton
BOOTH 41 — MAIN ARENA



New

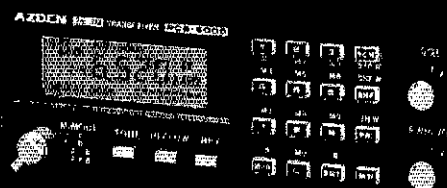
New

THE STANDARD OF EXCELLENCE

Definitely Superior!

AZDEN PCS-5000

COMMERCIAL — GRADE



UNPRECEDENTED WIDE FREQUENCY RANGE: Covers 140,000-153,000 MHz in steps that can be set to any multiple of 5 kHz up to 50 kHz.

CAP/MARS/NAVY MARS, BUILT IN: The wide frequency range facilitates use of CAP and ALL MARS FREQUENCIES including NAVY MARS. **COMPARE!**

TINY SIZE: Only 2 inches high, 5 1/2 inches wide and 7 1/2 inches deep!

MICROCOMPUTER CONTROL: Gives you the most advanced operating features available.

UP TO 11 NONSTANDARD SPLITS: **COMPARE** this with other units!

20 CHANNELS OF MEMORY IN TWO SEPARATE BANKS: Retains frequency, offset information, PL tone frequency.

DUAL MEMORY SCAN: Scan memory banks separately or together. **ALL** memory channels are tunable independently. **COMPARE!**

MEMORY SCAN LOCKOUT: Allows you to skip over channels you don't want to scan.

TWO RANGES OF PROGRAMMABLE BAND SCANNING: Limits are quickly reset. Scan ranges separately or together with independently selective steps in each range. **COMPARE!**

BUSY SCAN AND DELAY SCAN: Busy scan stops on an occupied channel. Delay scan provides automatic auto-resume.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PRIORITY MEMORY AND ALERT: Unit constantly monitors one memory channel for signals, alerting you when channel is occupied.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 5 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

ILLUMINATED KEYBOARD WITH ACQUISITION TONE: Keys are easily seen in the dark, and actuation is positively verified audibly.

CRISP, BACKLIGHTED LCD DISPLAY: Easily read no matter what the lighting conditions!

DIGITAL S/R/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

8817 S.W. 129th Terrace, Miami, Florida 33176 Telephone (305) 233-3631 Telex: 80-3356



MANUFACTURER:

JAPAN PIEZO CO., LTD.

1-12-17 Kamirenjaku, Mitaka, Tokyo, 181 Japan

Telex: 781-2822452

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 20th 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, 1900-2000 GMT. Br. Bernard Frey, 1 Fryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

JOIN the Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. 1417 Stoneybrook, Mamaroneck, NY 10543.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

MORSE TELEGRAPH CLUB, established 1942, seeks landline and radio operators interested in telegraphy and Morse history. 48 chapters USA & Canada. For information and sample paper contact W. K. Dunbar, AD9E, 1101 Maplewood Dr., Normal, IL 61781 309-454-2029.

THE FLORIDA Amateur Digital Communications Association (FADCA) publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

FCC EXAMS, Novice-Extra. Sunnyvale VEC ARC. 408-255-9000, 24 hour. 73, Gordon, W6NLG, VEC.

THANK YOU for attending Warren Ohio Hamfest. See you August 17, 1986.

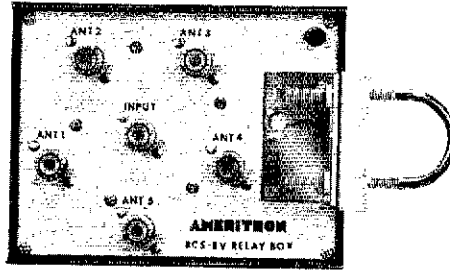
TCRA HAMFEST Tri-County Radio Association rain or shine, Sunday, May 4 Passaic Valley Community Center off Valley Road, Stirling, NJ 9 AM to 3 PM. Indoors, refreshments, rest rooms, free parking. Tables \$7 AD \$10. Registration \$2 Limited tail-gating by reservation only please. All reservations W2EUF Dick Franklin, 201-232-5955 Box 182, Westfield, NJ 07090.

SUNDAY MAY 18, LIMARC sponsors ARRL outdoor Hamfest at the NY Institute of Technology, Northern Blvd., Rte. 25A, 1 mile east of Glen Cove Road in Old Westbury (Exit 39N Rte 495). General admission for Hams \$3 at 9 AM to 3 PM. Sellers car space \$5. 7:30 AM no reservations. Call Hank WB2ALW notes for additional info or LIMARC INFOLINE 536-796-2366. Loads of parking. Catered food.

JUNE 1, 1986 - STARVED ROCK Radio Club Hamfest Princeton, Illinois - Same place as last year. SASE, please, for complete registration materials, map, etc. - SRRC, W9MKS, RFD #1, Box 171, Oglesby, IL 61348 - 815-667-4614.

INDIANA (MUNCIE) June 8: The Muncie Area ARC (MAARC) will hold its Annual Hamfest at the Delaware County Fairgrounds from 8 AM till 3 PM Sunday. Admission: in advance \$2. At the door \$3; tables \$5. With electricity. Overnight camping hook-up \$5 per space. Amateur Upgrade Test will be given in a separate building from 9 AM to 11 AM only. Free parking and food available, security will be on site at all times. For more info contact Robert A. Casada, KC9TY, 2608 Sycamore Ave., Muncie, IN 47302. Tel. 317-288-9449.

AMERITRON REMOTE COAX SWITCHES



Specifications: Loss at 150 MHz: less than .1 dB. VSWR: under 1.2 to 1 from DC to 250 MHz. Impedance: 50 ohms. Power capability: 5KW below 30 MHz, 1KW at 150 MHz.



The indoor control console has bright LED antenna selection indicators. The remote relay box is tower or mast mounted with a single clamp.

Specifications: VSWR: Under 1.1 to 1 from 1.8 to 30 MHz. Loss at 30 MHz: Less than .05 dB. Power Capability: 1500 watts average, 2500-watts pep max.

Send for catalog of other quality Ameritron Products.

RCS-8V

High Performance From DC Through UHF

The Ameritron RCS-8V is a remote controlled coax switch that selects up to five coax ports. Unused coax ports can be grounded or floated. Any number of ports can be engaged at the same time. Applications include stacking of antennas, cross-switching of coaxial lines or independent selection of five separate lines to a common port. The RCS-8V operates from 120 VAC, 220/240 VAC export model available.

RCS-4

Simple Installation For 1.8 Through 30 MHz

The Ameritron RCS-4 is a remote controlled coax switch that selects one of four antennas by supplying all control voltages through the coax feed line. The elimination of a control cable results in a neat and inexpensive installation.

AMERITRON, Division of Prime Instruments, Inc.
9805 Walford Avenue • Cleveland, Ohio 44102 • (216) 651-1740

CUSTOM COMMUNICATION CONSOLES

Personal, Commercial, Industrial & Governmental Applications

Any shape & size to fill a corner or a room. Special design features & services are:

- * Replaceable front panel, for equipment changes.
- * Precisely cut front panel holes by computerized equipment.
- * Computer aided design for: Floor plan lay-out, & console design.
- * Design assistance, on-site analysis & installation are available.

Constructed from plastic laminated birch plywood & black anodized aluminum extrusions.

Contact: Larry Kushner, WA6BKC/4, President
BCS, Inc., 5817 SW 21 Street, Hollywood, FL 33023 (305) 989-2371

Learn Radio Morse on Your
IBM PC, PC JR,
or IBM Compatible with
CODE TUTOR
\$9.95 Postpaid
ARCHWAY DATA SYSTEMS
13 Timber Road
Edison, NJ 08820

HI-VOLTAGE RECTIFIERS

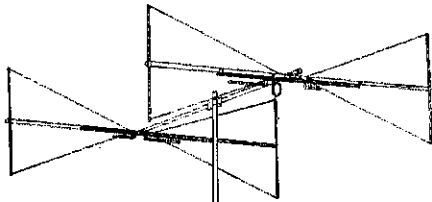
14,000 VOLTS - 1 AMPERE

REPLACES 866-872 3B28 ETC. IDEAL FOR 2 KW. LINEARS 250A. SURGE

4 FOR \$20.00 POSTPAID

K2AW's "SILICON ALLEY"
175 FRIENDS LANE WESTBURY, N.Y. 11590

The HF4B "Butterfly"™ A Compact Beam for 20-15-12-10 Meters



HF ANTENNAS FROM BUTTERNUT

Butternut Verticals

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

- 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.

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

MARCO-Medical Amateur Radio Council, Ltd. Operates daily and Sunday nets. Medically oriented amateurs (physicians, dentists, veterinarians, nurses, physio-therapists, lab technicians, etc.) invited to join. Presently over 550 members. For information, write MARCO, Box 73's, Acme, PA 15610.

39TH ANNUAL Evansville TARS Hamfest May 18, 1988 Bauer's Grove, Darmstadt, Indiana. Open at 6 AM CDT. All indoor-inside and outside flea market. Admission \$3. Indoor tables \$7.50 Outdoor flea market \$3. Talk-in on 147.75/15 and 148.19/7.9. For table reservations and information contact Charlie Sartore, NSDYE, 709 E. Virginia St., Evansville, IN 47711.

QSL Cards/Rubber Stamps/Engraving

POST CARD QSL Kit - Converts Post Cards, Photos, to QSL! Stamp brings circular. Labelcraft, P.O. Box 412, West Sand Lake, NY 12196.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch; will give quote. Little Print Shop, Box 9848, Austin, TX 78766.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

QSLs — 1) Famous K0AAB custom collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple calligns. 5) Ham "business cards." State your sample wants. 39c self addressed business size envelope required. Marv Mahre, W8MGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs Samples 40¢ (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

BE SURPRISED - get a variety of cards - 100 for \$8 or 200 for \$13. Samples \$1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FINEST CUSTOM QSLs AND RUBBER STAMPS: Large cut catalog and samples \$1 refundable on first order. Ritzy Print Shop, P.O. Box 45018, Westlake, OH 44145.

QSL's — since 1956, free samples, Rusprint, Box 7575, Kansas City, MO 64116.

FREE, 100 QSLs with first order. Samples 50c. Gazebo Press, Rt. 4, Box 4148, LaPlata, MD 20646.

ENGRAVING. CALLSIGN/name badges by W8QV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs — Completely different! Samples \$1. (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

PICTURE QSL cards of your shack, etc. from your photograph or black ink art work. 500 \$24.00; 1000 \$36.50. Also unusual non-picture designs. Send stamp for illustrated literature. Generous sample pack \$1.00; half pound of samples \$2.00. Custom printed cards, send specifications for estimate. Raum's, RD 2, Orchard Road, Coopersburg, PA 18038 (Formerly of Philadelphia).

QSLs, QUALITY and Fast Service for 25 Years. Include Call for Decal. Samples 50c. Ray, K7HLR, Box 331, Clearfield, UT 84015.

BROWNIE QSLs since 1939. Catalog & Samples \$1 (refundable with order) 3035 Lehigh Street, Allentown, PA 18103.

QUALITY QSLs, Samples 50c. Olde Press, W9MPP, Box 1252, Kankakee, IL 60901.

FIRST CLASS, Full Color QSL from your prints or slides. Confirming report and address printed on back, \$199/2,500. Smith Printing, 20420 Calhaven Dr., Saugus, CA 91350. 805-251-7211.

QSL CARDS - Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, 310 Commercial, Emporia, KS 66801.

CONTEST QSLs . . . our quantity discounts can save you money. Write for free samples. No stamps or SASE needed. QSLs By WAMPY, 705 Audubon Circle, Belvedere, SC 29841.

QSL samples — 25¢ Samcards — 48 Monte Carlo Dr., Pittsburgh, PA 15239.

QSL CARDS, Free Samples. Stan Magrecki, KD9KW, PO Box 50, Rockton, IL 61072.

ANTIQUÉ-VINTAGE-CLASSIC

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels, "Skyrider Commercial," early transmitters — HT-1, HT-2, HT-8, etc., other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell, Austin, TX 78745.

WANTED: old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milwaukee 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 FB02, Council Bluffs, IA 51502-0802.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berywn, IL 60402.

WANTED: radios, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201. 818-242-8361.

START COPYING CW THE EASY WAY!

- **Start copying words instead of letters!**
- **Master the standard exchange in just a few evenings!**
- **Gain on-the-air confidence quickly!**

THE QSO-TRAINER™ Code Course - For the ham who already knows the code. If you have been a ham for a while, tried the "traditional" random-letter approach to code practice, and still don't have the on-the-air confidence you'd like—this course may be exactly what you need.

Easy-to-learn lessons on two 60-minute audio cassettes.

Send \$14.95 + \$2.00 shipping and handling (IN residents add \$0.85) to:

AVC INNOVATIONS, INC.
Dept. Q, P.O. Box 20491
Indianapolis, IN 46220-0491

BUSINESS SIZE SASE GETS DETAILS

THIS MONTH'S GOODIE FROM THE CANDY STORE KENWOOD TS-440S UNDER \$820.00

T2X ROTATOR \$229.00 L.T.O.
OVER 7500 HAM RELATED ITEMS IN STOCK, ALL PRICES FOB PRESTON. Send SASE for NEW HF PRICE LIST. More specials in classifieds.
ROSS DISTRIBUTING COMPANY
78 South State Street, Preston, Idaho 83263
Telephone (208) 852-0830 Closed MON. & SAT. at 2:00

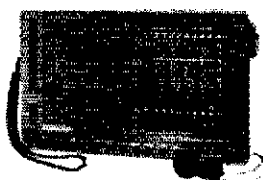
UR TRIPOLE ANTENNA

The TRIPOLE™ covers the 160-8 m bands, including new bands, without retuning. No taps, no traps, no coils, built-in balun. A best choice for an all-around amateur antenna. Guaranteed. Kit T80-K \$74.95; Assembled T80-A \$84.95. Prices postpaid cash. TX residents add 5% sales tax.

UNIVERSAL RADIO CO.
Dept. Q1 P.O. Box 26041 El Paso, Texas 79928 (915) 592-1910

VISA or MasterCard

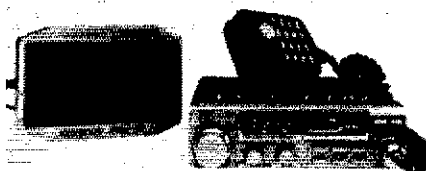
SAVE on these AES/KENWOOD Specials!



\$50 Off!

Headphones \$19⁹⁵

KENWOOD R-11 Receiver: 11 bands - AM, FM broadcast + 13, 16, 19, 22, 25, 31, 41, & 49m SW. No BFO! Bandspeed tuning, meter, 3" speaker, record & phone jacks, whip & ferrite antennas, 7" w x 4 1/2" h x 1 1/2" d. Carrying case & earphone, uses 4 'AA' cells. Shown w/optional headphones..... **Closeout \$69⁹⁵**



KENWOOD TM-201A • CLOSEOUT

Ultra compact! Covers 142-149.005 MHz in 5 kHz steps, 25W out. GaAs FET RF amplifier, dual digital VFO'S, 5 memories plus "com" channel w/back-up. Priority alert scan, memory and programmable band scan. Yellow LED display, LED S/RF meter, Ext. spkr, 16-key TTP UP/DN microphone, mobile mount. 5 1/2" w x 1 1/2" h x 7 1/2" d, 2.8 lbs. List \$329⁹⁵..... **Closeout \$259⁹⁵**

FREE FM Unit!



with **KENWOOD TS-430S**

For a Limited time - purchase a TS-430S at our normal LOW Sale Price & get the optional **FM-430*** FM Unit at **NO EXTRA CHARGE.**

*The FM-430 option provides HF FM transmit and receive capability on bands where authorized.

Call for our Low Sale Price!

Special Prices & Deals subject to change without notice.

FREE Extra Battery!

For a Limited time!

Purchase a TR-2600A (shown) at our normal Low Sale Price and receive an extra PB-26 battery • **FREE!**

or

Purchase a TH-21A/AT, TH-31A/AT or TH-41A/AT at our Low Sale Price and receive an extra PB-21 180 ma. battery • **FREE!**

Call for Sale Prices



Only a few left!

KENWOOD DFC-230 Digital Frequency Controller for TS-120S, 130S/SE, 530S, 830S. 20 Hz steps, 4 memories, scan, UP/DN mic..... **Closeout \$169⁹⁵**

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

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

AES BRANCH STORES

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

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

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

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

Associate Store

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

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!

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.

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 _____

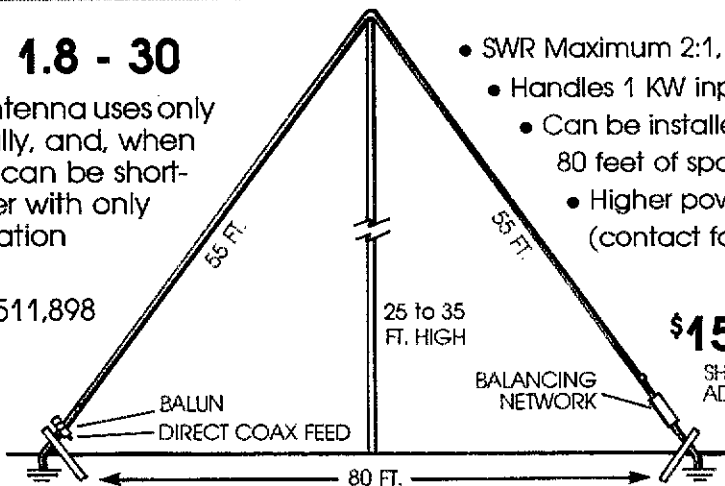
NEW from BARKER & WILLIAMSON!

1.8 - 30 MHz. Continuous Coverage Antenna for Commercial and Amateur Service

Model AC 1.8 - 30

The AC 1.8 - 30 Antenna uses only 80 feet horizontally, and, when space is limited, can be shortened even further with only slight loss of radiation efficiency.

U.S. Patent No. 4,511,898



- SWR Maximum 2:1, 1.4:1 Average
- Handles 1 KW input ICAS
- Can be installed in approximately 80 feet of space
- Higher power models available (contact factory)

\$159.50

SHIPPING AND HANDLING ADD \$4.00



BARKER & WILLIAMSON

Quality Communication Products Since 1932

At your Distributors write or call, 10 Canal Street, Bristol PA 19007

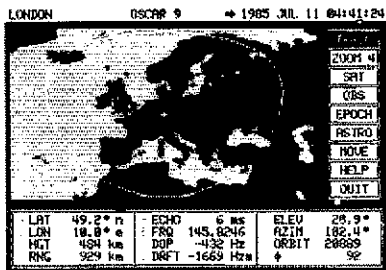
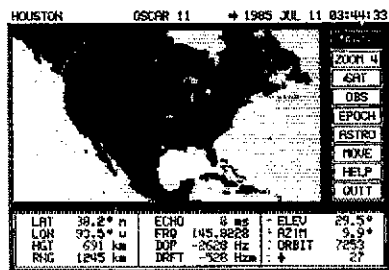
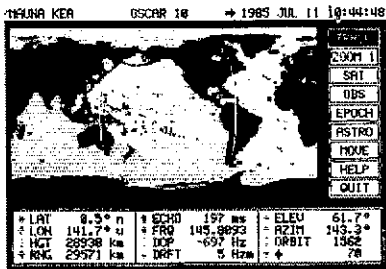
(215) 788-5581

ALL OUR PRODUCTS MADE IN USA



GET A BIRD'S EYE VIEW

From GrafTrak II™ and your IBM® PC



GrafTrak II™ provides realtime graphic display of a flat projection map which moves under the selected Satellite/Sun/Moon/Star coverage circle and updates once per second. Spherical projection views and graphic screen dumps to an IBM/Epson/OKI printer can also be produced. Requires an IBM PC, PC/XT, PC/AT, or true compatible, an IBM Color/Graphics Monitor Adapter or true compatible, 8087 math coprocessor, minimum 256K RAM with 512K recommended, DOS 2.0 or later, and either two 360K floppy drives or one 360K floppy and one hard drive.

SILICON EPHEMERIS™ provides tabular data output to the screen, printer, or disk file for the following operating modes: 1 observer to 16 satellites, 16 observers to 1 satellite, schedule for 1 observer to 1 satellite, window between 2 observers and 1 satellite, rise and set times for 1 satellite, time ordered rise and set times for 16 satellites, Almanac for Sun and Moon, 16 observers to Sun/Moon, schedule for 1 observer to Moon, window between 2 observers and Moon, schedule for 1 observer to Sun. Requires either an IBM PC, PC/XT, PC/AT, or true compatible, and IBM Monochrome or IBM Color/Graphics Monitor Adapter or true compatible, an optional 8087 math coprocessor, 256K RAM, DOS 2.0 or later, and one 360K floppy drive.

Each package includes SED, an editor program to construct and modify Satellite/Observer database files. These products can be run from a hard disk and are not copy protected.

GrafTrak II™ and SILICON EPHEMERIS™ are priced at \$119.95 each or \$199.95 for both. Texas residents add sales tax. Order by check, money order, MasterCard, or VISA.

Silicon Solutions, Inc. • P.O. Box 742546 • Houston, Texas 77274-2546 • (713) 661-8727

IBM is a registered trademark of IBM Corporation

GrafTrak II and Silicon Ephemeris are trademarks of Silicon Solutions, Inc.

Only the genuine has these trademarks

Spider Antenna™

U.S. Patents 4349825, 4460896

They are your assurance of quality and performance

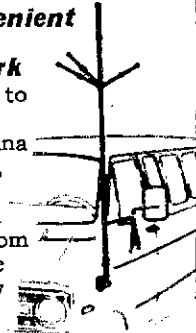
Is Factory Pre-Tuning Good? No—It Just Does Not Work!

Every HF mobile installation has its own characteristics, and the antenna must be tuned to fit them. Only the Spider™ Antenna with its patented tuning sleeves can be tailored by the user to fit his own requirements. If the antenna is later moved to a different installation, the Spider™ can always be re-tuned as needed.

Beware of Cheap Imitations!

The Most Convenient Antenna for Mobile Work

No more stopping to change coils. Once the Spider™ Antenna is tuned for 10, 15, 20 and 40 (or 75) meters, just switch your transceiver from band to band—the antenna will follow by itself.



We Have No Dealers—Order Direct

MULTI-BAND ANTENNAS
7131 OWENSMOUTH AVENUE, SUITE 363C
CANOGA PARK, CALIF., 91303
TELEPHONE: (818) 341-5460

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid; trade items available. Write: James Steele, 80 Central Park West, New York, NY 10023-5205.

WANTED: MCINTOSH and Marantz tube-tube audio equipment, parts, accessories and literature, for personal collection. 100% reply. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385, 414-475-6356.

RECAPTURE EARLY DAYS of Ham radio, professional radio and broadcasting! Our book Vintage Radio (263 pages) takes you from the earliest days up through spark to early 'phone days. A Flick Of The Switch (312 pages) covers Ham, commercial, wartime and broadcast radio from 1930 to 1950. Rekindle that excitement of early ham days! Discover the pleasures of collecting old radio gear! Just send \$10.95 for each book to N8VY, Box 2045, Palos Verdes Pnsia., CA 90274.

WANTED: QST VOLUME 1. WB1SQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE. Scaramella, Box 1, Woonsocket, R.I. 02895-0001.

VIBROPLEXES, BUGS wanted. Hensley, 5054 Holloway, Baton Rouge, LA 70808.

WANTED, OLD Western Electric, Cunningham, RCA, McIntosh, Marantz, Telefunken, tubes, speakers, amplifiers, 713-728-4343, Maury Corb, 11122 Atwell, Houston, TX 77096.

VINTAGE TUBES, Books, Magazines, Dollar and wants. WA2BUG.

CRYPTOGRAPHY items wanted. WB2EZX. 516-378-0263.

EARLY ELECTRONIC and Mechanical Television Sets, parts, literature wanted for substantial cash. Finder's fee paid for successful leads. Arnold Chase, 9 Rushleigh Road, West Hartford, CT 06117 203-521-5280.

BUY, sell, collect and restore early tube equipment? Early receivers, tubes and telegraph gear? Join AWA which sponsors old time "meets," flea markets, museum and journal with free want ads. Annual dues only \$8. Write: Bruce Kelley, W2ICE, Fite. 3, Holcomb, NY 14469.

WANTED: CRYSTAL SET Parts: Variometers, Variocouplers, Condensers, Detector Holders, Detectors, Catwiskers, Dial Knobs, Tap Switches, Tap Points, Binding Posts, Headphones. MIDCO, 860 N. Dixie Highway, Hollywood, FL 33020.

SELL: HAMMARLUND HQ180A Communications Receiver with Matching Speaker \$135. Drake TR22 two meter transceiver with AC10 Power Supply \$85. All equipment in good condition. Pickup only. 516-671-9832 WA2IOP.

HALLICRAFTERS HT37 Xmir & 6X111 Recvr Original good condition manuals, \$195. K9ZRB, R. Kouba, 21462 W. Barbara Ct., Kildeer, IL 60047.

FOR SALE: National SW-3, coils and Home Brew power supply. Write or call W3EYF: 301-265-1356.

COLLECTOR WANTS Pre-1935 Radios, Radio Parts, Books, Advertising, Marbleized Plastic Radios, old TVs, Jerry Finamore, Eagle Rock Village, Bld. 25, Apt. 3-A, Budd Lake, NJ 07828. 201-691-3368.

SSB XMT-R-Freq Meter-QST: Central Electronics 100V transmitter \$45. Frequency Meter BC-221AF \$40. QST's from 1963 through 1984, good condition, almost complete, will consider highest bid. Ed. K4KZE. 2829 Second St NW, Birmingham, AL 35215.

TRADE: QST's, 5/29, 3/30, three "collector earphones, more for? Want: "AS-is" "Mini-Beam," "Mini-quad," N4ZB, 1420 Mount Vernon Drive, Holiday, FL 33590.

ANTIQUA RADIOS Parts, Books for beginner collectors. SASE lists. W9REW, 4811 Forest Ave., Ft. Wayne, IN 46815.

ANTIQUA TUBES: UX-112-A, UX-171-A, UX-201-A, UX-301-A. SASE for list. K4MSG, 204 S. Harrison, Sterling, VA 22170.

HQ-129-X, DX-60, HG-10, more. SASE for list. K4MSG, 204 S. Harrison, Sterling, VA 22170.

TELEGRAPH KEYS. Collector seeking pre-1935 bugs. Vibroplex, Martin, United Electric, DeLaney, Boulter, etc. Also need spark keys and pre-1915 telegraph (keys, sounders, books, catalogues). Visitors welcome. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081, tel. 214-234-1853.

WANTED: VFO suitable for use with Hallicrafters HT-40. KA2WQJ, 315-363-4595.

FOR SALE: 80 years of QST's \$100. No shipping. W8CKX, W. K. Tumbler, 2703 Glenwood Ave., Moundsville, WV 26041. Phone 304-845-6299.

TV's BOUGHT! Pre-1955, Pilots, Predictas, Accs. 1930-1960 radios, Consoles, Rlders. Poster, Box 1883Q, South Hack., NJ 07068, 201-794-9606.

WANTED: E. H. Scott Radios and McMurdo Silver Radios i.e. Scott Radio Labs "Scott Special," Scott Worlds Record sets, etc. Literature, Memorabilia, etc. McMurdo Silver "Single Signal 5B or Radio Professional Model 5D" any Literature or Memorabilia etc. Also: Zenith Stratosphere or Lincoln Symphonic Radio. I will arrange shipping. Denis Yanko, 410 North Summit, Oconomowoc, WI 53066. The Scott McMurdo Silver Collector, 414-965-3641 after 5 PM CST collect.

HALLICRAFTERS HT-40, SX-140, HA-5 VFO, speaker, manuals complete rig \$250. Steve Patterson, N4MHI, 2061 Bishops Bridge Rd., Knoxville, TN 37922. 615-691-5662.

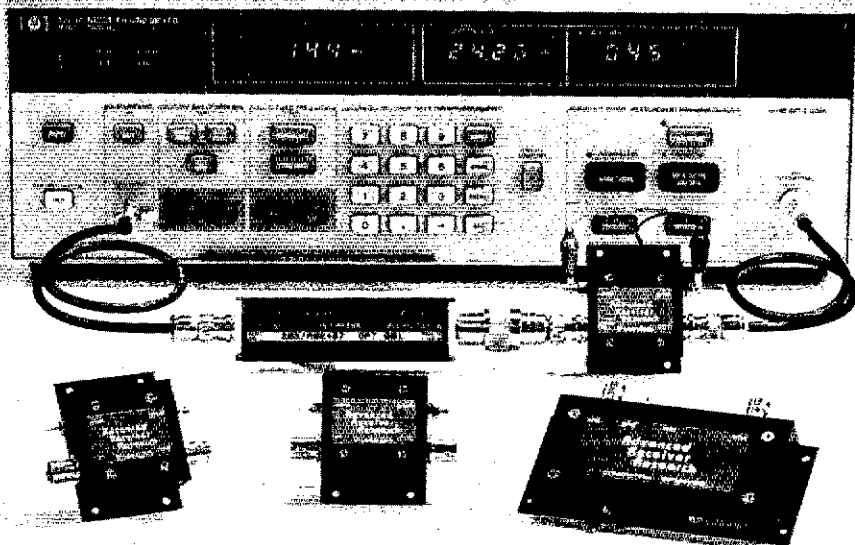
FREE: QST 1933 through 1980, please take all, you pick up. Bill Koepf, K5CD, 214-348-4878.

NEED Power Unit for Atwater-Kent Model 40. W4MZL, 435 Nieuport, Vero Beach, FL 32962, 305-567-6446.

AMPLITUDE MODULATION, class B input/output Transformers, 200 Watts, \$10. K2QB, 716-688-8293.

VINTAGE 1950's WRL Globe King 500 Watt broadcast quality AM/CW Transmitter, 180 thru 10 and 11 meters. Ideal linear amp with manual \$425 F.O.B. Call Paul, K2PE, 17 White Oak Tree, Syosset, NY 11791, 516-364-2047.

High Performance vhf/uhf preamps



Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
P28VD	28-30	<1.1	15	0	DGFET	\$29.95
P50VD	50-54	<1.3	15	0	DGFET	\$29.95
P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDG	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	<1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95

Inline (rf switched)

Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
SP28VD	28-30	<1.2	15	0	DGFET	\$59.95
SP50VD	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.6	15	0	DGFET	\$69.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	<1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	<0.55	16	+12	GaAsFET	\$109.95

Every preamplifier is precision aligned on ARR's Hewlett Packard HP8970A/HP348A 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

LIKE TO OPERATE BY/IN BEIJING CHINA? HAMS TRAVELLING WITH US DO!

Escorted and hosted by Radio Peking. Most comprehensive 22 day tour.

For brochure send S.A.S.E. & phone number

Paul Hale, 1619 N. Royer St. Colorado Springs, CO 80907

It's Incredible!

Now You Can...

CODE QUICK

Master code or upgrade in a matter of days. Code Quick is a unique breakthrough which simplifies learning Morse Code. Instead of a confusing maze of dits and dahs, each letter will magically begin to call out its own name! Stop torturing yourself! Your amazing kit containing 5 power-packed cassettes, visual breakthrough cards and original manual is only \$39.95! Send check or money order today to WHEELER APPLIED RESEARCH LAB, P.O. Box 3261, City of Industry, CA 91744. Ask for Code Quick #106 California residents add 6% sales tax.

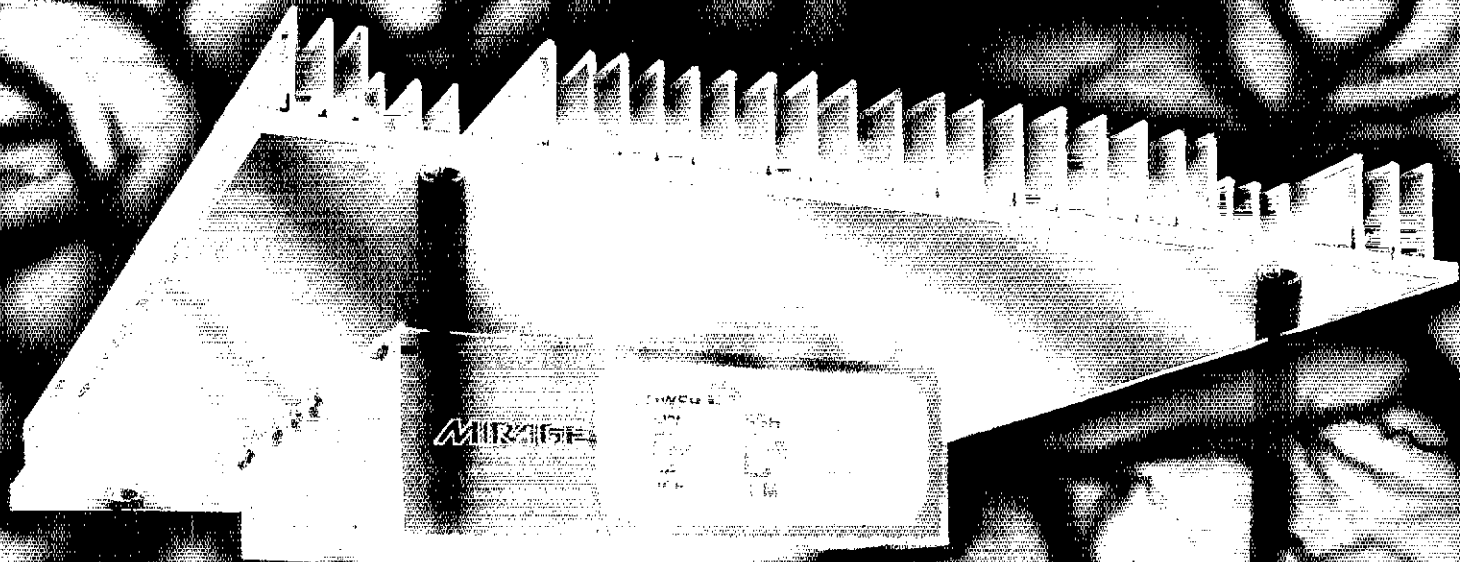
You can't lose! Follow each simple step. You must succeed or return the kit for a total immediate refund!

NEW 20-PAGE CATALOG FREE

7 MILLION TUBES

Includes all current, obsolete, antique, hard-to-find receiving, transmitting, industrial, radio/TV types. **LOWEST PRICES.** Major brands in stock.

Unity Electronics Dept.
P.O. Box 213, Elizabeth, N.J. 07206



MIRAGE / KLM

REPEATER AMPLIFIERS.

WANTED: BC-148 W/Alcraft Receiver and BC-454 3-6 MHz, BC-455 6-9 MHz Command Set Receivers. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

WANTED: 1930s Controlled-Carrier A-M Transmitter or components as UTC Variators. Also junker National AGS or NC-2-40D Receivers. Nagle, 1233D Lawyers, Herndon, VA 22071, 703-620-3066.

QST, CQ and Amateur Radio Handbooks (various) 35 year collection (about 12 feet). Will ship motor freight collect (you must take all) \$60. Also 5 or 6 years of 'Sport Aviation'. \$20. WA4VDM, 919-482-3764.

COLLINS: 51-J4 with F500B31, good working order, \$245. K2GJJ, 914-361-4609 evenings before 10:30 Eastern.

HALLICRAFTERS — NEED 50 kHz IF transformer from junked SX-96, -100, -101, 101A, -111, -115, S-76 or? John, WB2EQG, Box 1872, Wayne, NJ 07470. 201-694-2392.

SELLING FROM My Collection: National Receivers NC188 with matching speaker \$100. NC57 \$50. SW54 \$35. Knight VFO \$25. EICOM 720 CW Transmitter \$50. Lafayette HA-83 Receiver \$50. Heath Twoer \$35. Sixer \$35. Hallicrafter SX111 \$75. Want early Amateur Receivers and Antique Radios. DeForest, Grebe, Atwater-Kent. Will trade. K4UJZ, R. Olmsted, Rt. 11, #349, Murfreesboro, TN 37130, 615-893-5344.

General
105 FT. SKYNEEDLE-type motorized remote control crank up pwr down fully rotatable guyless 28 ft. nest height tubular steel tower with 5 over 5 stacked array for 20 mtrs. with 4 bedroom cottage on the Upper Rideau Lake Canal system situated 40 miles north of Brockville, Ontario on the USA border. Contact VE3GK, 1-613-225-3428.

AMIGATU SOFTWARE — Mouse driven menus all functions, split screen, buffers, autoID etc. Kantronics UTU or equiv, can modify for others. \$75 on disk. Information write — Allan Ebert, VE3AXV, 924 Westbury Ct., Samia, NY 77.

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 23rd year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate — no long wait for results! SASE for sample copy. \$10 for one year (24 issues). P.O. Box 2057, Glen Ellyn, IL 60138-2057.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

HOSS-TRADER, Ed Says, Shop Around for the best price the telephone the Hoss last, for the best deal.
Mosley Classic-33 Beam regular \$388, cash \$259. New Display ICOM IC-2AT \$189. New Display Azden PCS-5000 \$269. New Display ICOM-735 Transceiver regular \$849, cash \$689. New Display ICOM-751 Transceiver regular \$1379, cash \$949. New Display ICOM-745 Transceiver regular \$999, cash \$729. New ICOM D2-AT \$289. New MB-VA 3kW Antenna Tuner regular \$585, cash \$465. New Display LK-600ZB 2500 Watt Amp Supply Linear/tubes/Hypersil Transformer regular \$1119, cash \$959. New Display Kenwood 430-S \$839. New Display 940-S/w/ tuner \$1599. VISA/MasterCard Accepted !!! Moory Electronics Company, P.O. Box 506, DeWitt, ARK 72042, 501-946-2820.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, P.O. Box 707, Linden, NJ 07036. Call toll-free 800-526-4052.

FAST, ACCURATE, readable, nonsensational — The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send \$19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

KEYER KITS, \$15. SASE for information MSC, 1304 Toney Drive, Huntsville, AL 35802.

EIMAC-3-500Z's. New-very limited quantity! \$85 each, cash, COD, MO. Add \$3.50 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes - Mike Forman, 3740 Randolph, Oakland, CA 94602 415-530-8840.

AMRAD (Amateur Radio Research and Development Corporation) is a nonprofit organization of experimenters in packet radio, spread spectrum and digital communications. Monthly newsletter. Mail \$15 to AMRAD, 5829 Parakeet Drive, Burke, VA 22015. Add \$2 for Canada, Mexico; \$8 overseas air, \$2.30 surface.

SOLAR ELECTRIC panels, components, inverters. \$3 catalogs, technical information, price lists. SPECS Inc. P.O. 165, Montrose, CA 91020.

MAGICOM RF Speech Processors for selected Kenwood, Drake and Yaesu equipment. Excellent speech quality—6dB added average output. Affordable prices! SASE for data and cost. MAGICOM, P.O. Box 6352, Bellevue, WA 98007.

T199/4A Ham Computer Programs. 39¢ Stamp for Brochure to Sam Moore, AC5D, Box 368, Stigler, OK 74462. SALE - 1/2 Price on all AC5D Programs. Any five programs for \$32.00.

RTTY HEADQUARTERS: Authorized Dealers for "Hal" and "Info-Tech" products. You can't beat our prices! Call or write Delta Amateur Radio Supply, 212-48th Street, Rapid City, SD 57702. 605-343-6127.

RIGID PLEXIGLAS Key Cover. Bencher \$9.95; MFJ-422 \$9.95; Mercury \$16. George Chambers, K0BEJ, 302 S. Glendale Avenue, Coffeyville, KS 67337.

QRPers/BUILDERS: New-parts bargains! S.A.S.E. for flyer. KA1BUQ, Box 249, Luther, MI 49656.

CHASSIS & CABINET KITS. 5120 Harmony Grove Rd., Dover, PA 17315 SASE K3IWK.

WE SHIP WORLDWIDE
Barry Electronics Corp.
WORLD WIDE AMATEUR RADIO SINCE 1950
Your one source for all Radio Equipment!



May We Help You with the Best in Commercial and Amateur Radios... Call Us! It's Jan, KB2RV, Kity, WA2BAP, Mark, K2CDN.
Come to Yaesu Week at Barry's 5/11-5/18
Yaesu Reps on Saturday 5/17

KENWOOD
Antennas
TS440S/AT, R-1000, R-2000, TS-940 SIAT
TM-201B, TR26/3600A, TM2570A/50A/30A
TW-4000A. Kenwood Service/Repair.
TH2131/41AT, TM-21A/
411A & TS-711A/B11A

COMPU-FIRE EXTINGUISHERS
EXL-6000 RTTY/KTOR TERMINAL

VoCom/Mirage/Daiva
Tokyo Hy-Power
Amplifiers &
5/8HT Gain
Antennas IN STOCK

Soldering Station,
48 Watts, \$88
JBC soldering line in stock.
MICROLOC-Air I, Air Disk,
SWL, Morse Coach
KANTRONICS
UTU, Interface II, UTUXT,
Challenger, Packet Ctrl.

AEA 144 MHz
AEA 220 MHz
AEA 440 MHz
ANTENNAS

BIRD
Wattmeters &
Elements
In Stock

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.
Saturday & Sunday 10 to 5 P.M.
Monday-Friday 9 to 6:30 PM Thurs. to 8 PM
Come to Barry's for the best buys in town.

ONV Safety
belts-in stock

YAESU
FT-ONE, FT-980, FT-757GX, FRG-8000
FT-726R, FRG-9600, FT-270RH, FT-270DRH

Alinco
Power Supplies

AMERITRON AMPLIFIER AUTHORIZED DEALER
Yaesu FTR-2410, Wilson
ICOM IC-RP 3010 (440 MHz)
ICOM IC-RP 1210 (1.2 GHz)

Computer Interfaces
stocked: MFJ-1224
AEA CP-1, PK-80, DRDX
CP-100, PK-64, Dr. QSO,
Morse University

ALPHA AMPLIFIERS
Complete Butternut Antenna
Inventory In Stock!

DIGITAL FREQUENCY COUNTERS
10MHz-
Model TR-1000 5-1 GHz 120000
5-20 MHz 6-1.8 GHz 120000

BENCHER PADDLES,
BALUNS, AUDIO FILTERS,
IN STOCK

MIRAGE AMPLIFIERS
ASTRON POWER SUPPLIES
Saxton Wire & Cable

For the best buys in town call:
212-925-7000
Los Precios Mas Bajos en
Nueva York...

ICOM!
IC-R71A, 751, 745, 27A/H, 37A, 47A, R-7000,
1271A, 271A/H, 3200A, 471A/H, 735

SMART PATCH \$219.95
Use of this device on frequencies below
220.6MHz is illegal unless a separate
control link is provided.

PRIVATE PATCH III in stock

FLUKE 77 Multimeter

Nye MBV-A 3 Kilowatt Tuner

SANTEC
ST-222UP
ST-20T
ST-442UP
HT-7

MFJ Models
422, 313, 989, & 941D

MURCH
Model
2000 A,
A-L5, B
In stock

SANGAN Portable Shortwave Radios

HEIL EQUIPMENT
IN STOCK

HEIL Towers
Hy-Gain Towers
& Antennas, and
Rotas will be
shipped direct to
you FREE of
shipping cost.

New TEN-TEC
2891HT, Corsair II, Argosy II, Century 22, 2810

MAIL ALL ORDERS TO BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012.

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol!"
BARRY INTERNATIONAL TELEX 12-7670
MERCHANDISE TAKEN ON CONSIGNMENT
FOR TOP PRICES

Monday-Friday 9 A.M. to 6:30 P.M. Thursday to 8 P.M.
Saturday & Sunday 10 A.M. to 5 P.M. (Free Parking)
AUTHORIZED DIST. MOKAY DYMEK FOR
SHORTWAVE ANTENNAS & RECEIVERS.

IRITEX-Spring St. Station
Subways: BMT-"Prince St. Station"
IND-"E" Train-Bwy. Station"

Bus: Broadway #6 to Spring St.
Path—9th St./6th Ave. Station.

Commercial Equipment
Stocked: ICOM, MAXON,
Midland, Standard, Wil-
son, Yaesu. We serve
municipalities, busi-
nesses, Civil Defense,
base, portables, mobiles,
etc., repeaters

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
DEALER INQUIRIES INVITED. PHONE IN YOUR ORDER & BE REIMBURSED.

COMMERCIAL RADIOS stocked & serviced on premises.
Amateur Radio courses Given On Our Premises, Call
Export Orders Shipped Immediately. TELEX 12-7670

ALL
SALES
FINAL

WORLD FAMOUS
CURTIS
KEYERS

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

ONV SAFETY BELT

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)
• Ask your Dealer

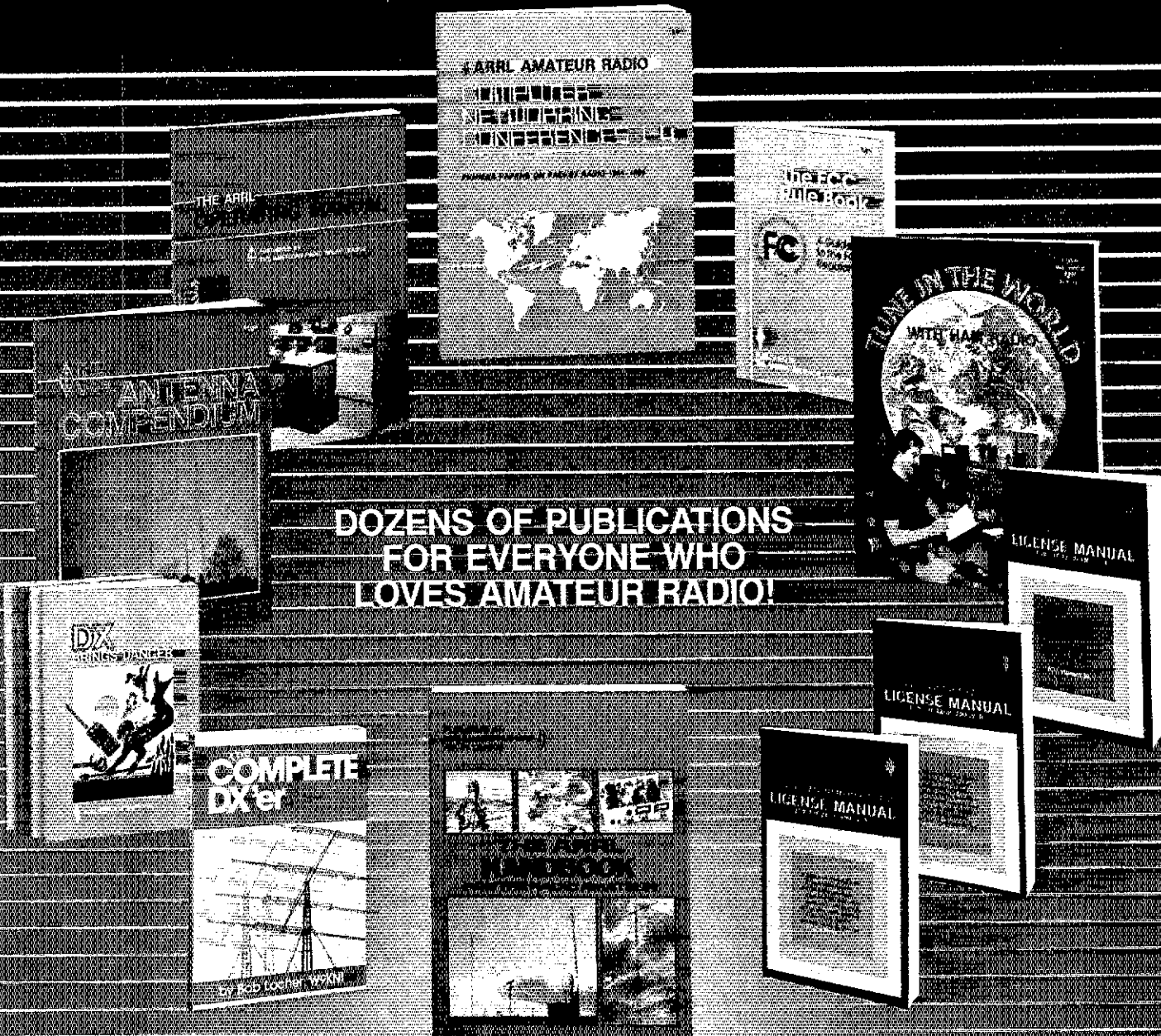
CW RTTY CW RTTY CW RTTY CW RTTY CW

APPLE II USERS
TRANSMIT/RECEIVE SOFTWARE FOR THE APPLE II
NO OTHER HARDWARE REQUIRED

CODE MACHINE \$29.95
RTTY MACHINE \$29.95

COTEC
13462 HAMMONS AVE — SARATOGA, CA 95070

The ARRL Bookshelf



DOZENS OF PUBLICATIONS
FOR EVERYONE WHO
LOVES AMATEUR RADIO!

ARRL BOOKSHELF

Prices are subject to change without notice. Shipping and handling: add \$2.50 for book rate or \$3.50 for UPS. Payment must be in US funds.

ARRL, 225 MAIN STREET, NEWINGTON, CT 06111

THE ARRL HANDBOOK

1186 pages and 40 chapters make this the most comprehensive edition since the *Handbook* was first published in 1926. It is updated yearly to present the cutting edge of rf communication techniques while presenting hundreds of projects the average Amateur Radio operator can build.

Paper #0631 \$18 US, \$19 elsewhere. Cloth #1638 \$27 US, \$29 elsewhere

The 63rd edition is packed with information on digital communication modes as well as new power supplies, amplifiers, and a digital PEP Wattmeter. Ready-to-use etching patterns are provided for many projects. This *Handbook* belongs in every ham shack.

OPERATING

The ARRL Operating Manual 192 pages packed with information on how to make the best use of your station including: interfacing home computers, OSCAR, VHF-UHF, contesting, DX traffic/emergency matters and shortwave listening.
©1985 2nd ed. #1086 \$7 US, \$7.50 elsewhere

The RSGB Operating Manual The third edition published in 1985 is packed with practical operating tips, techniques and tables
#R69X \$10

The ARRL Repeater Directory #0267 \$3
The ARRL Net Directory-free shipping.... #0275 \$1
Radio Amateur Callbook pub. 12/1/85
North American Ed. #C086 \$21
International (outside N. American) ... #C186 \$20

ANTENNA BOOKS

THE ARRL ANTENNA BOOK represents the best and most highly regarded information on antenna fundamentals, transmission lines, and propagation. There are practical construction details of antennas for 160-meters through microwaves, and those for mobile or restricted space use. Covers use of Smith charts and equipment for antenna and transmission line measurements. 328 pages copyright 1982.

Paper #4149 \$8 US, \$8.50 elsewhere
Cloth #0038 \$12.50 US, \$13.50 elsewhere

ANTENNA COMPENDIUM Packed with new material on quads, yagis and other interesting topics.

©1985 178 pages #0194 \$10 US, \$11 elsewhere

HF ANTENNAS FOR ALL LOCATIONS

G6XN's look at antennas with practical construction data.

©1982 264 pages #R576 \$12

YAGI ANTENNA DESIGN a new book published by ARRL coming soon! Watch *QST* for details.

PACKET RADIO/COMPUTERS

Computer Networking Conferences 1-4 from 1981-1985. Pioneer Papers on Packet Radio #0224 \$18.

RSGB Amateur Radio Software Contains 86 BASIC programs, 6 in assembly language covering CW, RTTY, AmTOR, Packet, Antenna Design, Satellite Predictions, Distances, Bearings and Locators.
©1985 328 pages, hardbound #R711 \$15

5th Computer Networking Conference Papers

©1986 #033X \$10

AX.25 Link Layer Protocol #0119 \$8

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.

Tune in the World with Ham Radio 1986 edition
Kit with book and cassette #0232 \$10
Book only #0240 \$ 7

License Manual Series

Technician/General Class #0143 \$ 5
Advanced Class #016X \$ 5
Extra Class #0178 \$ 5
FCC Rule Book #0216 \$ 4

Code Proficiency

Code Kit #5501 \$ 8
Morse University #0259 \$40

C-60 Code Practice Cassettes

30 min. each at 5 and 7½ WPM* #1030 \$ 5
30 min. each at 10 and 13 WPM* #1040 \$ 5
30 min. each at 15 and 20 WPM .. #2050 \$ 5

*Same tapes included in *Code Kit*

Morse Code the Essential Language: available soon.

First Steps in Radio #2286 \$ 5

DX

The Complete DX'er by W9KNI covers all aspects of the DX'er's life both in and out of the pile-ups: listening, the chase, capture and quest for elusive QSL cards. #0283 \$10 US, \$11 elsewhere

DX Power by K5RSG #T740 \$10

DXCC Countries List - free shipping #0291 \$1

QRP

QRP Notebook by Doug DeMaw, W1FB. An exciting book for the low power enthusiast and experimenter. There are many useful construction projects described. Copyright 1986, 112 pages #0348 \$5

OTHER ARRL PUBLICATIONS

Fifty Years of ARRL #0135 \$4

Instructor Guide-Novice #0305 \$4

Instructor Guide-Tech./General #0313 \$6

Oscarlocator #3037 \$8.50 US, \$9.50 elsewhere

ARRL RFI Book ... #4254 \$3 US, \$3.50 elsewhere

200 Meters and Down #0011 \$4

The Satellite Experimenter's Handbook by Martin Davidoff, K2UBC. Packed with information on amateur satellites and how to communicate through them. 208 pages, copyright 1985
#0046 \$10 US, \$11 elsewhere

FM and Repeaters #4548 \$5 US, \$5.50 elsewhere

Understanding Amateur Radio

..... #6036 \$5 US, \$5.50 elsewhere

Field Res. Directory #0321 \$10

OTHER RSGB PUBLICATIONS

RSGB 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

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**.

The author of this series is Walker Tompkins who is K6ATX in real life. He is noted screenwriter, newspaper columnist, historian and biographer. His knowledge of the areas where these stories take place makes them even more true-to-life. You'll want to read all of these classics in Amateur Radio fiction.

SOS at Midnight #5005 \$ 5

CQ Ghost Ship #5013 \$ 5

DX Brings Danger #5021 \$ 5

Death Valley QTH #503X \$ 5

Grand Canyon QSO Available soon.

23 CM "READY-TO-GO" 100+ watt linears and 2C39 amplifier cavities. Hi-Spec, Box 387, Jupiter, FL 33468.

FANTASYLAND SALE, New Units: Tan-Tec Corsair II, #1163, Argosy II, #5860. Cent. 22, #345. Drake R7 #1099. W9ADN, 815-838-1580, Box 117, Lockport, IL 60441.

HAM RADIO REPAIR, tube through solid state. Robert Hall Electronics, P.O. Box 8363, San Francisco, CA 94128; 408-729-8200.

FREE RECORDINGS of exciting Mexico City and Columbia emergency nets. Send two C-90 cassettes and return postage to K1MAN, Belgrade Lakes, Maine 04918. Join International Amateur Radio Net on odd Saturdays of month: SSB 14, 160 at 14:30Z, RTTY 14,090 at 15:30Z.

SPY RADIOS And "Bugging" Equipment Wanted! Buying radios beginning with letters "SS" or "SRR" (Example, SSR-5, SFR-5, etc.), military radios in civilian suitcases, "bugging devices" MUSEUM, Box 18521, Wichita, KS 67218, call 316-684-6254.

CLIMBING BELTS & Accessories. Illustrated brochure. W9VJF, 1147 N. Emerson, Indianapolis, IN 46219.

APPLE COMPUTER program "Hamlog," 15 modules; logs, auto-sorts 7-band WAS/DXC. Full feature editing. Much more. \$14.95. KA1AWH, PB 2015, Peabody, MA 01960.

NEW UPDATED PACKET PROGRAM Pak-Comm! For your IBM PC and controller. Split and Scrolling Screens, AutoLineFeed, PopUp windows, ASCII, Binary, X-Modem file transfers. Macros, Disk/Printer logging, DOS shell. Lots of goodies. Write for information. Works any controller. \$49.95 + \$3 shipping. Kalt & Associates, Suite #138, 2440 E. Tudor Rd., Anchorage, AK 99507, 907-246-0133.

APPLE II + e CW/RTTY Transmit/receive without TU or exploit TU. Auto-track, speed readout, word wrap, programmable buffers, calculate and plot beam headings. 5.25" diskette. Send \$49.95 and call letters to W1EO, 39 Long Ridge Road, Carlisle, MA 01741.

NICAD BATTERY PACKS - Exact replacement FNB-2 NiCad packs for Yaesu FT-207/FT208 with case, \$24 + \$2 shipping. Kenwood, ICOM and other inserts and cells also available, send SASE for list. Periphex, 149 Palmer Road, Southbury, CT 06488, 203-264-9985.

FREE STANDING Towers manufactured by Trylon Manufacturing of Canada, we have the height and wind load to suit your needs. Up to 96', also guyed towers complete with guys and anchors up to 160'. Write to BJX Supply Co., P.O. Box 388, Corfu, NY 14036 or call 716-599-3791 after 6 PM east. FOB Buffalo NY.

ICOM, KENWOOD & Yaesu Separate Newsletters: 5 years of back issues for ICOM & Kenwood. Cumulative Index available on each. T5930S & 430S Users Modifications Supplement now available. Send SASE for Free Brochure to: International Radio, Inc., 747 S.W. South Macedo Blvd., Port St. Lucie, FL 33452.

CLIMBING BELTS. Padded nylon web belt with adjustable length lanyard. Meets OSHA and ANSI specs. \$54.95 plus \$3 UPS. John Limbach, K8NN, Box 2263, Englewood, CO 80150.

TENNA TEST - Antenna noise bridge out-performs others, accurate, cost less, satisfaction guaranteed, \$41. Send stamp for details. W8URR, 1025 Wildwood Rd., Quincy, MI 49082.

HOUSE HAM-READY - Perfect for retirement. 1200 sq ft home on 1/4 acre lot on Smith Mountain Lake (near Roanoke VA) 112' waterfront, dock, hot tub, deck, two car garage. 10' sat dish, TH6DX, HDR300, 2 DBQ, HG52SS plus Swan 60' Twins. Also solar power. \$95,000. QSL via WA4YJG or call 703-721-3801.

RTTY EQUIPMENT - Warehouse full of Model 29/33/35 KSR's, ASR's, 15's, typing repairs, mod kits and parts, collected over 15 years - must vacate by June 30th - \$5000 for lot. Also, RTTY demodulators, video RTTY equipment, gear-shifts, paper. Send SASE for complete list and prices. Lawrence R. Pflieger, K9WJB, 2600 S. 14th Street, St. Cloud, MN 56301. Ph. 612-255-9794.

CRYPTOGRAPHY items wanted. WB2EZX. 516-978-0263.

WANTED-MICROWAVE antennas, waveguide flanges, small coaxial relays, test equipment, what-have you. D. Lusia, 420 King St., Apt. B-8, Bristol, CT 06010.

ELECTRON TUBES-Radio & TV types 75% off List Price - Huge Inventory! Also industrial types. Send for Free Catalog today or call Toll Free 800-221-5802, Box Qc, Transletronics, Inc., 1365 39th St., Brooklyn, NY 11218.

C-128 LOGGING and QSL Program. 80 Column monitor required. \$12.95 W6SBW, WSR Box 9457, Oroville, CA 95966.

WANTED-IC-502 6-meter portable. Must be in good condition. D. Lusia, 420 King St., Apt. B-8, Bristol, CT 06010.

VACUUM TUBES: 20,000 in stock. Business SASE for list. WB3GND, PO Box 750, Clinton, MD 20735. 301-248-7302.

WANTED: DRAKE ACCESSORIES for TR-7, TR-5, MN2700 Ant Tuner, RV.75 etc., MN2000 Kenwood HC-10 Clock, SP-520, etc. Various models of Antenna Tuners 200 Wts to 3 kw. Call: 215-271-8898. K3UKW, Tony Musero, 1609 So. Iseninger St., Phila., PA 19148.

WANTED: 8874 K4NBN "No Bad News".

INTERESTED IN SELLING your Ham Radio-Related business? Call or write SVS Inc., With complete confidentiality. 14615 NE 190th St., Woodinville, WA 98072, 206-485-0745.

AEA KT-2, CK-2 or MM-2 and Bencher Lambic Paddle. J. Waskowitz, 580 83rd St., Brooklyn, NY 11209.

FOR SALE: DRAKE MN-75 Ant Tuner 10-80 meters. New \$185 (excellent buy) (+ UPS). AK-75 Dipole Antenna 10-75 Meters. new \$29.95 (+ UPS). 215-271-8898, Tony Musero, K3UKW.

WANTED: 2M all-mode Xcvr 25W Base Station 2 yrs old or newer, Cushcraft #218XL, 215WB, 32-19, Heath Weather Station ID 1290, W2UGM, 66 Columbus Ave., Closter, NJ 07624 201-767-0123.



National Tower Company

P.O. Box 12286 Shawnee Mission, KS. 66212

Hours 8:30-5:00 M-F **913-888-8864**



ROHN FREE Base Stubs with each BX TOWER

25G	10' section	\$49.00
25AG	model 2 or 3 top section	\$60.00
25AG4	model 4 top section	\$65.00
45G	10' section	\$110.00
55G	10' section	\$133.50
TB3	thrust bearing	\$56.25
M200	10' mast, 2" o. d.	\$22.00
BX-40	40' self supporting [6 sq.ft.]	\$170.00
BX-48	48' self supporting [6 sq.ft.]	\$216.00
BX-56	56' self supporting [6 sq.ft.]	\$290.00
BX-64	64' self supporting [6 sq.ft.]	\$375.00
HXB-48	48' self supporting [10 sq.ft.]	\$255.00
HXB-56	56' self supporting [10 sq.ft.]	\$339.00
HDXB-40	40' self supporting [18 sq.ft.]	\$249.00
HDXB-48	48' self supporting [18 sq.ft.]	\$319.00
3/16	EHS guy wire [3990 lbs.] 1,000'	\$148.50
1/4	EHS guy wire [6650 lbs.] 1,000'	\$199.00

WE STOCK A COMPLETE LINE OF 'ROHN' ACCESSORIES
ALL OF OUR ACCESSORIES ARE MANUFACTURED BY 'ROHN'
★ ★ CALL FOR PRICES ★ ★

HYGAIN/TELEX ANTENNAS

HF ANTENNAS		Tribands	
1H3JRS	3 element 'Junior Thunderbird'	\$209.00	
TH5MK2S	5 element 'Thunderbird'	\$439.00	
TH2MKS	2 element 'Thunderbird'	\$174.00	
TH7DXS	7 element 'Thunderbird'	\$509.00	
1H6DXX	conversion kit to TH7DXS	\$169.00	
EXP 14	Explorer 14 triband beam	\$349.00	
QK710	30/40 M conv. Exp. 14	\$78.00	
Monoband			
105BAS	'Long John' 5 element 10 mtr.	\$149.00	
155BAS	'Long John' 5 element 15 mtr.	\$229.00	
205BAS	'Long John' 5 element 20 mtr.	\$389.00	
204BAS	4 element 20 mtr.	\$285.00	
7-15	'Discoverer' rotary dipole 30/40mtr.	\$159.00	
7-25	'Discoverer' 2 elem. 40 mtr. beam.	\$369.00	
7-35	converts 7-25 to 3 elem. beam.	\$225.00	
Multiband Verticals			
18HTS	'Hy-Tower' 10 thru 80 meters	\$433.00	
14RMQ	roof mt kit for 12 AVQ, 14AVQ, and 18AVT/WB.	\$36.00	
18VS	base loaded, 10 thru 80 meters	\$33.00	
12AVQS	trap vertical 10 thru 20 meters	\$53.00	
14AVQ/WBS	trap vertical 10 thru 40 meters	\$72.00	
18AVT/WBS	trap vertical 10 thru 80 meters	\$117.00	
Multiband Doublets			
18TD	portable tape dipole 10-80 meters	\$134.00	
28DQS	trap doublet 40 and 80 meters	\$68.00	
58DQS	trap doublet 10 thru 80 meters	\$123.00	

VHF ANTENNAS		Beams & Verticals	
23BS	2 meter 3 element beam	\$23.00	
25BS	2 meter 5 element beam	\$28.00	
28BS	2 meter 8 element beam	\$40.00	
214BS	2 meter 14 element beam	\$48.00	
64BS	4 element 6 meter beam	\$73.00	
V-2S	collinear gain vertical 138-174 MHz	\$49.00	
V-3	collinear gain vertical 220 MHz	\$49.00	
V-4	collinear gain vertical 430-470 MHz	\$58.00	
6P62A	base, 2 mtr. ground plane	\$26.00	
VHF & UHF Mobiles			
HR144GR1	fiberglass 2 mtr.	3/8-24 mt	\$69.00
HR144GR1	HyBander 2mtr	3/8-24 mt	\$56.00
HR144MAG	HyBander 2 meter		\$56.00
B988	terrace balun for 10-80 meters		\$23.00

CUSHCRAFT ANTENNAS		CUSHCRAFT ANTENNAS	
A3	3 element triband beam	\$204.00	
A743	7 & 10 MHz add on kit for A3	\$69.00	
A744	7 & 10 MHz add on kit for A4	\$69.00	
A4218	18 element 2 mtr. 28' boomer	\$94.00	
A4	4 element triband beam	\$269.00	
AV4	40-10 mtr. vertical	\$88.00	
AV5	80-10 mtr. vertical	\$95.00	
ARX28	2 mtr. 'Ringo Ranger'	\$34.00	
ARX450B	450 MHz, 'Ringo Ranger'	\$34.00	
A144-11	144 MHz, 11 ele. VHF/UHF	\$44.00	
A147-11	11 element 146-148 MHz beam	\$44.00	
A147-22	22 element 'Power Packer'	\$122.00	
A144-10T	10 element 2 mtr. 'Oscar'	\$47.00	
A144-20T	20 element 2 mtr. 'Oscar'	\$68.00	
215WB	15 element 2 mtr. 'Boomer'	\$74.00	
214FB	14 element 2 mtr. FM 'Boomer'	\$74.00	
220F	17 element FM 'Boomer'	\$88.00	
228FB	28 element 2 mtr. 'Boomer'	\$204.00	
32-19	19 element 2 mtr. 'Boomer'	\$88.00	
424B	24 element 'Boomer'	\$75.00	
R3	20-15-10 mtr. vertical	\$254.00	
10-4CB	4 element 10 mtr. 'Skywalker'	\$101.00	
15-4CD	4 element 15 mtr. 'Skywalker'	\$115.00	
20-4CD	4 element 14 mhz 'Skywalker'	\$257.00	

HUSTLER ANTENNAS		HUSTLER ANTENNAS	
4B1V	40-10 mtr. vertical	\$79.00	
5B1V	80-10 mtr. vertical	\$105.00	
6B1V	6 band trap vertical	\$124.00	

ROTORS		ROTORS	
Alliance	HD73 [10.7 sq.ft.]	\$104.00	
Alliance	U110	\$47.00	
CDE	C045-II [8.5 sq.ft.]	\$145.00	
CDE	HAM IV [15 sq. ft.]	\$229.00	
CDE	T2X [20 sq. ft.]	\$279.00	
HYGAIN	HDR300 [25 sq ft.]	\$569.00	

ROTOR CABLE		ROTOR CABLE	
[2-18 & 6-22]	4080 - per foot	\$0.18	
[2-16 & 6-20]	4090 - per foot	\$0.35	
HGBU Mini	low loss foam per foot	\$0.17	
	500' roll	\$79.00	
HGBU Columbia	superflex \$26/100' or 500' for	\$120.00	

J.I.L. SCANNER/RADIO

JUST REDUCED



\$359.00

SX400-scanner/radio. Multi band, programmable, synthesized scanner/radio, 20 channels with 12 block chan. space switches, 28-520 MHz. frequency range, AM/FM change mode, momentary memory recall, birdie free seek, DC or optional AC power, priority, muting circuit, dual squelch control, auto noise limiter/FM IF filter.
RF CONVERTERS for SX400 RADIO
RF1030 - 100 KHz to 30 MHz \$179.00
RF8014-800 MHz to 1.4 GHz \$149.00
RS5080 - 500 MHz to 800 MHz \$149.00

SX200 - scanner/radio. Covers aircraft, military, FBI, satellites, police, fire, defense, zero navigation, amateur radio plus AM/FM radio on 16 channels, seek and scan, digital readout, AC/DC \$149.00

uniden Bearcat



SALE

\$159.00

BC210XL 18 channel 6 band, dual scan speed, auto squelch, direct chan. access, limit, search, programmable, auto lockout, AC/DC.
BC50XL 10 Chan. 10 band, hand held \$114.90
BC100XL 16 chan. 8 band, programmable hand held \$179.00
BC145XL 16 chan. 10 band, weather, AC/DC \$99.00
BC175XL 16 ch 11 band hand held \$159.00
BC210XW 20 Chan. 8 band(2 ham), programmable \$179.00
BC800XLT 40 Chan. 12 band, aircraft & 800 MHz \$299.00

Regency



\$219.00

MX3000 30 chan. 6 band, compact size, search or scan, digital display, delay, chan. lockout, chan. 1 priority, dual scan speed, brightness switch, Includes: mounting bracket, AC adaptor/charger & DC cord.
G403 4 chan. 3 band, crystal, AC only \$67.90
R106 10 chan. 6 band, crystal, AC/DC \$96.90
HX750 6 chan. aircraft, hand held \$89.00
HX1200 45 ch. 8 band hand held, aircraft \$219.00
MX4000 multi band, 20 ch. AC/DC \$369.00
MX5000 20 Ch. 25-550 MHz, aircraft \$329.00

SUPER HET RADAR DETECTORS

Uniden RDS	dash/visor or hidden superhet	\$199.90
Uniden RD35	dash/visor superhet	\$69.90
Uniden RD55	dash/visor, audio alert	\$109.95
Uniden R955	remote mounting superhet	\$129.95
Fox Super XK	LED dash/visor mt.	\$79.95
Fox Vxten II	Superhet, dash/visor	\$154.90
Fox Super Remote	Superhet detector	\$184.90
BEL 861	dash/visor, audio & LED's	\$89.90
BEL 860	small dash/visor	\$119.00
BEL 834	sensitive dash/visor, LED & audio	\$149.00
BEL 837	smallest remote, audio for X & K band	\$159.00
BEL B70	super small with GaAs diodes	\$124.90
Whistler SPECTRUM	superhet dash/visor	\$189.90
Whistler SPECTRUM II	super small, travel case	\$209.90
Whistler Q2000	dash/visor, filter	\$109.90
Whistler Q2500	push button dash/visor	\$129.90

ASTATIC

D104 SILVER EAGLE \$59.90
Chrome plated base station amateur microphone. Factory wired to be easily converted to electronic or relay operation. Adjustable gain for optimum modulation.



MAXON....\$26.95

model 49S
49 MHz, FM 2-WAY RADIO
hands free operation, voice activated transmit up to 1/2 mile. Batteries optional
model 49B \$34.95
same as 49S except uses "AA" nicad batteries and comes with battery charger



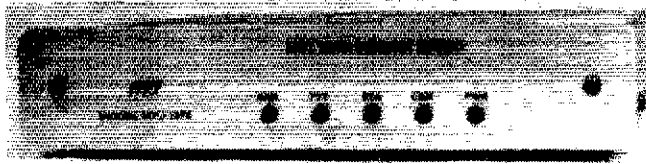
TENNA PHASE III POWER SUPPLIES

PS3	Output: 13.8V DC - 3 amp regulated low ripple, electronic overload protection w/insulant auto reset, fuse protected.	\$13.90
PS7	Fully regulated, 7 amp constant, 10 amp surge capacity.	\$19.95
PS20	Fully regulated, 20 amp surge capacity, 13.8 VDC, 17 amp constant.	\$59.95



AFFORDABLE PACKET RADIO FROM MFJ

An identical TAPR TNC 2 clone with a new cabinet and added features ... for an incredible \$129.95!



MFJ-1270
\$129.95

Join the exciting packet radio revolution and enjoy error-free communications ... for an incredible \$129.95!

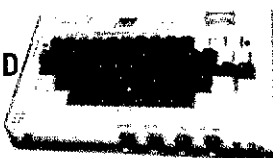
MFJ brings together efficient manufacturing and TAPR's Tucson Amateur

Packet Radio leading edge technology to bring you affordable packet radio. You get a nearly identical clone of the widely acclaimed TAPR TNC 2 with identical software and hardware. It's in a new cabinet and includes a TTL serial port for extra versatility.

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

SUPER KEYBOARD

MFJ-496
\$169.95



Price slashed 50% to \$169.95! Get a full feature Super Keyboard that sends CW/RTTY/ASCII for the price of a good memory keyer.

You get the convenience of a dedicated keyboard—no program to load—no interface to connect—just turn it on and it's ready to use.

This 5 mode Super Keyboard lets you send CW, Baudot, ASCII, use it as a memory keyer and for Morse Code practice. You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold.

TRIPLE OUTPUT LAB POWER SUPPLY

MFJ-4002 \$149.95



Lab quality power supply gives you plenty of voltage and current for all your analog and digital circuits. 3 completely isolated outputs: 2 variable 1.5-20 VDC at 0.5 amp and a fixed 5 VDC at 1 amp. Connect in series or parallel for higher voltage and current. It's short circuit protected, has excellent line (typ. 0.01%/V) and load regulation (typ. 0.1%). Lighted meters monitor volt./cur. 12x3x6 in. 110 VAC.

CROSS-NEEDLE SWR/WATT METER

MFJ-815 \$59.95

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



—no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter. Needs 12 V ±10% full scale accuracy. 6½ x 3¼ x 4½ inches.

2 KW COAX SWITCHES

MFJ-1702
\$19.95



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

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

MFJ-1702, \$19.95. 2 positions. Cast aluminum cavity construction gives excellent performance up to 500 MHz with better than 60 dB isolation at 450 MHz. Heavy duty, low loss switch has less than 20 milliohm contact resistance, less than 0.2 dB loss and SWR below 1:1.2, 2 x 2½ x 1 inches.

MFJ-1701, \$29.95. 6 positions. White markable surface for recording ant. positions. 8½ x 1½ x 3 in.

\$29.95 MFJ-1701



ANTENNA CURRENT PROBE

MFJ-206 \$79.95



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

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

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

MFJ's Best VERSA TUNER

MFJ-949C \$149.95



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

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

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

DIGITAL SWR/WATTMETER

MFJ-818
\$89.95



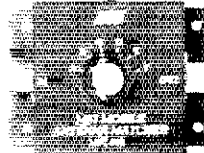
Fully automatic Digital SWR/Wattmeter reads SWR 1:1 to 1:9.9 directly and Instantaneously—no SWR knob to set. Huge 0.6 inch bright orange digits make across-the-room reading easy. 12 segment LED bar graph wattmeter gives instantaneous PEP readings up to 200 watt RF output.

Good, bad, mismatch tri-color LEDs indicate SWR conditions. Small size (5½ x 4¼ x 1 in.) and easy-to-read digital display makes it ideal for mobile use. For 50 ohm systems. 1.8-30 MHz. 12 VDC or 110 VAC with MFJ-1312, \$9.95.

MOBILE ANTENNA MATCHER

MFJ-910 \$19.95

Lower your SWR and Get more power into your mobile whip for solid signals and more QSOs. Your solid state rig puts out more power and generates less heat. For 10-80 meter whips. Easy plug-in installation. Complete instructions. Fits anywhere, 2½x2½ in.



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

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

MFJ

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

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

800-647-1800

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



MFJ TUNERS

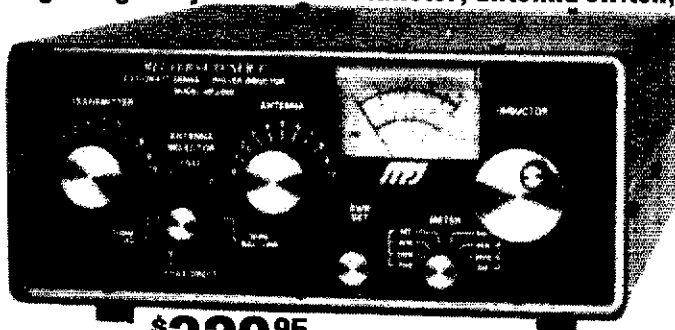
This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs—only 10 3/4" W x 4 1/2" H x 14 7/8" D.

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

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

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



MFJ-909

\$329.95

Accurate meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter, MFJ-1312 is available for \$9.95.

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

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

MFJ's Fastest Selling TUNER

MFJ-941D **\$99.95**



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

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

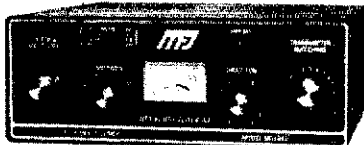
New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 2.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:2 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962 **\$229.95**



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

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. 6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 in.

MFJ's Best VERSA TUNER

MFJ-949C **\$149.95**



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

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

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

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

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

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

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **\$19.95**



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

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

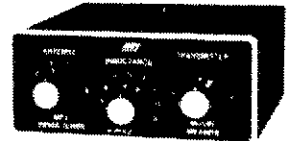
MFJ-1701, \$29.95.

6 positions. White markable surface for antenna positions.



MFJ's Smallest VERSA TUNER

MFJ-901B **\$59.95**



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

MFJ's Random Wire TUNER

MFJ-16010 **\$39.95**



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

MFJ's Mobile TUNER

MFJ-945C **\$79.95**



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

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

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

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

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

MFJ

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

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

800-647-1800

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



It was worth buying . . . It's worth insuring!

The improved ARRL "All-Risk" Ham Radio Equipment Insurance Program with expanded insurance protection!

The ARRL Ham Radio Equipment Insurance Program has been improved once again...without a price increase. That's important to you—for the hazards you face and the accompanying losses that can follow from loss or damage to your fixed station and mobile equipment by theft, accident, fire and natural calamity. This Program also includes flood protection—because chances are your homeowners policy will not cover your equipment for damage by flood.

But that's not all! You're now covered for the replacement cost of computer software such as disks and tapes including reimbursement for expense or reprogramming for up to \$1,000 per claim if you have your computer hardware equipment scheduled on your policy. The computer equipment may include televisions, recorders or other monitoring systems you have as related ham radio accessories.

There's more! Your coverage includes protection from short circuiting and electrical disturbances due to fire. Your equipment and accessories are covered at home, in the car and even at a Field Day or Hamfest site. That's protection plus!

What's Covered?

Your mobile and home station equipment are covered from all risks of loss or damage—including fire, lightning, theft, collision and

overturn or other accidents and natural hazards. (Loss or damage to antennas, towers or rotators is not covered.) Coverage is also provided for computer software for up to \$1,000 AND hardware you have scheduled including related accessories.

New Property Coverage

If additional property is purchased, it will automatically be protected without any additional premium as long as the added value does not exceed \$1,000. At your next policy renewal date, your total insurance coverage would be reviewed and your policy and premium charge adjusted for the additional coverage.

Low Cost

Your annual premium is just \$1.00 per \$100 of replacement cost value plus a \$5 administration fee (minimum premium is \$10). If your equipment is worth \$4,400... your premium is \$44 (plus the \$5 administration fee).

Deductible

The program's deductible is just \$50 for each loss. To assist you even further, the deductible for loss for repairs is just \$25.

Exclusions

Loss or damage to radio towers, antennas or rotators is not covered. This program does not insure against the usual and customary exclusions such as loss or damage by mechanical or structural breakdown or failure, dishonest acts, wear and tear, damage occasioned by repairing or tuning.

To Enroll... simply complete the application at the right listing all equipment (except antennas, towers or rotators) valued over \$50 each. Then, mail your application with your premium check to the ARRL Insurance Administrator.

Act today!

OFFICIAL APPLICATION

(Please type or print)

The ARRL "All Risk" Ham Radio Equipment Insurance Program

301A



1. Name of Applicant: _____
2. Mailing Address: _____
 City _____ State _____ Zip _____
3. Other Locations Where Equipment Is Kept _____

4. Date of Birth: _____
5. QST Control No. (from QST Label) _____

6. SCHEDULE OF EQUIPMENT

Use this listing to describe all radio equipment in your possession.

Description (Including Manufacturer's Name, Model and Serial Numbers or Other Identification)

Replacement Cost
(Value at today's prices)

Description (Including Manufacturer's Name, Model and Serial Numbers or Other Identification)	Replacement Cost (Value at today's prices)
_____	\$ _____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

7. To figure your premium complete the following:
 - Total amount of Replacement Insurance \$ _____
 - Total amount of Miscellaneous Items (valued under \$50.00 each) \$ _____
 - Total amount of Insurance \$ _____
 - Annual Premium (based on the rate of \$1 per \$100 of insurance. Minimum premium \$10.00) \$ _____
 - Add Annual Administration Charge \$ 5.00
 - Total Amount Enclosed \$ _____

Date _____ Signature _____

Mail your completed application and premium check payable to:

Albert H. Wohlers & Co., Administrator
 ARRL Group Insurance Plans
 1500 Higgins Road
 Park Ridge, Illinois 60068-5750



Your protection begins... on the first of the month following receipt of your application and premium check.

Officially sponsored by the American Radio Relay League

ENROLLMENT PERIOD ENDS: JUNE 1, 1986

TNT RADIO SALES INC.

1-800-328-0250

1-612-535-5050
(IN MINNESOTA—COLLECT)

USED GEAR BLOW-OUT! We Must Make More Room For Your Trade-Ins!

(We're Stacked To The Walls With Previously Owned—Bench-Tested Warranted Gear)

ATLAS
180, Base Station pkg.,
Dig. \$349
COLLINS
KWM-2 w/waters,
\$1692 \$495
S1-J3 \$299
DRAKE
TR-4 HF transceiver
w/ps \$289
TR-3 HF transceiver
w/ps \$229
R4C w/MS4, late s/n \$249
R4B receiver, w/MS4 \$199
T4X transmitter w/ps \$179
R4A receiver w/MS4 \$179
C4 station control console
(missing AC strip) \$125
Theta 7000E Dedicated
rtty/ascll/cw \$299
ICOM
IC-740 HF scvr w/int. ps,
mint! \$675
IC740 w/PS740, EX257, FL58,

FL44, FL45, EX241,
EX243 \$799
IC-701 HF scvr
w/PS701 \$429
IC-700A \$379
IC-745 mint! current
model \$439
IC-751 HF scvr, current top-
of-line \$949
IC-280 10 watt, 5 memory
w/remote kit \$189
IC-EAT \$155
IC-EAT 440 MHz w/PL \$219
AT-100 auto tuner \$239
AH-1 mobile antenna \$159
R-70 mint! \$449
R-70 w/FL-44 & FM \$549
KENWOOD
TS-180S w/DFC, SSB, WARC
mod \$499
TS-320 HF scvr, ideal first
rig \$389
TS-520S \$409
TS-520SE HF scvr
w/cw \$449

TS-820S HF scvr,
digital \$499
TS-820S w/YG455C,
YK88C \$769
TS-920S w/AT \$995
TS-130S HF transceiver,
mobile \$379
PS-430 \$115
DFC-230 remote
controller \$149
AT-120 mobile tuner \$79
AT-230 \$149
TR-2500 \$199
TR-2600A w/case \$249
SP-230 speaker \$49
VFO 240 remote analog
vfo \$125
VFO 230 remote digital
vfo \$259
SBB
SB 34 HF scvr w/AC/DC &
mic \$179
SB-2LA 1 KW linear \$209
YAESU
FT-101ZD Mark II \$489

FT-101EE HF scvr w/cw & am
filters \$389
FT-901DM HF scvr \$599
FT-901DM HF scvr w/Shure
444 mint! \$649
FT-700R 440 mhz \$199
FT-2578B "Memorizer" 10
watt, 4 memory \$179
FT-460R all mode \$339
FT-202 2M xtal control \$89
FT-202R 2M, 10
memory \$199
FT-700R 440 MHz, 10
memory, LCD \$209
FY-101 remote vfo \$99
FTV-450B 6 meter
transverter \$149
FT-107A HF scvr, w/int ps,
WARC \$589
FT-796R w/10M, 430, 440,
satellite \$1399
FY-101Z remote vfo \$169
FY-101DM digital remote vfo
w/memory \$199

FC-707 antenna tuner
w/meter & dummy
load \$159
TENTEC
Corsair w/CW, keyer, mic &
speech proc, PS \$999
Corsair w/narrow ssb
filter \$849
Centure 21
w/calibrator \$199
Omni-D series B w/500 Hz cw
filter \$499
Triton IV \$225
SSB T-match w/meter \$99
HALLCRAFTERS
H-120 \$29
HEATH
HR-1680 w/ext.
speaker \$169
SB200 very nice! \$335
NATIONAL
HRO-500 \$459

PANASONIC
RF-4900 \$299
RF-6300 \$249
HAL
DS-3000 \$199
ST-3000 \$89
DENTRON
ATIK 1KW w/meter &
antenna switch \$129
Clipperton-L \$499
HENRY
10-120 watt 2 meter
FM \$109
10-100 watt 2 meter
FM/SSB \$109
KLM
10-160 watt 2 meter
FM/SSB \$159
HEIL
Mic Equalizer \$45
Mic \$45

VISA/MASTER CARD
FREE SHIPPING
ON MOST RIGS FOR CASH!



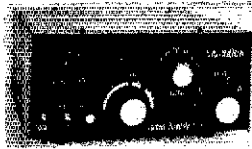
S.A.S.E. FOR OUR
"BENCH-TESTED"
USED EQUIPMENT LISTING

MON-FRI 9 AM - 6 PM CENTRAL TIME
SATURDAY 9 AM - 5 PM

4124 West Broadway, Robbinsdale, MN 55422 (Mpls./St. Paul)

FOR A LIMITED TIME ONLY

Purchase an LA-1000 series amplifier along with the AT-1200 matching tuner and receive and All-Band Doublet™ antenna FREE!



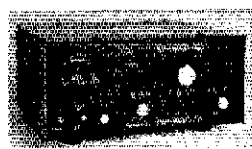
LA-1000A
Portable Kilowatt SSB or
CW Amplifier

The amp Supply LA-1000A is a portable RF linear power amplifier that features its own solid-state power supply. It is capable of 1200 watts PEP input power on SSB or 800 watts DC input CW service with any exciter capable of 100 watts PEP nominal output. The LA-1000A may be operated outside the amateur bands for MARS and other services authorized for a Kilowatt amplifier. The amplifier stage uses four inexpensive 6MJ6 tubes connected in parallel with first grid and cathode drive.

This is a super linear for all purposes, the LA-1000A excelled during the Heard Island DX prediction with over 30,000 contacts.

LA-1000A \$479.50*

*POSTPAID 48 States USA. For additional info On Amps or New Products Call Or Write Today.

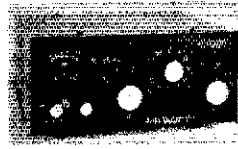


LA-1000-NT
The New No Tune

More contacts, eliminate tune-up and less tune-up interference are yours with the NEW LA-1000-NT. The NO TUNE LA-1000 offers full coverage of the 160-15 meter amateur bands. A powerful 1200 watts PEP input and 800 watt DC input is the power rating of the LA-1000-NT. As with all Amp Supply Amplifiers, the NO TUNE LA-1000 features QSK, full break-in CW Computerized CW and Keyboard Operators will love conversation-like full break-in (QSK) CW.

If you desire a compact kilowatt amplifier that needs no tuning and you have a transceiver capable of delivering 100 watts PEP—The LA-1000-NT is the perfect addition to your radio station!

LA-1000-NT
No Tuneup \$549.50*



AT-1200
Antenna Tuner

The AT-1200 antenna tuner is designed around versatile "T" type matching network. This tuning network allows the transfer of almost any antenna impedance to 50 ohms. The use of 3.5 KV capacitors and tapped coil allow a wide range of tuning and antenna combinations. The switches used in the AT-1200 are high quality ceramic switches for guaranteed performance.

The "T" network is fed through an antenna switch which allows front panel selection of four different antennas. Antenna position #1 can be fed direct, bypassing the tuner, or can be fed through the tuner. Antenna #4 can be used for either feeding coax or a long wire. Frequency coverage is 1.8-30 mhz.

For balanced feedline, the BL-1500 can be used in conjunction with the AT-1200.

AT-1200 \$199.50*



ALL BAND DOUBLET

This doublet is center fed with 100 feet of 470 ohm balanced transmission line. The antenna is 130 feet long. Purchase the AMP Supply "BL-1500" 9:1 transformer and tune this antenna on any band 1.8-30 mhz.

All Band Doublet \$39.50*
BL-1500 9:1 Balun \$29.50*
Free Doublet Offer Expires 2-28-86
Order Today.

For fastest delivery, send cashier's 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.-6 p.m. E.S.T.



CALL 919-821-5518

Amp Supply Co.

208 Snow Ave., P.O. Box 147
Raleigh, North Carolina 27602
919-821-5518

CALL TOLL FREE FOR QUOTES

TNT RADIO SALES INC.

1-800-328-0250

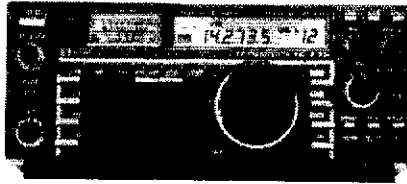
1-612-535-5050

(IN MINNESOTA—COLLECT)

You've Read All The Raving Reviews... Now Order Your New Icom 735 From T.N.T.!

... CALL NOW
FOR QUOTE!

IC-735 HF Compact XCVR



SPECIAL T.N.T. VALUE!

Kenwood HF mobile antenna—MA-5 (10-80 M.) with Free bumper mount
Now Only \$99.95

■ KENWOOD
■ ICOM
■ MIRAGE
■ AEA

■ SANTEC
■ KDK
■ AZDEN
■ NYE VIKING

■ TELEX HY-GAIN
■ HUSTLER
■ KLM
■ ROHN

■ AMERITRON
■ WELZ
■ LARSEN
■ BUTTERNUT

■ AVANTI
■ CALLBOOK
■ ARRL BOOKS
■ CABLE

■ HEIL
■ MFJ
■ KANTRONICS

■ CONNECTORS
■ BENCHER

VISA/MASTER CARD
FREE SHIPPING
ON MOST RIGS FOR CASH!



S.A.S.E. FOR OUR
"BENCH-TESTED"
USED EQUIPMENT LISTING

MON-FRI 9 AM - 6 PM CENTRAL TIME
SATURDAY 9 AM - 5 PM

4124 West Broadway, Robbinsdale, MN 55422 (Mpls./St. Paul)

here is the next generation Repeater

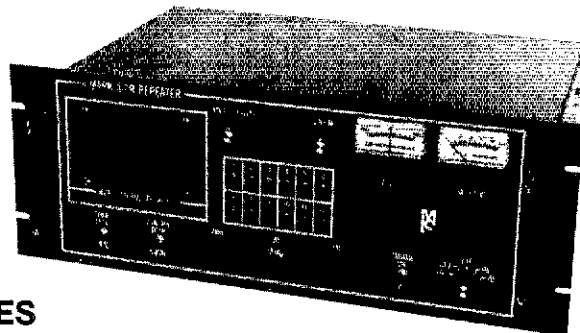
MARK 4CR

The only repeaters and controllers
with REAL SPEECH!

No other repeaters or controllers match Mark 4 in capability and features. That's why Mark 4 is the performance leader at amateur and commercial repeater sites around the world. Only Mark 4 gives you Message Master™ real speech • voice readout of received signal strength, deviation, and frequency error • 4-channel receiver voting • clock time announcements and function control • 7-helical filter receiver • extensive phone patch functions. Unlike others, Mark 4 even includes power supply and a handsome cabinet.

Call or write for specifications on the repeater, controller, and receiver winners.

Create messages just by talking. Speak any phrases or words in any languages or dialect and *your own voice* is stored instantly in solid-state memory. Perfect for emergency warnings, club news bulletins, and DX alerts. Create unique ID and tail messages, and the ultimate in a real speech user mailbox — only with a Mark 4.



MICRO CONTROL SPECIALTIES

Division of Kendecom Inc.

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

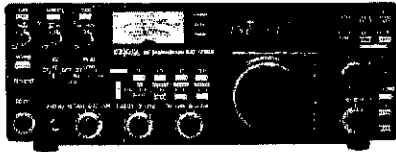


ICOM

KENWOOD

YAESU

ICOM



IC-751 9 Band Xcvr, 1-30 MHz

HF Equipment	List	Juns
IC-751 Xcvr	1399.00	Call \$
IC-751A Xcvr	New	Call \$
IC735 Xcvr	889.00	Call \$
PS-55 Power Supply	169.00	Call \$
PS-35 Power Supply	169.00	Call \$

Receivers

IC-R-7000	969.00	Call \$
IC-R71A	849.00	599.95

VHF/UHF

IC-02AT 2m, HT	369.00	Call \$
IC-2AT	269.00	Call \$
IC-271A 2m, Base	735.00	Call \$
IC-27A Compact	389.00	Call \$
IC-3AT, HT	299.00	Call \$
IC-37A Compact Mobile	449.00	Call \$
IC-04AT 440 MHz, HT	399.00	Call \$
IC-4AT	299.00	Call \$
IC-471H 75w, 440 MHz	1149.00	Call \$
IC-47A	489.00	Call \$
IC-3200 25W, Dual Bander	569.00	Call \$
IC-290H 25W, 2M, SSB/FM	\$549	Call \$
IC-490A, 10W, 440, SSB/FM	\$649	Call \$
RP-3010 UHF, Repeater	1049.00	Call \$
IC-1271A 1.2 GHz Base	1049.00	Call \$
IC-120 Mobile	499.00	Call \$

KENWOOD HF Equipment

	List	Juns
TS-840S w/AT	1999.95	Call \$
wo/AT	1799.95	Call \$
TS-430S	899.95	Call \$
TS-830S	949.95	Call \$
TS-530S	749.95	Call \$
TS-670 Quad Bander	699.95	Call \$

Receivers

R-2000	599.95	Call \$
R-1000	499.95	Call \$



TS-440S All New Compact HF Xcvr

VHF/UHF

TR 2600A 2m, FM, HT	339.95	Call \$
TR 3600 440, HT	349.95	Call \$
TH 21AT Compact 2m	229.95	Call \$
TH 31AT Compact 220	239.95	Call \$
TH 41AT Compact 440	239.95	Call \$
TM 4000A 2m/70cm	599.95	Call \$

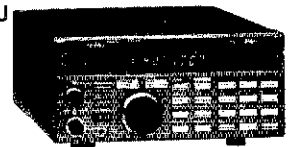
Super Special Call \$

TM 2570A 70w, 2m	549.95	Call \$
TM 2550A 45w, 2m	459.95	Call \$
TM 2530A 25w, 2m	399.95	Call \$
TM 211A 2m, Mobile	369.95	Call \$
TM 411A 70 cm	449.95	Call \$
List		
TM-201B 2m, FM Mobile	339.95	Call \$
TM-401B 70 cm Mobile	369.95	Call \$
TS-711A 2m, All Mode	799.95	Call \$
TS-811A 440, Base	899.95	Call \$

ENCOMM

Santec	List	Juns
ST-20T 2m HT	349.95	Call \$
Welz		
Power Meters, Acces.		Call \$
Tokyo Hy-Power		
VHF/UHF Amps/Tuners		Call \$

YAESU



FRG-9600 60-905 MHz Receiver

HF Equipment

	List	Juns
HT ONE Xcvr	2859.00	Call \$
FT 757GX Xcvr	879.95	Call \$
FT 980 CAT System	1659.00	Call \$
FT-77 Compact Xcvr	599.00	Call \$

Receivers

FRG 8800 150kHz-30 MHz	569.00	Call \$
FRG 9600 60 - 905 MHz	649.00	Call \$

VHF/UHF

FT-203R/TT 2m, HT	259.95	Call \$
FT-209RH w/FTS-6	359.95	Call \$
FT-103R/TT 220 MHz	279.95	Call \$
FT-703R/TT 440 MHz	299.95	Call \$
FT-709 RH 440 MHz, HT	349.00	299.95
NC-15 Quick Charger	79.00	Call \$
FT-270 RH w/FTS-8 2m	439.00	Call \$
FT-2700RH w/FTS-8	599.95	Call \$
FT-726R All Mode		

OSCAR	925.00	Call \$
6m Module	215.95	Call \$
SU-726	109.95	Call \$
430/726	299.95	Call \$
440/726	299.95	Call \$
HF/726	225.95	Call \$

TE Systems

	List	Juns
Mirage		Call \$
Ameritron		Call \$
Amp Supply Co.		Call \$
Bird Products In Stock		Call \$
KLM Antennas		Call \$
Hustler Antennas In Stock		Call \$
Larsen Antennas In Stock		Call \$

JUN'S ELECTRONICS
800-882-1343

AEA Products In Stock
 Kantronics Products In Stock
 Astron Products In Stock
 Bencher Products In Stock
 Ameritron Products In Stock
 AMATEUR • TWO WAY • MARINE
 • CELLULAR MOBILE PHONE • SCANNER
 • Free U.P.S. Cash Order
 (Most Item, Most Place)
 • SE HABLA ESPAÑOL

(213) 390-8003

3818 Sepulveda Blvd.
Culver City, CA 90230

- AIR CONDITIONED - ALL INDOORS - AIR CONDITIONED -

---Atlanta HamFestival---

WORLD CONGRESS CENTER-ATLANTA GEORGIA

SATURDAY, JULY 19TH & SUNDAY, JULY 20TH

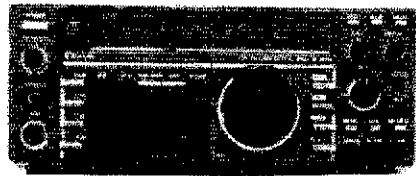
- Location-Georgia World Congress Center
- Indoor Airconditioned FleaMarket
- License Exams Given Both Days
- Plenty of Parking Nearby

- Admission-\$6 Advance-\$7 at the Door
(All Admissions Valid Both Days of HamFestival)
- Reservations Encouraged & Accepted
- Make Checks Payable to: Atlanta HamFestival

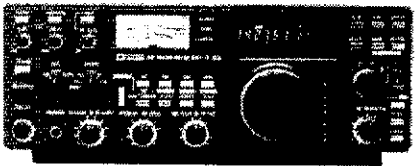
FOR INFORMATION WRITE:

ATLANTA HAMFESTIVAL-P.O. BOX 77171-ATLANTA, GA. 30357

- AIR CONDITIONED - ALL INDOORS - AIR CONDITIONED -



HF Equipment	Regular	SALE
IC-735 HF transceiver/SW rcvr/mic	889.00	769 ⁹⁵
PS-55 External power supply	169.00	149 ⁹⁵
AT-150 Automatic antenna tuner	399.00	359 ⁹⁵
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
UT-30 Tone encoder	TBA	
IC-745 9-band xcvr w/1.30 MHz rcvr	999.00	799 ⁹⁵
PS-35 Internal power supply	169.00	149 ⁹⁵
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-45 500 Hz CW filter (1st IF)	59.50	
FL-54 270 Hz CW filter (1st IF)	47.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89 ⁹⁵
FL-53A 250 Hz CW filter (2nd IF)	96.50	89 ⁹⁵
FL-44A SSB filter (2nd IF)	159.00	144 ⁹⁵
SM-6 Desk microphone	40.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	21.99	



IC-751 9-band xcvr/1.30 MHz rcvr	1399.00	999 ⁰⁰
PS-35 Internal power supply	160.00	149 ⁹⁵
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89 ⁹⁵
FL-53A 250 Hz CW filter (2nd IF)	96.50	89 ⁹⁵
FL-33 AM filter	31.50	
FL-70 2.8 kHz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	40.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	21.99	

IC-720A 9-band xcvr • (CLOSEOUT) •	1349.00	689 ⁹⁵
PS-15 20A external power supply	149.00	134 ⁹⁵
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
BC-10A Memory back-up	8.50	
SM-5 8-pin electret desk mic	40.00	
MB-5 Mobile mount	21.99	

Other Accessories:	Regular	SALE
PS-15 20A external power supply	149.00	134 ⁹⁵
CF-1 Cooling fan for PS-15	45.00	
EX-144 Adaptor for CF-1/PS-15	6.50	
PS-30 Systems p/s w/cord, 6-pin plug	259.95	234 ⁹⁵
OPC Opt. cord, specify 2, 4 or 6-pin	10.00	
SP-3 External speaker	54.50	
SP-7 External speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	56.00	
PP-1 Speaker/patch (specify radio)	139.00	129 ⁹⁵
SM-8 Desk mic - two cables, Scan.	69.95	
SM-10 Compressor/graph EQ, 8 pin mic	119.00	109 ⁹⁵
AT-100 100W 8-band auto. antenna tuner	399.00	359 ⁹⁵
AT-500 500W 9-band auto. antenna tuner	499.00	449 ⁹⁵



Check the Prices at AES!

Other Accessories cont.	Regular	SALE
AH-2 8-band tuner w/mount & whip	549.00	489 ⁹⁵
AH-2A Antenna tuner system, only	429.00	389 ⁹⁵
GC-4 World clock • (CLOSEOUT) •	99.95	69 ⁹⁵
GC-5 World clock	79.95	

HF linear amplifier	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1795.00	1389

6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	469.00	419 ⁹⁵
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	735.00	649 ⁹⁵
EX-106 FM option	125.00	112 ⁹⁵
BC-10A Memory back-up	8.50	
IC-271A 25W 2m FM/SSB/CW	735.00	649 ⁹⁵
AG-20 Internal preamplifier	56.95	
IC-271H 100W 2m FM/SSB/CW	944.00	789 ⁹⁵
AG-25 Mast mounted preamplifier	84.95	
IC-471A 25W 430-450 SSB/CW/FM xcvr	839.00	729 ⁹⁵
AG-1 Mast mounted preamplifier	89.00	
IC-471H 75W 430-450 SSB/CW/FM	1149.00	989 ⁹⁵
AG-35 Mast mounted preamplifier	84.95	

Accessories common to 271A/H and 471A/H	Regular	SALE
PS-25 Internal power supply for (A)	99.00	89 ⁹⁵
PS-35 Internal power supply for (H)	169.00	149 ⁹⁵
PS-15 External power supply	149.00	134 ⁹⁵
SM-6 Desk microphone	40.00	
EX-310 Voice synthesizer	41.25	
TS-32 CommonSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM, TTP mic	549.00	479 ⁹⁵
IC-490A 10W 430-440 SSB/FM/CW	649.00	569 ⁹⁵

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	389.00	349 ⁹⁵
IC-27H Compact 45W 2m FM w/TTP mic	429.00	379 ⁹⁵
IC-37A Compact 25W 220 FM, TTP mic	449.00	349 ⁹⁵
IC-47A Compact 25W 440 FM, TTP mic	489.00	429 ⁹⁵
PS-45 Compact 8A power supply	112.95	99 ⁹⁵
UT-16/EX-388 Voice synthesizer, 47A	31.00	
SP-10 Slim-line external speaker	31.95	
IC-3200A 25W 2m/440 FM w/TTP	569.00	499 ⁹⁵
UT-23 Voice synthesizer	31.00	
AH-32 2m/440 Dual Band antenna	32.95	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	

IC-1271A 10W 1.2 GHz SSB/CW Base	1049.00	929 ⁹⁵
PS-25 Internal power supply	99.00	89 ⁹⁵
EX-310 Voice synthesizer	41.25	
TV-1200 ATV interface unit	115.00	106 ⁹⁵
UT-15S CTCSS encoder/decoder	79.95	
IC-120 1W 1.2 GHz FM Mobile	499.00	449 ⁹⁵
ML-12 1.2 GHz 10W amplifier	339.00	299 ⁹⁵

Repeaters	Regular	SALE
RP-3010 440 MHz, 10W FM, xtal cont.	1049.00	949 ⁹⁵
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1259.00	1129
Cabinet for RP-1210 or 3010		269.00



Hand-held Transceivers	Regular	SALE
Deluxe models		
IC-02AT for 2m	369.00	299 ⁹⁵
IC-04AT for 440 MHz	399.00	339 ⁹⁵
Standard models		
IC-2A for 2m	239.00	189 ⁹⁵
IC-2AT with TTP	269.50	209 ⁹⁵
IC-3AT 220 MHz, TTP	299.95	249 ⁹⁵
IC-4AT 440 MHz, TTP	299.95	249 ⁹⁵

Accessories for Deluxe models	Regular	SALE
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50	
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50	
BC-35 Drop in desk charger for all batteries	74.95	
BC-60 6-position gang charger, all batts	SALE 349.95	
BC-16U Wall charger for BP7/BP8	19.95	
LC-11 Vinyl case	18.49	
LC-14 Vinyl case for Dix using BP-7/8	18.49	
LC-02AT Leather case for Dix models w/BP-7/8	39.95	

Accessories for both models	Regular	SALE
BP-2 425mah/7.2V Nicad Pak - use BC35	42.50	
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	31.25	
BP-4 Alkaline battery case	13.75	
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50	
CA-5 5/8-wave telescoping 2m antenna	18.95	
FA-2 Extra 2m flexible antenna	10.00	
CP-1 Cig. lighter plug/cord for BP3 or Dix	10.75	
CP-10 Battery separation cable w/clip	19.99	
DC-1 DC operation pak for standard models	18.75	
EX-390 Bottom slide cap	4.95	
MB-16D Mobile mtg. bkt for all HTs	21.99	
LC-2AT Leather case for standard models	39.95	
RB-1 Vinyl waterproof radio bag	30.00	
HH-SS Handheld shoulder strap	14.95	
HM-9 Speaker microphone	39.00	
HS10 Boom microphone/headset	19.50	
HS-10SA Vox unit for HS-10 & Deluxe only	19.50	
HS-10SB PTT unit for HS-10	19.50	
ML-1 2m 2.3w in/10w out amplifier	SALE 89.95	
SS-32M Commspec 32-tone encoder	29.95	

Receivers	Regular	SALE
R-71A 100 kHz-30 MHz, 117V AC	\$849.00	689 ⁹⁵
RC-11 Infrared remote controller	59.95	49 ⁹⁵
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144 ⁹⁵
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	41.25	
CR-64 High stability oscillator xtal	56.00	
SP-3 External speaker	54.50	
CK-70 (EX-299) 12V DC option	10.95	
MB-12 Mobile mount	21.99	
R-7000 25 MHz-2 GHz scanning rcvr	969.00	849 ⁹⁵
RC-12 Infrared remote controller	TBA	
Voice synthesizer	TBA	
AH-7000 Radiating antenna	89.95	

HOURS • Mon. thru Fri. 9-5:30; Sat. 9-3
 Milwaukee WATS line: 1-800-558-0411 answered evenings until 8:00 pm Monday thru Thursday.
Please use WATS lines for Ordering
 use Regular lines for other Info and Service dept.

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

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

AMATEUR ELECTRONIC SUPPLY® Inc.

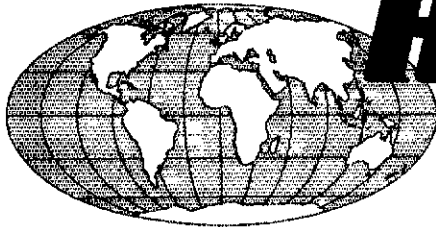
4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 • Phone (414) 442-4200

AES® BRANCH STORES

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. 33575 1898 Drew Street Phone (813) 461-4267 No In-State WATS No Nationwide WATS	LAS VEGAS, Nev. 89106 1072 N. Rancho Drive Phone (702) 647-3114 No In-State WATS Outside Nevada 1-800-634-6227	CHICAGO, Illinois 60630 ERICKSON COMMUNICATIONS 5456 N. Milwaukee Avenue Phone (312) 631-5181 Outside Illinois 1-800-621-5802
--	---	---	---	--

WORLDWIDE DISTRIBUTION



HAM RADIO OUTLET

NOW IN ATLANTA, GEORGIA!
Opening May 1986 • (404) 263-0700
6071 Buford Hwy (Doraville, 1 ml. north of I-285)

6 STORE BUYING POWER



**YAESU
FRG 8800**

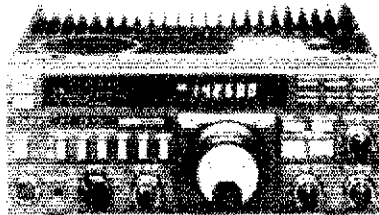


THE BEST IN
SWL PERFORMANCE

CALL FOR PRICE



**YAESU
FT 757GX**



YOUR HF SPECIAL. CALL FOR PRICE



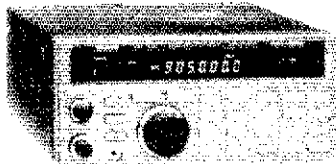
**YAESU
HANDHELD
FT 209R
5 WATT 2M/HT**



**CALL
NOW
FOR
LOW
PRICE**



**YAESU
FRG 9600**

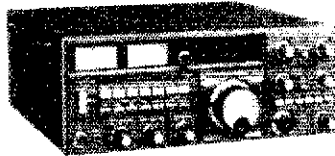


IN STOCK FOR IMMEDIATE DELIVERY

FREE SHIPMENT



**YAESU
FT 726R**



MOST POPULAR LINK
TO OSCAR 10

YOUR BEST BUY!



**YAESU
FT 2700RH**



CALL FOR PRICE

CALL TOLL FREE

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

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) 451-5757: Don, Mgr. N6IPE
Hwy. 17 to 23rd Ave. Exit

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900: Glenn, Mgr. K6NA
Hwy. 163 & Claremont Mesa Blvd.

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

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



CALL TOLL FREE (800) 854-6046



Toll free including Alaska & Hawaii. Phone Hrs: 9:30 a.m. to 5:30 p.m. Pacific Time. California and Arizona customers call or visit nearest store. California and Arizona residents please add sales tax. Prices, specifications, descriptions subject to change without notice.



meeters sealed (Government removed, a mechanical titters, operation unaffected), complete/collection \$195, complete/reparable \$115, spare parts unit (80% complete) \$65. R-390A parts, tubes, sections. Info SASE. Shipping charges collect. Baytronics, Dept. QST, Box 591, Sandusky, OH 44870. 419-627-0460 evenings.

ARCOS VHF/UHF amplifier parts and kits. Harold "Connie" Bramstedt, 6104 Egg Lake Rd., Hugo, MN 55038, 612-429-9397.

FOR SALE: 85 Ft. Free-standing Commercial Galvanized Tower on 1/4 acre with 4 bedroom country-style home, hill-top location 1/2 mile to Solana Beach Surf, 25 miles to San Diego. Tower erected prior to code restrictions. WB6RKR, 619-755-4249.

MORSE CODE the MACEASY Way. With Code Practice you can increase your Morse Code speed dramatically and earn that license. For Novice to Advanced, written by a ham for hams. Send \$19.95 to Kall #314, 700 Marine Parkway, New Port Richey, FL 33552.

WANTED DISK based RTTY software for Microtronics Terminal T-3 Interface for TRS-80 Model III/IV. Tom Zabka, 139 Royal Dunes Blvd., Ormond Beach, FL 32074.

CENTURY-21. EXCELLENT condition, \$200. Chuck West, KS3M, after 5:00 P.M. 301-854-0284.

SALE: TENTEC 525D VGC \$365. 7A/P.S. \$25. Both \$375. Galaxy III recently worked, new tubes, VGClean \$149. KDK2033 new \$245. Callbook 85 KC9TD.

2M REPEATER(s) Duplexers-Amp-Preamp-Power Supply ACC Controller and much much more. No desense. Will sell all or part. Send your needs and Freq. with an S.A.S.E. to: N. Northland, P.O. Box 702, Dayton, TN 37321.

BELDEN 9913 COAX Special \$38/100 feet or \$.39/foot. No spool saves on shipping. Amphenol N-type fitted for 9913 \$4.50. Other connectors and adaptors in stock. 8 gauge hook-up wire \$.28/foot. U.S. Geological Survey Maps, complete N.J. index in stock, \$2.50 ea. Inquire for other areas. Same day shipping. Call Bill, KA2QEP at 201-887-6424 or write QEP's 110-4 Route 10, East Hanover, NJ 07936.

DISCOUNT TOWER ACCESSORIES: 1/4" EHS Guy Wire 15c/ft—Preformed end grips \$1.90—8" Ground Rods \$10.50—Strain insulators \$2.25—Galvanized Anchors \$12—Professional Climbing Belts. More! KME Enterprises (ABBY) Box 25, Richland, MI 49083.

COMMODORE 64/128 "COMKEY" Program turns computer into sophisticated memory keyer. Send characters as you type them or load 16 message areas (256 characters each) with Call, Name, QTH, Rig, Contest Exchange, etc. to be sent later with a single keystroke. More. Write for free details. \$15 for program and instructions for building simple interface of \$28 postpaid for program and homemade interface (nothing else needed to make your computer key your transmitter). Specify tape or diskette. Fritz Reuning, KA0AQ, 120 Elk Rd., Bristol, TN 37620.

SHORT DIPOLES for 160/75, 160/40, 160/30... coax-fed, no tuning. \$59.50 postpaid. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

THE DX BULLETIN—America's Oldest Weekly Amateur Radio publication contains complete DX information. SASE or call for sample. Box 4233, Santa Rosa, CA 95402, 707-523-1001.

EXPERT REPAIR on all types of ham gear by WABSRX, P.O. Box 2064, Idyllwild, CA 92349, 714-659-4018.

HEATH HW-16, HQ-10B VFO and Speaker. Clean, works good. 1 UPS for \$115 cashier's check. David Combs, W5VJW, 2000 Victory, Wichita Falls, TX 76301.

WANTED QTH Northern New Jersey. Small, Simple, Hilltop. WA2VHQ, 212-532-5845 eve.

HAM ACCESSORY CATALOG—Send legal size SASE to H.A.M. Sales, P.O. Box 497, Finksburg, MD 21048.

HI-MOUND KEYING MECHANISM. Finest most extensive line of hand keys, mobile keys, lambda paddles. Write for free catalogue of all our communications products. Skywave Radio, Box Q-1, 943 Bobblet, Blaine, WA 98230.

WANTED: MOTOROLA or GE VHF Repeater; leave model and price on machine. 719-783-3188. N2HA.

ICOM '745 with Internal P.S. and SSB Filter for sale. Never used. W5ZZ, 214-235-6927.

DON'T CLIMB? Heights/Universal 50 ft., screw-operated, foldover Hinge Tower, excellent, pickup only \$800. Almost new Cushcraft A3 with A3SK \$145 and HD73 Rotor \$75. WB4ZCD, 608-441-9684.

WANTED: DRAKE RV-75, SPR4. Call Reiner, WA2VHQ, 212-532-5845.

INFOTECH M200F & 9" monitor \$350. Sonar 2M FM w/PS \$45. Computer Power Supply +12, -12, +5 at 5 Amps \$30. 6 ft. rack \$25. 2AP1A scope tube, shield & bezel \$20. Drake FL1600 \$30. UT-2 \$20. ICOM TTP Mike \$15. Dave, K3KD, 1-215-754-6286.

HAM RADIO SOFTWARE for C64 or V20. 12 programs on disc. Includes Morse Code, WAS, WAZ, DXCC and more. Send \$14.95 check or M.O. to H.A.M. Sales, P.O. Box 497, Finksburg, MD 21048.

BIG APPLE. How did it get that name? Send your QSL to the "Crew" at Junior High School 22 via WB2JKJ and they will tell you PLUS give you a chance at their QSL OF THE WEEK AWARD.

SAVE THIS AD! Quality repairs at very affordable prices. \$25/hr. We repair: Kenwood R-600, R-1000, R-2000. TS-120, TS-130, TS-430, TS-520, TS-530, TS-820, TS-830, TS-930. Yaesu FR-101, FT-101, FT-102, FT-757. ICOM IC-720, IC-730, IC-740, IC-745, IC-751. H. F. Amplifiers - Amp Supply, Ameritron, Dentron, Kenwood, Yaesu. Almost any Heathkit equipment at 20% less than Heath rates, including T.V. Boards and High Voltage Supplies. Other equipment includes some Satellite, Computer, and Disk-Drive Repair and alignment. 30-day Warranty on parts and labor. Call for an estimate on equipment not shown. Quick turn-around. Skylab, Inc. 3306 S. 27th Street, Milwaukee, WI 53215, 414-672-6000. 24 hours.

IBM-PC RTTY/CW. CompRtty II is the complete RTTY/CW program for the IBM-PC and Compatibles. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in screen editor! 10,000 character transmit/receive buffers! Adjustable split screen display. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages. Now with WRU (simple mailbox). Ideal for MARS and traffic handling. Requires 128k PC, XT, AT, PCjr. PC-DOS, serial port, RS-232C TU. \$65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 7373 Jessica Drive, North Syracuse, NY 13212.

LOOP YAGIS: 1296, 2304, 902 Assembled or kit. Stacking Frames, Power Dividers. Write: Down East Microwave, Bill Olson, W3HQT, Box 1655A RFD #1, Burnham, ME 04922 207-948-3741.

FOR SALE: Receiver Solid State 80 thru 10. No WARC: Heath HR-1680. Mint. 1 ship \$100. K3JON, Illinois, 312-758-1985.

WANTED: ASTRO 200A CW/SSB 100W ROM Digital Display, AD7Q 206-932-2839.

FOR SALE: Collins S Line: 32 S-3 75 S-3B, 516F-2, all mint. \$600. Paul Wise, Rte 10, Box 12, Rogers, AR 72756.

PACKET/COMPUTER Buffs! Brand new! 4-position RS232C data switches. Gold plated connectors. Switches all 25 lines. Shielded metal cabinet. Switch between TNC, Modem, etc. \$110 prepaid shipping. MJO to Richard Tashner N2EQ 163-34 21 Road, Whitestone, NY 11357.

COLLINS, KWM-2A, 516F-2 P.S. 136B N.B., DX-Eng-Speech Processor, Waters North Filter & EVT, NM1 Mic, sound great, mint. \$575 firm. Linear, copy of Collins 30L-1 \$325. Transverter copy of 62S 6M \$100. 305-485-5913 W1IXU.

CAPS WITH Call/Handle. Mesh or foam backs. 12 colors/white fronts: brown/tan. Men/ladies styles. \$7.50 net. CERAMIFUN 315-11th St., Ramona, CA 92065 619-789-4730. Visa/MC accepted. Quantity rates to clubs.

MOVING SALE: Hewlett Packard Signal Generator model 608C, \$875 or will consider highest bid. 19" Rack, 64Hx3DD, w/accessories \$95. 19" Rack, 56Hx18D \$45. Drake wattmeter WH7 \$40. Signal generator, 5.4-40 MHz, model TS-413C/U \$28. Variac, 230V 1670W, continuous duty \$45. Ed. K4KZE, 2829 Second St NW, Birmingham, AL 35215.

COLLINS 30S-1 Serial 11177, excellent condition, \$1375. Pickup or I'll deliver 100 miles. W0UDZ, 25 Briarcrest Place, Colorado Springs, CO 80906. 303-576-8844.

YAESU FT-103R 220 MHz band FM Hand-held Transceiver. New this year. Virgin. With Key Pad, Battery, Wall Charger, Rubber Antenna, Case, Sirap, Manual, Warranty Card. \$195. WB6ODM, 916-487-4908.

YAESU FT101EE with CW Filter, external speaker, 30M, \$400. Yaesu FT480R 2M Multimode \$280. Mirage B108 \$100. MFJ949 Antenna Tuner \$75. W0UDZU 319-291-6676.

HEATH SB401, SB300 with Filters, mike \$300. K2KCY, 518-354-8646.

WANTED: FT-757GX; Sell Ten-Tec Omni-DB. Mahagan 3001-C Pisgah Place, Greensboro, NC 27408 919-282-2214.

SWAN 700CX w/Power Supply mint condition, \$395. Swan 508VFO \$100. Swan digital DD-76 \$140. Kenwood Twins 599-D, MC50 \$425. N9DQV, 413 Brazøau Avenue, Oconto, WI 54153 414-834-5230.

HEATH 8A-2034 Antenna Tuner, excellent cond., \$125. W1FF, 354 20th Ave., Brick, NJ 08724. 201-458-1538.

CHEAP: COLLINS Transmitter 32S1, Drake Receiver R4A, Hallicrafters Receiver SX100, Swan 40M Transceiver MB40A. Must sell. Please call w/an offer. KC2YU, Joe 212-674-3367 leave name & number.

SELL: HEATH KL-1 Linear and KS-1 Power Supply. This is a rugged 2kW PEP 80-10 meter linear amplifier using two 4-400 tubes. \$450 Local sale desired. W3CS, 420 Bluebird Lane, Dresher, PA 19025, 215-646-3677.

BUILDING A LINEAR? Power Supply for it? I have extra good parts for about any size you want to build. The prices are right too! Drop me a line. K4UC.

YAESU FT-901 DE, SP-901P, \$475. FT-225RD with Mutek Front End, \$475. N2FQY, 1216 Turr Drive, Oceanport, NJ 07757 201-542-0960.

WANTED: TEN-TEC 314 Receiver (any condition). Daniel Meir, 424UX/W1, P.O. Box 1942, Brown Univ., Providence, RI 02912.

LINEAR AMPLIFIER - Pair 813's, 1500 Watts 80-10, Professional Construction, \$150. Hammarlund HQ-170 Receiver, \$180. Several Test Equipment items, ask for list. Mort Caldwell, WB1FN, 9 Dorado Dr., Columbia, MO 65201. 314-449-8277.

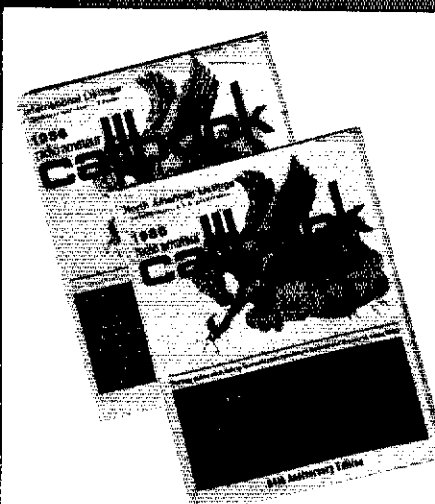
HEATH SB-300/SB-400, \$300. SA-2040, \$95. SB-610, \$95. MFJ-941C, \$95. 250, \$25. 525B, \$75. Swan WM-2000A, \$50. K1MVT, 617-585-8430.

FOR SALE: Collins 39L-1 \$550. Kenwood TS-130S with AC Supply \$450. TR-2400 with Accessories \$225. HAL DS-3100 with ST-600 \$1350. K5ZXL, 409-822-3194.

B&W 375, 376, 550 coax sw. \$15 ea; 3942 clips & 851 tank, coils; Nye keys \$12 ea; Ham-M & AR22 control \$60 ea; Miller GDO Coils; 572-B ea \$35; Misc Xcelite tools; 8200 pk kit \$15; Teflex headsets; 75A4 Venier Knob \$10; Coax PL259's, coax T, Elbows, Double Mate, Double Female, co-ax lig restorer, RG58AU; station drawer slides \$8; #14 copperweld ant. wire, glass guy line, stainless aircraft cable 2400 lb test; Gonsel 3 & VFO mtr \$50; 30-50 Mc. receiver \$37; VTVM \$25; 60 amp all. filter, 688 cy noise sup kit, chassis pins; Drake 2NT \$50, Heath HO10 & HO13 Scopes \$40 ea; Hi-pass filters, & many more misc. ham parts, all in new cond. W9WVJ, phone 312-456-0897, Box 3213, Oak Park, 63033.

HEATHKIT HW-101, excellent condition \$225. Heathkit SB-620, Station Monitor \$50. Greg Reed, WB7TSY, P.O. Box 44, Lehi, UT 84043, 801-768-4567.

1986 CALLBOOKS



The "Flying Horse" has a great new look!
It's the biggest change in Callbook history!
Now there are 3 new Callbooks for 1986.

The North American Callbook lists the amateurs in all countries in North America plus those in Hawaii and the U.S. possessions.

The International Callbook lists the calls, names, and address information for licensed amateurs in all countries outside North America. Coverage includes Europe, Asia, Africa, South America, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The Callbook Supplement is a whole new idea in Callbook updates. Published June 1, 1986, this Supplement will include all the activity for both the North American and International Callbooks for the preceding 6 months.

Publication date for the 1986 Callbooks is December 1, 1985. See your dealer or order now directly from the publisher.

- North American Callbook
incl. shipping within USA \$25.00
incl. shipping to foreign countries 27.60
- International Callbook
incl. shipping within USA \$24.00
incl. shipping to foreign countries 26.60
- Callbook Supplement, published June 1st
incl. shipping within USA \$13.00
incl. shipping to foreign countries 14.00

SPECIAL OFFER
 Both N.A. & International Callbooks
incl. shipping within USA \$45.00
incl. shipping to foreign countries 53.50

Illinois residents please add 6 1/4% sales tax.
All payments must be in U.S. funds.

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

Tel: (312) 234-6600

KENWOOD



TS-940S LIST \$1999
NEW Top-of-the-Line
HF Transceiver
 • 100% Duty Cycle
 • 40 Memory Channels
CALL FOR SPECIAL PRICES!!



TS-930S LIST PRICE \$1649
CALL FOR SPECIAL SALE PRICE!



TS-440S NEW! NEW! NEW!
CALL FOR SPECIAL SALE PRICE



TS-430S LIST PRICE \$899.95
CALL FOR SPECIAL SALE PRICE!



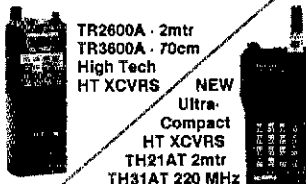
TS-711A LIST \$799.95
TS-811A LIST \$899.95
CALL FOR SPECIAL PRICE!



TW-4000A LIST \$599.95
CALL FOR SPECIAL PRICE!



COMPACT 2M FM MOBILE
TM 2570A (70W) LIST \$549.95
TM 2550A (45W) LIST \$459.95
TM 2530A (25W) LIST \$399.95
CALL FOR SPECIAL PRICE



TR2600A - 2mtr
TR3600A - 70cm
High Tech
HT XCVRS
NEW Ultra-Compact HT XCVRS
TH21AT 2mtr
TH31AT 220 MHz
TH41AT 440 MHz
CALL FOR SPECIAL PRICES—
SAVE \$\$\$!!

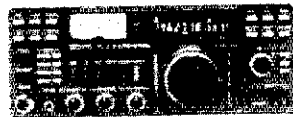
ICOM



IC735 NEW General Coverage
HF Transceiver Full Featured
-Ultra Compact - Economical
List Price \$849
CALL FOR SPECIAL PRICE!



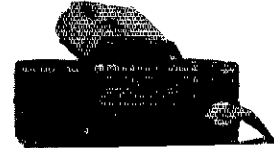
IC-751A New Full Featured
HF Transceiver. Top of The Line.
Warranty
CALL TODAY FOR LOW
TEXAS TOWERS/ICOM PRICE!



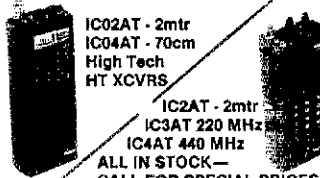
IC271A List \$699 **IC271H List \$899**
IC471A List \$799 **IC471H List \$1089**
CALL TODAY FOR SPECIAL
LOW ICOM PRICES!!



IC27A List \$369 **IC27H List \$409**
IC37A List \$449 **IC47A List \$469**
CALL TODAY FOR SPECIAL
ICOM PRICES!



IC3200 NEW 2m/70cm
Dual Band Xcvr List \$549
CALL FOR SPECIAL PRICE!



IC02AT - 2mtr
IC04AT - 70cm
High Tech
HT XCVRS

IC2AT - 2mtr
IC3AT 220 MHz
IC4AT 440 MHz
ALL IN STOCK—
CALL FOR SPECIAL PRICES!

ASTRON POWER SUPPLIES

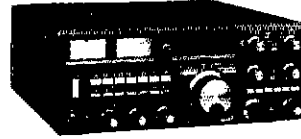
- Heavy Duty - High Quality - Rugged - Reliable**
- Input Voltage: 105-125 VAC Output: 13.8 VDC ± 0.5V
 - Fully Electronically Regulated—5mV Maximum Ripple
 - Current Limiting & Crowbar Protection Circuits
 - M-Series With Meter—A-Series Without Meter

Model	'Cont. Amps	ICS Amps	Price
RS4A	3	4	\$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

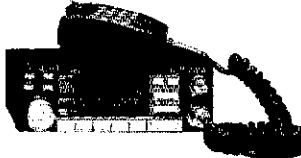
YAESU



FT-757GX LIST PRICE \$829
CALL FOR SPECIAL SALE PRICE!



FT-726R LIST PRICE \$899
CALL FOR SPECIAL SALE PRICE!



FT2700RH NEW 2m/70cm
Dual Band Transceiver
Full Duplex — Cross Band
Operation! List \$579
CALL FOR PRICE—SAVE \$\$!



FT-209RH
NEW High Tech
2mtr HT
5 Watt Output
NOW IN STOCK

CALL FOR YOUR
SPECIAL PRICE!

NEW PACKRATT Model PK-64
Packet Controller \$219.95



- PK-80 Packet Controller \$219.95
 - CP-1 Computer Patch \$189.95
 - CP-1/20 Computer Patch W/VIC20 MBATEST \$219.95
 - CP-1/54 Computer Patch W/C64 MBATEST. \$219.95
 - CP-100 Deluxe Computer Patch \$299.95
 - PK64 C64 Packet System \$219.95
 - MBATOR Software C64 or VIC20 (Specify) \$89.95
 - Doctor DX CW Band Simulator Software \$99.95
 - Doctor DSO Morse Code Trainer Software \$79.95
- Isopole 144MHz, 220MHz & 440MHz Antennas**
In Stock — CALL FOR SPECIAL PRICES!

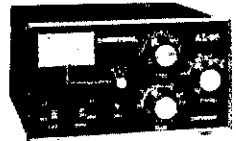
MIRAGE AMPLIFIER SALE!



B3016
ONLY \$199!

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	\$249
B235	2M	No	2W	30W	\$ 79
B23A	2M	Yes	2W	30W	\$ 89
B215	2M	Yes	2W	150W	\$259
B108	2M	Yes	10W	80W	\$159
B1016	2M	Yes	10W	160W	\$249
B3016	2M	Yes	30W	160W	\$199
O24	440	No	2W	40W	\$179
D1010N	440	No	10W	100W	\$289

AMERITRON



AL80A NEW 1000W 3-500Z Amplifier \$689
AI-84 600W PEP Output
 (4-6MJ6 Tubes) \$379
RCS-4 4 Pos Remote Antenna Switch ... \$119.95
RCS-8V 5 Pos Remote Antenna Switch ... \$129.95
ATR-15 1500W Antenna Tuner \$289



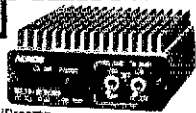
TEN-TEC SALE!

NEW CORSAIR II
CALL FOR PRICE AND DELIVERY INFORMATION



425 Titan New 3KW amplifier
in stock - Call For Special Price

ALINCO



ELH-230D
LIST \$89.95
30 Watt 2M Amp w/Preamp
Special \$79.00
Other Alinco Amps In Stock Call For Special Price.

POWER-SUPPLIES
EP-3030 LIST \$208.00
SPECIAL \$189.00



FM-240
NEW COMPACT
2M-25W FM Transceiver
 • 16 memory channels • 2 VFOs
 • Programmable sub audible tone unit included no extra charge.
 • Optional voice synthesizer available
Call For Special Price

THL CORP.



Power amps and receive preamps in stock.
CALL FOR SPECIAL PRICES!

Kantronics

NEW KPC-2 Packet Controller
List \$219.00 ONLY \$199.95

The Interface	List \$169.95	SALE \$129.95
Interface II	List \$289.95	SALE \$239.95
Challenger	List \$99.95	SALE \$89.95
Universal Term Unit	List \$199.95	SALE \$189.95
Packet Communicator	List \$219.00	SALE \$199.95
UTU Terminal Software (IBM/CPM/TRS80)		\$19.95
Hamssoft/Amtorsoft (Atari/C64/VIC/TRS80C)	\$79.95	\$79.95
Apple Hamssoft	\$29.95	Atari/VIC Hamssoft \$49.95
TRS80C Hamssoft	\$59.95	T1994A Hamssoft \$99.95
Hamssoft (Apple/Atari/C64/VIC20)		\$99.95
Amtorsoft (C64/VIC20)		\$89.95
Amtorsoft (Apple)		\$139.95

ORDER FREE SHIPPING-UPS SURFACE TOLL FREE 1-800-272-3467

(continental USA) (most items, except towers/antennas)

Texas, Alaska & for information call 1-(214)-422-7305



TEXAS TOWERS

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

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

WANTED: ALPHA Amplifier, TS-420S, KA2YHI.
WANTED VFO: HG-10. Arnold Johnson, Rt 1, Marseilles, IL 61341.

WANTED: 2 kW LINEAR, Pefor SB-220 ok equal. Also Large Beam and Rotor. KD9NR, 219-763-1290.

SALE: SIGNAL-ONE CX7 Transceiver, 200 watts output 10-160 works perfectly-mint \$650. WD4BEM, 704-527-0399.

FOR SALE/TRADE: 2kW 6-meter amp Swan mark 6, \$650; Yaesu 107 240W solid state rig, FTV107R TV, FP107 internal PB, YM35 mic, scan 160 thru 432, \$575; National NC-240-Rcvr \$325; HT-220 UHF \$175 on 468.5 PL, \$175; Drake TC-6, SC-6, TC-2, SC-2, CPS-1 console, 300 Watt PEP on 6 & 2 meters, \$485; Drake JV-3, 144 220 440 FM rig, PS-3, UMK remote mount for mobile, \$650; Drake TR-6 300 Watt PEP rig for 6 meters, AC-4, DC-4 PS, \$425; 4x1 RF deck, 1500 Watt out on Om. \$325; ICOM PS-20, \$110; Drake TR-7, all filters, PS-7 supply, \$575. WB8VYF, 513-875-2992.

FOR SALE: Collins Thirty-S-One power amplifier in good condition. You ship. \$1,300. E. Gamble, 25 White Oak Rd., Trumbull, CT 06611. 203-268-5571.

SELL DX60B nice VE1VFO \$60. Heath Q Mult \$15. Geo McNally, W2GSC, 7 Glennon Pl., W. Orange, NJ 07052, 201-325-3844.

SELL: HEATHKIT SB-104 Transceiver complete with SB-604 Speaker. HP-1144 Power Supply, CW Filter & Noise Blanker installed. Manuals, good condition, \$300 or best offer. N8LS, Stuber, Amherst, OH 44001.

WANTED: 4-1000A Tube, socket & chimney. Also need Vac. Var. & H.V. Fil. Cap. Bryan McCoy, N8VE, 10122 Hill Rd., Garden Grove, CA 92640, 714-636-9894.

SELL: DRAKE Twins T-4XC, F-4C, P.S. \$300. E-Tek FR-4 FRQ Readout for Drake \$50. Drake Linear L-4B \$500. Ultimate Transmatch Murch UT2000A \$300. SSTV Gear. Robot 400, 800 ect Monitors Color Computers. Disk Drives. 608-855-0835 Phil Spillane, W2IZY, RD 2, Box 87, Cranbury, NJ 08512.

TENTEC CENTURY 21 Xcvt. w/Digital Display, Calibrator, Manual, mint, \$200. Robot 800 CW/RTTY Keyboard, new, \$225. Datong FL-1 audio filter, \$75 Datong Speech Processor \$35. Bob, KD4ZN/3, 215-698-2627 eves.

FOR SALE: Drake TR7 transceiver with PS7 power supply, 5, 1.5 and 6 kc Filters, Noise Blanker, WARC freqs., Fan, Desk Mike and MN4 Antenna Tuner; like new, \$680. A. Margolis, W2UPN, 196-43 69th Avenue, Flushing, NY 11365 718-454-0354.

WANTED: KENWOOD SM-220 with BS-5 Pan. WB8ZSI, 616-669-9364.

RADIO FREQUENCY SPECTRUM CHART Made specially for Amateur, Shortwave Listeners, and Scanner Enthusiasts. 16" x 20" Full Color Poster suitable for framing. Only \$4.50 plus \$1.50 s&h. Schools and others please write for quantity discounts, Rover Printers, KB6DYM, 2135D Columbia, San Diego, CA 92101.

HAL ST-5000 Terminal Unit, DS-2000 KSR Keyboard, Electrohome 9" monitor, RITY/ASCII/CW. I'll ship! \$300 O.B.O. Rick N6W/KL7, P.O. Box 210701, Auke Bay, AK 99821, 907-789-4978.

BEAM HEADINGS, DISTANCES and call prefixes for over 450 U.S. and Canadian cities; 350 DX locations; and all 1600 continental U.S. grid squares, calculated from your exact longitude and latitude. Send your longitude and latitude and \$8 to Dave White, 2900 Wyndale Drive, Mechanicsville, VA 23111.

FOR SALE: Atlas 210X and Console P/S. W7HQB, Box 464, Columbia Falls, MT 59912.

WANTED: SWAN 16A converter for Swan Cygnat Transceiver, good condition. Write: Elijah, WA2NKY, 1221 Mass. Ave., N.W., Apt. 415, Wash., D.C. 20005.

ROHN 64' FOLD OVER, Ham II, Winch, Guys, Anchors \$1000. TH6DXX Assembled \$150. Dis-assembled \$250. You move. KA1ES, 617-369-5744.

ROBOT 400 w/3000C all manuals included \$300. Drake T4XCW with AC4 \$300. Dwight Raddatz, 312-964-8198 after 5 PM.

NOTICE TO "The Swap List" subscribers. Effective immediately new address for ALL correspondence including ads, P.O. Box 2222, Vacaville, CA 95696.

BARGAINS: HALLICRAFTER Exciter HT-37 \$90. Collins Receiver 75-S-3 \$150. Heathkit rt sig. gen. IG-102 \$30. Transistor Tester IM-36 lab. quality \$60. FM stereo gen. IG-37 \$60. Resistance Substitution Box IN-37 (5) \$15 ea. Millen Grid-Dipper type 90651 incl. coils \$60. Astatic microphone 10-D \$25, all plus mailing charges. W1GTZ, Robert Price, 266 Round Cove Rd., Chatham, MA 02633, 617-945-0051.

CONTEST LOG & Dupe Check Program for IBM PC/Compatibles. Requires BASIC. \$15.95 or SASE for information. A & R Technologies RD 2 Box 166, New Albany, PA 18833.

WESTERN ELECTRIC Tube Manual wanted. Also would like to contact groups specialized in home-brewing tube type audio equipment. Doug Yumoto, AG8C, 8258 Niles Center Road, Skokie, IL 60077, 312-982-9693 (home) 312-764-9186 (work).

ATTENTION DXERS: Have a I28K Apple II/c and AppleWorks TM? Or an MS-DOS machine with a program that reads DIF or WK1 such as Lotus 1-2-3 TM or Symphony TM? Here is a data disk to keep track of your DXCC, WAS, WAZ status. Template contains the current DXCC countries, prefixes, I.T.U. & CQ Zones. AppleWorks database template has 16 labeled categories to record Calls Worked, Data, Time, QSL status & other information. Spreadsheet portion keeps track of DXCC/SBDXCC totals. \$19.95 ea + \$2 s&h. (+ 5.5% tax for Ohio residents). Eightland Data, Rt #3 Alexander Rd., Bellville, OH 44813, 419-888-3807 or 589-2167. Visa & MC \$1 off phone orders.

TEMPO-ONE 80-10 meters, power supply and mic. \$225 Hamtex by Kantronics for VIC-20 \$35. Terry Isenhour, WA4OPO, Rt. 2, Box 853, Lincoln, NC 28092, 704-732-1067.

WANTED - STRAIGHT-KEY Signal Electric Co. Menomine, Michigan, Mark, W0KTC, 6137 Wanda, St. Louis, MO 63116.

UNIQUE HAM KEYCHAIN! 1 1/2 inch miniature H/T (Handheld Transceiver) made of pewter. Call signs engraved on backside. FREE! \$2.95 each/2 for \$5. Print call signs clearly. Hunter, H4MUK, Box 382, Maggie Valley, NC 28751.

ICOM 730, PS15, HM10 mint \$395. KA1ES, 617-369-5744.

"CRYSTALS: BUILD something, it's satisfying fun. Try QRP. Inexpensive FT-243 made to order. 40M \$2.50, five or more \$1.95 each. 30M \$2.95, five \$2.50. 80M \$2.95, five \$2.50. 160M \$3.95, five \$2.95. 12M Overtones \$3.95. Sockets 60c. Airmail 30c per crystal. Stamp or long SASE for listings-circuits, 1700 - 60,000 kilocycles. "Crystals Since 1933." W0LPS. C-W Crystals, Marshfield, MO 65706.

4-1000 TUBES RETIRED from Broadcast Service. Call Ben Ferguson, N2GK, 609-935-1510.

DIGITAL AUTOMATIC DISPLAYS for FT-101's, TS-520's, Collins, Swan and all others. Six 1/2" digits. 5" wide by 1 1/4" metal cabinet. Send \$1 for information. Receive a \$25 discount. Be specific. Grand Systems, POB 3377, Blaine, WA 98230.

SELLING STATION, Kenwood 599D Twins, TR-7400A, TR-7730, accessories, send SASE for list, WA4PEE, P.O. Box 939, Cary, NC 27511.

BIRD TERMINALINE 50 ohm RF Loads. Model 8080-25W, new, \$55 firm. Model 8188-150W, \$130 or best offer. I'll ship USA, Jim, WA9GCB.

WANTED: TEN-TEC Argonaut 515. Absolutely mint only. Generous offer. John Clark, N3DON, 1050 Stone Jug Road, Biglerville, PA 17307, 717-677-7438.

TS-830S, SP230, Shure 444, perfect condition, hardly used. \$590. UPS Certified Postpaid. Dave, WD4NSF, 904-268-2953.

"BLUE BARGAIN" Swap Sheet. \$6/year (24 issues). Free 25 Word Ad to first 500 subscribers! Send SASE for info. Box 69, Willmar, MN 56201.

ICOM 2AT with hi current battery and charger \$140. Heath HW104 with matching PS/Speaker and CW Filter \$250. WB2BMH, 516-560-6443.

NEED SBE-34 for parts. K4BHV.

CORSAIR, Power Supply, Filters, Mics \$775. KA2JIZ, 518-842-8847.

WANTED - Monster Quad, N2JM, 718-347-7610.

WANTED: TWO Digital Readout Units (DG-1) for Kenwood TS820. W3GH, Bob King, 545 Sportsman Dr., Apollo, PA 15613, 412-337-2562 7 AM-3 PM.

WANTED: ANYTHING made by Specific Products, Kinematics, True Time Receivers, Manuals, Catalogs, Incomplete Assemblies, Parts, Clocks, etc. G. Barber, POB 31654, Aurora, CO 80041.

HAM RADIO Equipment For Sale: Yaesu Musen Co. Microphone UD-844, FT dx 650, FV 400S, FL2000B. Hallicrafters - SX100. Heathkit - VFO HG-10B, DX60B, HM102. Miscellaneous items. Best offer. Call 718-224-0839 7 PM to 9 PM only, Mrs. Garvey.

TELREX TB4EC tri-bander 10-15-20 meters. Never used, \$100. William E. Trumbull, M.D., KD6RZ, 2021 Santa Monica Blvd., Santa Monica, CA 90404, 213-829-4469.

FOR SALE: McKay Dymek DR-22 shortwave receiver, mint condition, \$650 or best offer. Call KN11 at 1-401-434-8655 after 5 PM EST.

WANTED: 1200 Watt Linear Amplifier 15-160 meters. Local vendor preferred. I will pick up within 100 miles. Tele. 215-743-3491 W3PSV.

WANTED! SWAN ST-3, PSU-5, or other Swan accessories? Also Heath SB610, SB630, SB650, WB2RTA, 2 Fulton St., Glens Falls, NY 12801.

WANTED: SONY Multiband Radio ICF-5900-W. David Rodger, PO Box 40-2702, Miami, FL 33140.

ICOM 720A with Nye Phone Patch, 5M5 and HM7 mikes \$600. Tempo One with Power Supply, Turner Mike, 6KD6 finals (spare incl) digital counter \$300. Manuals for both rigs included. Will ship via UPS. NV8I, 805-983-4316.

WANTED USED Henry 2002A VHF RF Amplifier. Bennett, 7061 Peninsula, Rockford, MI 49341.

KIRK 4-Element Super Quad, 10-15-20 meter; All necessary fiberglass arms, aluminum spider mounts, T-mount, booms, couplers, hardware, terminals and instruction manual \$385. F.O.B., call Paul K2PE, 518-364-2047.

VHF AND Microwave Test Gear, 3kW AM Transmitter plus other parts; SASE please K1BB, 25 Winchester Drive, Lexington, MA 02173. 617-862-5017.

TEN-TEC OMNI 545 W/6 Filter Position's & 242 M.P.S. \$475. W1EWD, 236 Briar Lane, San Mateo, CA 94403.

TET HB33SP 3 el. tri-band \$135; Wilson SY-2 4 el. tri-band \$175. I ship US. K0HRF, 402-391-0784.

MOTOROLA R-1121/TRC-87 Military aircraft receiver. 225-400 MHz with Speaker, Antenna. Modified for 117VAC \$450. Dana Archer, 8532 Columbus Ave., #23, Sepulveda, CA 91343-6055, 818-893-3479.

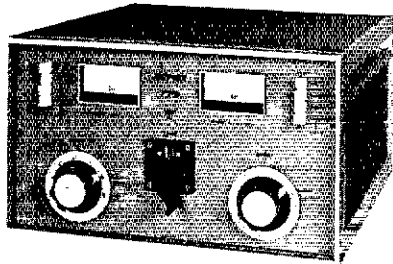
DX ANTENNAS FOR 160-10 METERS! Small size, broad-band, high performance. Also many antenna parts, Beverage insulators, wire and cable for do-it-yourself amateurs. Low prices, fast service. S.A.S.E. for catalog. W1FB, Oak Hills Research, P.O. B. 250, Luther, MI 49656.

CODECOPY program for IBM-PC and compatibles. Copies CW using simple interface through RS232 DSR line. \$15.00 postpaid includes interface plans and software. SASE for information. OPS SOFTWARE, POB 866414, Plano, TX 75086.

WANTED: HP-430 or HP-431 series microwave power meter with bolometer or thermocouple mount. Also need UHF/microwave relays. D. Lusia, 420 King Street, Apt. B-8, Bristol, CT 06010.

ETO ALPHA 77DX

If you want the finest



SPECIAL SALE - ALL ALPHAS

Model	List	Sale
77DX	\$5450	
78	\$3495	CALL
374A	\$2595	FOR
76A	\$1985	LATEST
76PA	\$2395	PRICE
76CA	\$2695	

Phone Don Payne, K4ID, for Brochure
Personal Phone - (615) 384-2224
P.O. Box 100
Springfield, Tenn. 37172

PAYNE RADIO

148 PAGES
100'S OF NEW
PRODUCTS



GET IT NOW!

More pages, more products-and it's hot off the press! Get the new 1986/7 DICK SMITH ELECTRONICS Catalog and find anything for the electronics enthusiast. The data section alone is worth the price of admission. Send for your copy today.

Please reserve my copy of the 1986 Dick Smith Catalog. I enclose \$1 to cover shipping.

Name

Address

City

Zip

DICK SMITH ELECTRONICS INC.
P.O. Box 2249 Redwood City CA 94063
EVERYTHING FOR THE ELECTRONICS ENTHUSIAST

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.

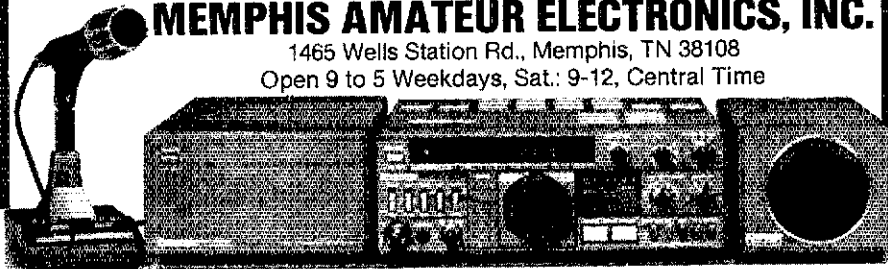
WE TRADE!

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



**STARVED ROCK RADIO CLUB — W9MKS
ONE DAY S.R.R.C. HAMFEST**

June 1, 1986

Bureau County Fairgrounds, Princeton, IL

— Same Place As Last Year —

Free Coffee & Doughnuts To Registrants 8 A.M.

Free Swap & Shop · Rental Tables Available, Inside Buildings
Watch for Big Yellow "HAMFEST" Signs. Come Early.

Visit A.R.R.L. Booth with

Ed Metzger, W9PRN, Director, Central Division
Howard Huntington, K9KM, Vice Director A.R.R.L.

The sale of food and/or beverages prohibited without the written, prior approval of the club.

Talk-In 147.121.72 · 146.071.67 · 146.52 Simplex

Registration · Before May 20 · \$2.50 WITH LARGE SASE, \$3.00 at Gate, 6/1/86

No Price Increase!!! Furnish Large SASE for Information, Map, etc.

To — STARVED ROCK RADIO CLUB · W9MKS, RFD #1, Box 171, Oglesby, IL 61348

MORE DETAILS IN MAY QST CONVENTION/HAMFEST CALENDAR

AFFILIATED WITH ARRL SINCE MARCH 15, 1934

Crystal Filters

For most Ham Rigs from:
KENWOOD · YAESU · HEATHKIT
Also DRAKE R-4C/7 Line, COLLINS 75S3-B/C,
and ICOM (FL44A Twin Only)

Finest 8-pole Construction
ALL POPULAR TYPES IN STOCK
CW · SSB · AM

Phone for Information or to Order.
VISA/IC or COD accepted.

FOX-TANGO Corp.

Box 15944, W. Palm Bch, FL 33418
Telephone: (305) 683-9587

WRITAPES: (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, MIC, Visa \$3.95 ea. PPD 1st class USA, Can. Printed texts add \$.50 per tape. Call anytime.
Instant Service

PH: 517-484-9794 WRITAPES
235 E. Jackson S-1 • Lansing, MI 48906

MULTI-BAND SLOPERS

ALSO: DIPOLES & LIMITED-SPACE ANTENNAS. Now enjoy multi-band BIG-SIGNAL reports! Automatic bandswitching! Very low SWR · Coax feed · 8kw power · Compact · FULLY ASSEMBLED to your specified center frequency each band · Easy to install · Very low profile · Complete instructions · Your personal check accepted

4-BAND SLOPER - 80, 80, 40, 20m.....	60 ft. long .. \$ 48 ppd	
3 ..	40 ft. .. \$ 35 ..	
2 ..	40 ft. .. \$ 35 ..	
1 ..	40 ft. .. \$ 35 ..	
NO-TRAP DIPOLE - 80, 80, 40m.....	13 ft. long .. \$ 71 ..	
2 ..	80, 40m.....	95 ft. .. \$ 55 ..
8-BAND SPACE-SAVER DIPOLE - 80 thru 10M* ..	40 ft. long .. \$ 85 ppd	

* Requires wide-range tuner (80, 40, 20, 15M without tuner)
SEND SASE for complete details of these and other unique antennas

WINN ANTENNAS 312-394-3414
BOX 393 Mt. PROSPECT, IL 60056

antennas

H. C. Van Valzah Co.

Downers Grove, IL 312/852-0472

TRAVEL-TENNA

MOBILE

\$15.95

- BNC connector.
- Magnet mount.
- Stranded coax

HUSTLER

The Travel-Tenna Family

Mobile-Tenna 17.95
PL259 17'
Stranded Coax
Handi-Tenna 19.75
Telescoping Whip
BNC or PL259
Duck Tenna 18.50
for rubber ducks SF-2
CGT-144

The Hustler Family

CGT-144 Colinear TLM 42.95
CG-144 Colinear 3/8-24 25.95
SF-2 5/8 w/ 3/8-24 14.95
SFMM 5/8 w/ 4" mag 29.95

2 METER ANTENNAS

VERTICALS

Base-Tenna 15.95
1/4 W Low SWR
AL-144 24.95
KLM Maximizer 1/4 W
Ringo AR-2 29.95
Half Wave
Ringo Ranger II 42.95
5/8 W over 1/2 W
2MCV Double Trombone 49.95
2MCV-5 Triple Trombone 59.95
Hustler G-6 9'-9" 90.95
Hustler G-7 15'-4" 129.95

AL-144

BEAMS

A147-4 4el., 44" boom 31.95
A147-11 11el., 144" boom 49.95
A147-22 22el., 2 booms 139.95
A144-7 SSB 7el., 98" boom 34.95
A144-11 SSB 11el., 144" 49.95
A214B 14el., 15' boom 73.95
32-19 19el., 13'-3" boom 89.95
42-18XL 18el., 28' boom 99.95
215WB 15el., 15' boom 79.95
230WB 30el., 2 15' booms 227.50

1-800-HAM 0073

H. C. Van Valzah Co.

1140 Hickory Trail
Downers Grove, IL 60515

Satisfaction Guaranteed

KENWOOD TM-211A 2 meter xcvr, mike, DCS, mobile mount, external speaker, manual. \$229. Heathkit active audio filter HD-1478, power cube, manual. \$53. Nye-Viking master key. \$15. KA7BMB, 602-298-4820

ROSS'S NEW SPECIALS (May only): Robot 1200C \$1195.90. Hy-Gain HG-525S (125-1) Tower \$1195.90. ICOM IC-45A \$279.90, IC-2AT \$197.90, IC-490A \$509.90, IC-751 \$1099.90. Kenwood TS-940S/WAT \$1699.90, R-1000 \$369.90, TR-3500A \$249.90, TM-2550A \$379.90, TS-430S \$638.50, TM-201A \$259.90, TR-9500 \$529.90, VFO-120 \$139.90, Yaesu FT-209RH & FT-8-4 \$294.90, FT-757GX \$Phone, FRG-7700 \$369.90, FRG-8800 \$479.90, FT-101DM \$269.90, SC-1 \$149.90, FT-720RH \$249.90. Over 7500 ham-related items, all major lines. Phone or send SASE for personal price quote. Mention ad. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. Floss Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

CODE SKILLS can be learned or improved using AI4J's two courses: Novice (0-10 W.P.M.) or Upgrade (10-22 W.P.M.). Upgrade course includes 10 V.E. - style exams. Used by individuals and clubs with proven results. Booklet and two C-120 cassettes provide nearly 4 hours of systematic practice. Send \$16.50 plus \$1.50 P.&H. (N.C. residents add .81 sales tax) to Gary J. Ambert, 209 Lewis St., Greenville, N.C. 27834. SASE for full details.

FOR SALE: Butternut HF3B Butterfly, \$125 with paid shipping. N1BOW, 7 Oakwood Road, Niantic, CT 06357 203-739-8456.

WANTED: Used Gin Pole for Rohn 25G, at a reasonable price. W8OZG, 418 Lake Forest, Vicksburg, MS 39180.

IC-2AT, BC-30, BP-385, CP-1, DC-1, HM-9, LC-2AT, all excellent. \$255 UPS. K1LEC, 802-886-8121.

MINT CONDITION Drake C-Line; T-4XC series 22689 R-4C series 20611 AC-4 Power Supply w/MS-4 Speaker W4 SWR/Wattmeter 2kW. All units with covers and R-4C has complete Short Wave Band and BC Crystals. Original Owner. Call 914-657-6534 or write WA2SRO via Callbox. Price \$750.

IBM-PC RTTY/CW. ComPRTy II is the complete RTTY/CW program for the IBM-PC and Compatibles. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in editor! 10,000 character transmitter/receiver buffers! Adjustable split screen display. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages. Now with WFRU (simple mailbox). Ideal for MARS and traffic handling. Requires 128K PC, XT, AT, PCjr, PC-DOS serial port, RS-232C TU, \$65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 7373 Jessica Drive, North Syracuse, NY 13212.

FOR SALE: Drake R4C with CW Filters, Sherwood CW Filter, crystals for 10 and 180. Excellent receiver. \$210. W1KM, 617-428-4205.

TAPR/TNC-1, with cabinet, checked out. \$145. W6KAW, 619-789-3667.

WANTED - AUTOMATIC Antenna Tuner IC-AT500, K6DL.

AMATEUR RADIO Stamps for collectors business for sale. I have large quantities of many world-wide stamps honoring Amateur Radio. Business includes all stamps and mailing list. Write for inventory list and price. Phil Sager, WB4FDT, 126 Whiting Lane, West Hartford, CT 06119, 203-233-4843.

5/8, 20-METER 500 WATT antenna really gets out. Hang anywhere, connect to your xcvr using 50 ohm coax, and you are ready to operate. \$39.95 includes shipping in the US. W1FEW, MDA Co., PO Box 701, Windham, NH 03087.

NOVICES and CW ops; Galaxy V, CW Filter, Sidetone, Break-In, Power Supply, Speaker, Mic, Spare Finals, \$150. W9KV, 706 N. Elmhurst, Mt. Prospect, IL 60056.

NEW, CURRENT Production Eimac 8877's \$500 each. Drake L-4B \$625. R4B/T4XB/AC-4/MS-4 \$375. C-4 console \$275. As new Henry 3K-A \$1175. Alan Gray, W3VL, 212 Penn Valley Terrace, Yardley, PA 19067.

FOR SALE: HAL CT2200/KB2100 RTTY Equip. Exc. cond. \$500. Call John, WB4QBO, 504-637-8422.

PC/MS-DOS Ham Software. \$22.50 for 35 programs on 3 disks. Rockford Systems, 7474 Hessler, Rockford, MI 49341.

TELETYPE, KSR-28, T.U. and Scope included. Spares. Best offer. WA8VFK, 513-324-3065.

SELL - INTECOLOR Model 8000 Computer complete with extras. 19 inch screen, two disk drives plus unused spare, EPROM Burn-In Box, hundreds of programs on disks and hard copy. Source editor and assembler, Basic Editor, Utilities all on ROM. Games. Asking \$1500. W2OKO, Mendelson, 27 Somerset, Murray Hill, NJ 07974, Phone 201-464-5244.

PHONE PATCH: Smart Patch Autopatch with connectors and instructions used minimally. New condition. \$240 or best offer. Harvey Fritz, 513-299-4945.

DRAKE-HEATH: TR4C, AC-4 \$250. R4C, T4XC, AC-4, MS-4, FL500 \$450. Heath SB-200 with 10 \$275. K2GJJ, 914-361-4609 evenings before 10:30.

ARGONAUT-615, 405-LINEAR, all \$625. U-ship, K4RV, Tom Sessions, 123 Pinebluff Dr., Warner Robins, GA 31088, 912-929-2030.

PC/MS-DOS Packet/RTTY Programs. Includes source code. \$14.50. Rockford Systems, 7474 Hessler, Rockford, MI 49341.

DRAKE TR-4C with RV-4C Remote VFO, Power-Supply. Extra set matches Finals. KD2CR, 609-468-2495, 300 Harvard Ave, Wenonah, NJ 08090.

SIGNAL ONE MilSpec 1030, high power option. AFSK, AM, CW Filters. Most of latest factory mods. Mint Condition. Specifications and condition guaranteed. Will ship worldwide. Lloyd Peterman, N9BBQ, 24410 78th Street, Salem, WI 53168, 414-843-3901.

WANTED: ICOM 22U in good working condition. Will buy or trade. Harvey Fritz, 513-299-4945.

ROSS'S USED May Specials: Kenwood TS-520SE \$409.90, TS-830S \$579.90, TS-180S/wDFC \$389.90, TS-700SP \$399.90, VOX3 \$29.90, TS-600 \$565.90 (New Demo). Yaesu FT-101E \$399.90, FT-620B/wCAL \$285.90, FR-101S & FL-101 \$399.90. ICOM IC-DV21 \$89.90, IC-730/FL30 \$469.90, IC-490A \$495.90. Phone or send SASE for used list. Over 200 used, 7,500 NEW ham items in stock. Mention ad. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. Floss Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

WANTED: IC-202 or IC-202S 2-meter SSB/CW portable. Must be in good condition. D. Lusia, 420 King Street, Apt. B-8, Bristol, CT 06010.

EXECUTIVE CUSTOM HOME nestled between the 8th Green and the #2 Fairway at Holiday Island, Arkansas on Table-Rock Lake — just 4 miles from Missouri. Built 1983. Living-dining area (custom oak cabinets with built-in stereo) 45 x 18, breakfast room, 3 bedrooms, 2 baths (jacuzzi). Large double garage, workshop, deck. Professional security system. Professionally landscaped. QTH Elevation 1540. Radio Room 15 x 17.56' Rohn Tower with Ringo Hanger; 2-11 Element KLM 2-Meter Antennas (Used as Dipole/peeler Station); 13 Element Horizontal 2M, Mini-quad 10-15-20M; Mor-Gain (80-10M) & Butternut HF6V Vertical. David Cathers, NV4H, 73 Holiday Island Drive, Holiday Island, AR 72832, 501-253-7091.

Jobs for Hams

WANTED for summer of 1986: Instructors in Electronics, Ham Radio, and Computers. Small boys' science camp in Pennsylvania. Apply: Donald Wacker, P.O. Box 356, Paupack, Pennsylvania 18451.

COUNSELOR - Ham Radio; H.S. Grad., College Student. Adult Children's camp; varied activities; professional atmosphere; 6/24-8/22 or any part thereof. Northeastern Pennsylvania 2 1/2 hours. NYC. Apply Camp Wayne, 570 Broadway, Lymbrook, NY 11563 516-599-4562.

CAMP COUNSELOR/RADIO INSTRUCTOR, nine summer weeks in New Hampshire. Top facilities for programs in DX, AM and Ham, long established activity, triplebeam tower, new rigs. Winter office c/o Dr. A. J. Stolz, 5 Lockwood Circle, Westport, CT 06880, 203-226-4389.

CAMP COUNSELOR in coed Vermont children's camp 6/25-8/24. General or higher class license. Practical kit building/troubleshooting experience. Some theory. Own rig best. Contact John Seeger, Bridgewater, CT 06752; tel: 203-354-5728.

STEP UP TO TELREX ANTENNAS ANTENNA SYSTEMS

TELREX antennas are the most reliable, most accurate, most durable, most efficient, most economical antenna systems available. They are built to last and are guaranteed for life. They are the only antennas that can be used for all bands from 160 meters to 10 meters. They are the only antennas that can be used for all modes of operation. They are the only antennas that can be used for all types of terrain. They are the only antennas that can be used for all types of weather. They are the only antennas that can be used for all types of interference. They are the only antennas that can be used for all types of noise. They are the only antennas that can be used for all types of fading. They are the only antennas that can be used for all types of distortion. They are the only antennas that can be used for all types of distortion. They are the only antennas that can be used for all types of distortion.



TIRED OF WIND DAMAGE ?

Protect your investment with a Telrex antenna. Telrex antennas are built to last and are guaranteed for life. They are the only antennas that can be used for all bands from 160 meters to 10 meters. They are the only antennas that can be used for all modes of operation. They are the only antennas that can be used for all types of terrain. They are the only antennas that can be used for all types of weather. They are the only antennas that can be used for all types of interference. They are the only antennas that can be used for all types of noise. They are the only antennas that can be used for all types of fading. They are the only antennas that can be used for all types of distortion. They are the only antennas that can be used for all types of distortion.

THE ARRL DXCC COUNTRIES LIST

- COMPLETE DXCC RULES
- SHOWS COUNTRIES WHERE CARDS MAY BE SENT THROUGH THE ARRL OUTGOING QSL BUREAU
- LISTS ITU AND CQ ZONES PLUS THE CONTINENT OF EACH COUNTRY
- CHECK-OFF BOXES FOR MIXED, PHONE, CW, RTTY, SATELLITE, AND FOR EACH BAND.

Now keep all of your DXCC records on this handy and complete 12 page form. Available postpaid for \$1.00 a copy.

Available from:
ARRL, 225 Main Street,
Newington, CT 06111

10 AMP REGULATED POWER SUPPLY

ON/OFF SWITCH • NICE METAL CASE
OVERLOAD PROTECTED
AUTOMATIC RESET
N.P.S. Inc. 1138 Boxwood Rd. Jenkintown, PA 19046

CES-DIALER - T.T. MIKE

KEY PAD MIKE \$68.00*
AUTO DIALER MIKE \$97.00* + UPS

WITH LED LIGHTED KEY PAD ADD \$10.00 (218)
N.P.S. Inc. 1138 Boxwood Rd. Jenkintown, PA 19046 884-6010

Some of the WORLD'S finest.

TB4EC 10, 15, 20 Mtr.	\$310.00
TB5ES 10, 15, 20 Mtr.	\$425.00
TB5EM 10, 15, 20 Mtr.	\$530.00
TB6EM 10, 15, 20 Mtr.	\$640.00
20M326 3 elem. 20 Mtr.	\$385.00
20M536 5 elem. 20 Mtr.	\$635.00
20M646 6 elem. 20 Mtr.	\$1075.00
15M532 5 elem. 15 Mtr.	\$510.00
15M845 8 elem. 15 Mtr.	\$1010.00
10M523 5 elem. 10 Mtr.	\$340.00
10M636 6 elem. 10 Mtr.	\$705.00
2MVS814, 2 Mtr. phased	\$269.00

Prices subject to change.

ATV VHF UHF KITS

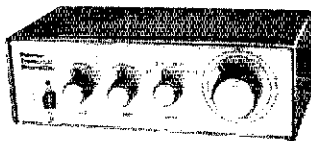
For 2m, 70cm, 23cm
High Quality Units from Wood & Douglas, England. Converters, Receivers, Transmitters, Amplifiers

Write for Catalogue

TACTICAL ELECTRONICS CORPORATION
P.O. Box 1743
Melbourne, Florida 32902

TELREX antennas are the most reliable, most accurate, most durable, most efficient, most economical antenna systems available. They are built to last and are guaranteed for life. They are the only antennas that can be used for all bands from 160 meters to 10 meters. They are the only antennas that can be used for all modes of operation. They are the only antennas that can be used for all types of terrain. They are the only antennas that can be used for all types of weather. They are the only antennas that can be used for all types of interference. They are the only antennas that can be used for all types of noise. They are the only antennas that can be used for all types of fading. They are the only antennas that can be used for all types of distortion. They are the only antennas that can be used for all types of distortion.

PREAMPLIFIER

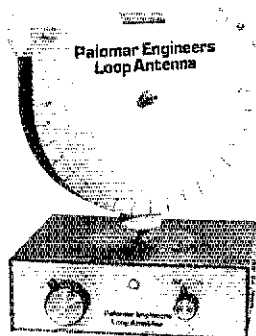


Can't hear the weak ones when conditions are bad? Receiver lacks sensitivity on 20, 15 or 10? Get the world famous Palomar pre-amplifier. Tunes from 160 to 6 meters. Gives 20 db extra gain and a low noise figure to bring out those weak signals. Reduces image and spurious responses too.

An RF sensing circuit bypasses the pre-amplifier during transmit. The bypass handles 350 watts.

Model P-410X (for 115-v AC) or Model P-412-X (for 12-v DC) \$149.95. Model P-408 (SWL receive only for 115-v AC) \$129.95. Add \$4 shipping/handling in U.S. & Canada. California residents add sales tax.

LOOP ANTENNA



Loops pick up far less noise than other antennas. And they can null out interference. Palomar brings you these features and more in a compact desktop package. The wideband amplifier with tuning control gives 20 db gain. Plug-in loops have exclusive tilt feature for deep nulls. Loops are available for 10-40 KHz, 40-150 KHz, 150-550 KHz, 550-1600 KHz and 1600-5000 KHz.

Model LA-1 Loop Amplifier \$84.95. Plug-in Loops (specify range) \$62.95 each. Add \$4 shipping/handling in U.S. and Canada. California residents add sales tax.



Send for FREE catalog that shows our complete line of noise bridges, SWR meters, pre-amplifiers, loop antennas, VLF converters, audio filters, baluns, RTTY equipment, toroids and more.

PALOMAR ENGINEERS

BOX 455, ESCONDIDO, CA 92025

Phone: (619) 747-3343

ADVERTISING DEPARTMENT STAFF

Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Deputy Adv. Mgr.
Lindy Messmer, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

Index of Advertisers

AEA: Advanced Electronic

Applications, Inc.: 4

ADN: Advanced Design Networks, Inc.: 108

AVC Innovations: 150

Advanced Computer Controls: 119

Advanced Receiver Research: 153

Alinco Electronics Corp.: 122

All Electronics: 106

Alpha Delta Communications: 138

Amateur Electronic Supply: 144, 146, 151, 167

Amateur Wholesale Electronics: 115, 148

American Radio Relay League: 95, 96, 98, 126, 128, 130, 132, 134, 135, 136, 156, 157, 158, 173

Ameritron: 149

Amp Supply Co.: 164

Amtech: 100

Archway Data Systems: 149

Associated Radio: 108

Atlanta Hamfestival: 166

Autek Research: 102

Autocode: 105

BCS Inc.: 149

Barker & Williamson: 152

Barry Electronics: 155

Bauman Sales Co.: 107

Bencher Inc.: 105

Buckmaster Publishing: 119, 136

Butternut Electronics Co.: 150

C-Comm: 110, 111

Certified Communications: 138

Colorado Comm Center: 107

Communication Concepts, Inc.: 107

Communications Electronics: 142

Communications Specialists: 123

Cotec: 155

Cubex Corp.: 101

Curtis Electro Devices: 155

Cushcraft Corp.: 5

DX Edge, The: 118

Daiwa USA Inc.: 101, 103, 105

Delaware Amateur Supply: 132

Dick Smith Electronics: 171

EGE Inc.: 116, 117

EEB/Antenna Bank: 97

Encomm Inc.: 147

Fox Tango Corp.: 172

GLB Electronics: 101

Glen Martin Engineering: 100

Listeners & Friends of Radio Peking: 153

Ham Radio Outlet: 92, 93, 94, 168

Ham Station, The: 138

Heaster Inc., H. L.: 103

Henry Radio Stores: Cov. II

Hustler Inc.: 104

ICOM America Inc.: 2, 124, 125, 127, 129, 131, 133

Jun's Electronics: 166

K2AW's Silicon Alley: 149

Kantronics: 99

LaCue Communications Inc.: 120

Larsen Electronics Inc.: 114

MFJ Enterprises Inc.: 160, 161

Madison Electronics Supply, Inc.: 109

Memphis Amateur Electronics Inc.: 172

Micro Control Specialties: 165

Microcraft Corp.: 106

Microlog Corp.: 140

Mirage/KLM: 154

Missouri Radio Center: 176

N.P.S. Inc.: 173

National Tower: 159

P.C. Electronics: 107

Palomar Engineers: 98, 174

Payne Radio: 171

Processor Concepts: 138

QSKY Publications: 102

rf Enterprises: 113

Radio Amateur Callbook: 169

Radio World: 98

Ross Distributing: 150

S-Com: 118

Silicon Solutions: 152

Space Electronics Corp.: 112

Spi-ro Mfg. Inc.: 103

Spider Antenna: 152

Starved Rock Radio Club: 172

TNT Radio Sales: 164, 165

Tactical Electronics Corp.: 173

Telex Communications: 136

Telrex Labs: 173

Texas Towers Inc.: 170, 175

Towtec Corp.: 119

Trio-Kenwood Communications:

Cov. IV, 1, 6, 7, 137, 139, 141, 143, 145

U.S. Tower Corp.: 98

U.P.I. Communications: 155

Unity Electronics: 153

Universal Amateur Radio: 108

Universal Radio Co.: 150

VHF Shop, The: 119

Van Gorden Engineering: 112

Van Valzah Co., H. C.: 172

Varian/Eimac Division: 10

W9INN Antennas: 172

Wacom Products: 119

Western Electronics: 118

Wheeler Applied Research: 153

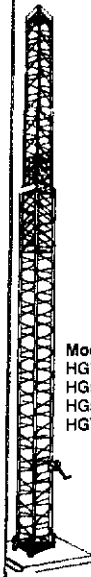
Williams Radio Sales: 106

Wohlers Insurance, Albert: 162, 163

Wrightapes: 172

Yaesu USA: Cov. III, 121

ANTENNA/TOWER SALE!

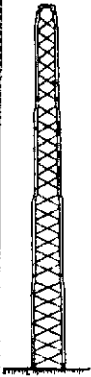


hy-gain CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid!
Check these features:
• All steel construction
• Hot dip galvanized after fabrication
• Complete with base and rotor plate
• Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG75SS	37 ft	9 sq ft	\$CALL
HG52SS	52 ft	9 sq ft	\$CALL
HG54HD	64 ft	16 sq ft	\$CALL
HG70HD	70 ft	16 sq ft	\$CALL

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



ROHN Self Supporting Towers On SALE!

FREIGHT PREPAID
• All Steel Construction—Rugged
• Galvanized Finish—Long Life
• Totally Free Standing—No Guy Wires
• America's Best Tower Buy—Compare Save \$
• Complete With Base and Rotor Plate
• In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HXB40	40 ft	10 sq ft	164	\$329
HXB48	48 ft	10 sq ft	303	\$429
HXB56	56 ft	10 sq ft	385	\$499
HDBX40	40 ft	18 sq ft	281	\$399
HDBX48	48 ft	18 sq ft	383	\$489

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN Guyed Tower Packages

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

You can save freight costs on optional thrust bearing & antenna mast by ordering with tower packages. See lower right for most prices. Packages shown 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	Model	Model	Model	Model	Model
25G	45G	55G	80'	849	1,479
40'	\$ 598	\$ 915	\$1,249	90'	309
50'	628	1,059	1,598	110'	988
60'	629	1,159	1,579	110'	1,186
70'	689	1,289	1,729	120'	1,249
				120'	2,179



MA-40
40' tubular
Regular \$745
SALE! \$549
MA-550
55' tubular



Will handle 10 sq. ft. antennas at 50 MPH winds.

regular \$1245
SALE! \$899
IN STOCK FOR IMMEDIATE DELIVERY
CALL FOR INFORMATION ON ALL OTHER MODELS

RG-213U

\$ 29/ft \$279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-BX

\$ 19/ft \$179/1000 ft

- RG-BX—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10 MHz	30 MHz	150 MHz	450 MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	50	8	1.2	3.5	5.8
RG-58/U	52	1.4	1.9	6.0	12.5
1/2" Alum	50	3	5	1.2	2.2
3/4" Heliax	50	2	4	9	1.6
1" Heliax	50	1	2	5	9

HARDLINE/HELIAXTM

Lowest Loss for VHF/UHF!

1/2" Alum. w/poly Jacket	\$.79/ft
1/2" LDF4-50 Andrew Heliax™	\$ 1.79/ft
1/2" LDF5-50 Andrew Heliax™	\$ 3.99/ft

select connectors below.

HARDLINE & HELIAXTM CONNECTORS

Cable Type	UHF	FML	UHF	MALEN	FML	MALE
1/2" Alum	\$19	\$19	\$19	\$25	\$25	\$25
1/2" Heliax™	\$25	\$25	\$25	\$25	\$25	\$25
3/4" Heliax™	\$49	\$49	\$49	\$49	\$49	\$49

AMPHENOL CONNECTORS

Silver PL259	\$1.25
UG218 N Male	\$2.95
UG230 N Female	\$2.95

Antenna Wire & Accessories

Solid Copper wire	12 ga. \$.12/ft	14 ga. \$.10/ft
Stranded Copper	14 ga. \$.10/ft	16 ga. \$.09/ft
Standed 14 ga.	\$.10/ft	16 ga. \$.09/ft
1/4 mile 18 ga copper-clad steel wire	\$30	
6 inch heavy-duty end insulator	\$3.00/ea.	
Dog-bone insulator	\$.79	
Coax seal	\$2.50	

Van Gorden

1-1 Balun	\$11
Center Insulator	\$6
Dipole Kits	D80 \$31/D40 \$28
Short Dipole Kits	SD80 \$35/SD40 \$33
All-band Dipole w/ladder line	\$29
G5RV all band antenna	\$49

ALPHA DELTA

DX-A 160-80-40 Sloper	\$49
-----------------------	------

CUSHCRAFT

A3 3-el Tribander Beam	\$209
A743 30/40 mtr Kit for the A3	\$75
A4 4-el Tribander Beam	\$269
A744 30/40mtr Kit for the A4	\$75
R3 20, 15, 10mtr Vertical	\$259
AV5 80-10mtr Vertical	\$99
D40 40mtr Dipole	\$149
40-2CD 2-el 40 mtr Beam	\$279
A50-5-5-el 6 mtr Beam	\$79
215 WB NEW 15-el 2 mtr Beam	\$75
4218 XL 18-el 2 mtr Beam	\$95
3219 19-el 2mtr Beam	\$89
220B 17-el 220MHz Beam	\$89
424B 24-el 432MHz Beam	\$75
AR2B 2mtr Vertical	\$39

hy-gain

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER-SPECIAL	
QK10 30/40 mtr. Add-On Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr vertical.	
14 AVQ 40-10 mtr vertical.	
18 AV1/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical.	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
28DQ 80/40 mtr Trap Dipole	
58DQ 80-10 mtr Trap Dipole	
BN8S 80-10 mtr KW Balun W/Coax Seal	

HUSTLER

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

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

Bumper Mounts - Springs - Folding Masts In Stock!

BUTTERNUT ELECTRONICS CO

HF6V \$129 Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Slub Tuned Radial Kit Model STR II \$29
- Optional Roof Mounting Kit Model RMK II \$49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 \$49

HF2V 80/40 Meter Vertical Antenna \$129

Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 \$49

HF4B "Butterfly" \$199. (del. cont. USA)

- Covers 10, 12, 15, 20M
- Compact Beam Design
- Max. Element Length of 12.5'
- Light Weight, Only 17 lbs.
- Use with TV Rotor

Free Shipping On Butternut Accessories Also When Purchased With Antenna

IKLM

KT34A 4-el Broad Band Triband Beam	\$399
KT34XA 6-el Broad Band Triband Beam	\$489
2m-14C 14-el 2-mtr Satellite Antenna	\$89
2m-16LBX NEW-16-el 2-mtr Beam	\$89
2m 22C NEW-22-el 2-mtr Satellite Antenna	\$119
432-30LBX NEW-30-el 432 MHz Antenna	\$99
435-18C 435 MHz Satellite Antenna W/CS-2	\$119
435-40CX 435 MHz Satellite Antenna W/CS-28159	

ROTORS

Alliance HD73 (10.7 sq ft rating)	\$119
Alliance U110 (3 sq ft rating)	\$49
Telex CD 45H (8.5 sq ft rating)	\$CALL
Telex HAM 4 (15 sq ft rating)	\$CALL
Telex Tailwister (20 sq ft rating)	\$CALL
Telex HDR3000 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 & #22 gal)

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

ROHN GUYED TOWERS

10 ft Stack Sections	
20G \$39.50	45G \$112.50
25G \$49.50	55G \$134.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Model	Height	Ant Load*	Price
Towers FK2548	48 ft	15.4 sq ft	\$899
FK2558	58 ft	13.3 sq ft	\$949
FK2568	68 ft	11.7 sq ft	\$999
FK4544	44 ft	34.8 sq ft	\$1199
FK4554	54 ft	29.1 sq ft	\$1299
FK4564	64 ft	28.4 sq ft	\$1399

25G Foldover Double Guy Kit... \$249
45G Foldover Double Guy Kit... \$269
*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.
All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	\$.15/ft
1/4 EHS Guywire (6650 lb rating)	\$.18/ft
5/16 EHS Guywire (11,200 lb rating)	\$.29/ft
5/32 x 7 Alrcraft 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 9EJ (1/2" x 9" Eye to Eye Turnbuckle)	\$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	\$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	\$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	\$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	\$16.95
3/16" Preformed Guy Grip	\$2.49
1/4" Preformed Guy Grip	\$2.99
8" Diam - 4 It 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 It 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)	\$7.95
9902LD Cable End (for 6700 cable)	\$8.95
Socketlast Potting Compound (does 6-8 ends)	\$14.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	\$29	\$49	\$59	\$79
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 - 5 pm
Sat: 9am - 1 pm

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

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

MISSOURI RADIO CENTER

1-800-821-7323

1021 NW Business Park Lane, Kansas City, MO 64115 • 816-241-0818

MasterCard — VISA — COD Welcome

AEA
ALINCO
AMERICAN
ASTRON
ICOM
KANTRONICS
QUATRON
YAESU


KENWOOD



TS940S "DX-celence"

- Programmable Scanning
- High Stability, Dual Digital VFO's
- 40 Channel Memory
- General Coverage Receiver

KENWOOD



TS430S "Digital DX-terty"

- Tuneable Notch Filter
- 250 Watts PEP on SSB
- General Coverage
- Mobile or Base

KENWOOD




TM2570 "ALL NEW"

- First 70 Watt FM Mobile
- First With Memory & Auto Dialer
- 23 Channel Memory
- Front Panel Programmable CTCSS

KENWOOD

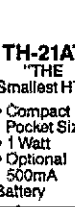
TR2600 "SPECIAL"

- 2.5 W/300 MW 2 Meter HT
- LCD Readout
- 10 Memories
- Band And Memory Scan




TH-21AT "THE Smallest HT"

- Compact Pocket Size
- 1 Watt
- Optional 500mA Battery




YAESU



FT-757GX "CAT SYSTEM"

- All Mode Transceiver
- Dual VFO's
- Full Break-in CW
- 100% Duty Cycle


YAESU



FT-2700R "Yaesu gets you there"

- Duo-Band Full Duplex
- 25 Watt
- 144/430 MHz

YAESU



FRG-9600

- 60 MHz-905 MHz Continuous
- 100 Memories
- Clock

YAESU



FT209RH "Powerful HT"

- 5 Watts
- 10 Memories
- LCD Readout
- Battery Saver


ICOM



IC-735 "NEW"

- HF Transceiver
- Ultra Compact Mobile
- Simplified Front Panel
- Continuously Adjustable output Power up to 100 Watts


ICOM



IC-751 "One Year Warranty"

- 100 KHz - 30 MHz
- FM Standard
- 32 Memories
- QSK (Nominal Speed 20 WPM)


ICOM



IC-27A "Call for Price"

- 25 Watts
- 32 PL Frequencies
- 9 Memories
- Scanning

ICOM

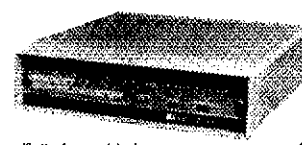


IC-2AT

- DTMF Pad
- 1.5 Watts
- Thumbwheel freq. selector

Kantronics


PACKET COMMUNICATOR



AEA PK-64


- MBA - TOR™
- AMTOR • Baudot
- ASCII • Morse
- 300 and 1200 Baud

ALINCO



ALR-206T "More For Your Money"


- Completely Programmable From Microphone
- 25 Watt



ALM-203

- 5 Watt
- Subaudible Tone
- 10 Memories
- Built-in "S" meter

ASTRON CORPORATION



Power Supply

• RS7A	.....	\$48
• RS12A	.....	\$68
• RS20A	.....	\$88
• RS20M	.....	\$105
• VS20M	.....	\$125
• RS35A	.....	\$133
• RS35M	.....	\$149
• VS35M	.....	\$165
• RS50A	.....	\$189
• RS50M	.....	\$215
• RM50A	.....	\$219
• VS50M	.....	\$229

"OUR ASSOCIATE STORE IN THE ST. LOUIS AREA"

Floyd Electronics

2213 Vandalla
Collinsville, IL 62234
618-345-6448

QUATRON

AM-6000G - \$109.00



- 4 Band Graphic Equalizer
- Power Output Adjust
- VU Meter
- Compressor Amplifier
- Condenser Microphone

"Adapt to Any Radio"

HUSTLER — HORGAIN — ISON — MOST ORDERS SHIPPED SAME DAY — JEL — KANTRONICS — KEN



Celebrate your buying decision with the money you've saved.

When it comes to getting maximum HF performance for your dollar, the choice is clear. Yaesu's FT-757GX.

Nowhere else will you find so many HF features packed into one compact, mobile-ready package. At a price that's got the competition baffled.

For starters, each 757 includes an electronic keyer, 600-Hz CW filter, AM and FM modes, AF speech processor. And a 25-kHz marker generator. All at no extra charge.

And working the DX has never been easier with dual VFOs, single-button VFO/memory swap for split-frequency operation, eight

memories, and push-button quick memory and band scan.

The 757 also lets you listen from 500 kHz to 30 MHz with its high-performance general coverage receiver. The transmitter covers 160 through 10 meters, including the new WARC bands, with 100 watts output on sideband, FM and CW.

CW buffs will enjoy the delights of full QSK operation. Plus the massive heatsink and duct-flow cooling system allow continuous RTTY operation for up to 30 minutes. Use the FP-757HD heavy-duty power supply option for continuous-duty applications.

And of course, there's the 757's highly attractive price. It's the

perfect way to get all the HF performance you desire, with money left over to apply toward other ham gear. Perhaps a power supply for base station use. An antenna or antenna tuner. Or whatever else makes your operation complete.

So ask your dealer today about Yaesu's FT-757GX. The most celebrated HF price/performer on the air.

YAESU

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

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

Prices and specifications subject to change without notice. Contact your yaesu dealer regarding MARS operation.

KENWOOD

...pacesetter in Amateur radio

Here Now!
220 MHz

220: Kenwood Style!

TM-3530A

The first comprehensive 220 MHz FM transceiver

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

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

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

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

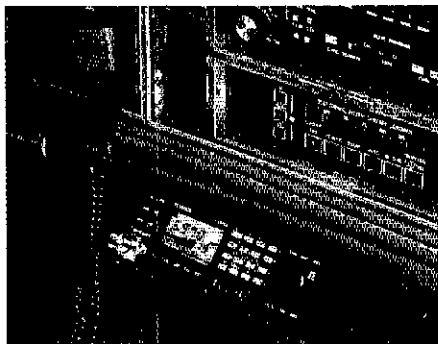
TH-31AT/31A

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

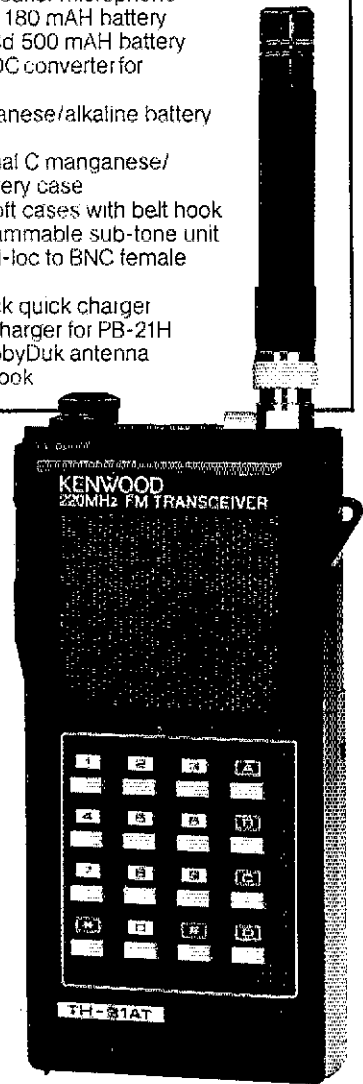
- 1 watt high, 150 mW low
- Super compact and lightweight (about 8 oz. with PB-21!)
- Frequency range 220-224.995 MHz in 5-kHz steps
- Repeater offset:—1.6 MHz, reverse, simplex
- **Supplied accessories:** rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery and wrist strap
- Quick change,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

TH-31AT/31A optional accessories:

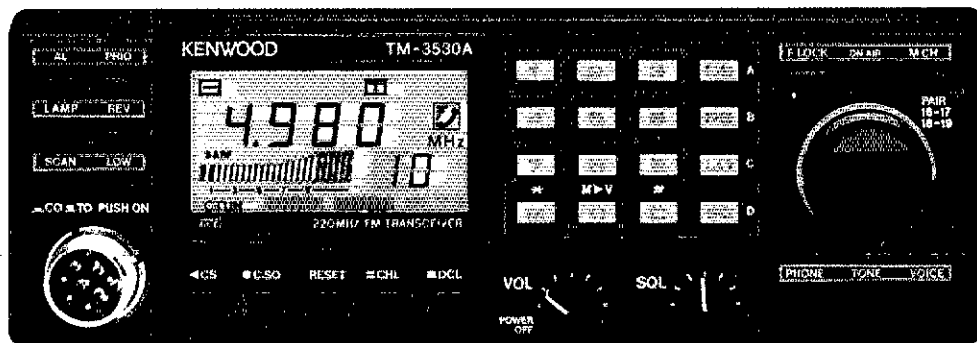
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 NiCd 180 mAH battery
- PB-21H NiCd 500 mAH battery
- DC-21 DC-DC converter for mobile use
- BT-2 manganese/alkaline battery case
- EB-2 external C manganese/alkaline battery case
- SC-8/8T soft cases with belt hook
- TU-6 programmable sub-tone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



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



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



TM-3530A optional accessories:

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

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

KENWOOD

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